Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019 for:

Dextra Steel Rebar Coupler Products

Dextra Steel Rebar Coupler Products including following brands – Bartec®/ Fortec®[1], Griptec®, and Rolltec® – and 50 products in total are included

from

Dextra Group

Dextra

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-09433
Publication date:	2023-06-30
Valid until:	2028-06-29

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

[1] Depending on the trademark registration in the considered country

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction products Version 1.11*
PCR review was conducted by: *Martin Erlandsson, from IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se*
Life Cycle Assessment (LCA)
LCA accountability: *Sijia YANG, from IVL Swedish Environmental Research Institute*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Daniel Böckin, from Miljogiraff AB.* Approved by: The International EPD® System
OR
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☐ EPD verification by accredited certification body Third-party verification: <*name, organisation*> is an approved certification body accountable for the third-party verification The certification body is accredited by: <*name of accreditation body & accreditation number, where applicable*>
OR

Independent third-party verification of the declaration and data, according to ISO 14025:2006 via:

☐ EPD verification by EPD Process Certification*

Internal auditor: *<name, organisation>*

Third-party verification: *<name, organisation>* is an approved certification body accountable for third-party verification

Third-party verifier is accredited by: *<name of accreditation body & accreditation number, where applicable>*

*For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see GPI.

Procedure for follow-up of data during EPD validity involves third party verifier:

☒ Yes ☐ No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:

Dextra group

Contact:

Tanyarade NATEWEERA (tanyarade@dextragroup.com)

Description of the organisation:

Dextra specializes in the design, manufacturing, and distribution of engineered construction solutions.

Dextra business lines include:

- Products for the reinforcement concrete, for both civil and nuclear applications,
- Engineered bar systems (tie bars, tension rods, post-tensioning bars)
- Rock and soil anchors used in various applications such as geotechnical works.

Overall, Dextra provides a complete solution, encompassing engineering, manufacturing, and product delivery, including specialized equipment like bar-end preparation machines.

With Dextra's affiliates, partners, after-sales service network, as well as our three manufacturing plants located in Thailand, India, and China, we can reach the necessary projects with the right level of efficiency and expertise. This extensive network enables Dextra to establish a substantial global presence.

As a result, we are proud to announce the successful completion of over fifteen thousand projects on a worldwide scale.

Dextra growth is constantly fueled by strong values which include stakeholders' satisfaction, agile creativity, transparent integrity, environmental and social responsibility, passion and commitment.

Product-related or management system-related certifications:

- ISO9001
- ISO19443
- ASME BPVC.III.NCA-3800
- ISO17025
- IAPMO – In-House Testing Lab
- Thailand Green Industry certificate
- ISO14001

Name and location of production site(s):

Dextra Manufacturing

191 Chalermprakiet Rama 9 Alley, 48 Alley,
Dokmai Sub-District, Prawet District,
Bangkok Metropolis, 10250
Thailand

Product information

Product name:

Steel Rebar Couplers

Product identification:

According to ISO 15835-1:2018, Coupler is a coupling sleeve or threaded coupler for mechanical splicing of reinforcing bars for the purpose of providing transfer of axial tension and/or compression from one bar to the other where

- coupling sleeve is a device fitting over the ends of two reinforcing bars;
- threaded coupler is a threaded device for joining reinforcing bars with matching threads

Product description:

Dextra rebar couplers are full performance mechanical splicing system designed for the connection of concrete reinforcing bars from Ø12 to 50 mm. This analysis covers the following Dextra rebar coupler range, for the connection of concrete reinforcing bars from Ø12 to 50 mm:

- Dextra Bartec®/Fortec®[1] (Depending on the trademark registration in the considered country), including:

  BF16, BF20, BF22, BF25, BF28, BF#10, BF32, BFR36, BFC36, BFC38, BFR40, BFC40
- Dextra Griptec®, including:

  G28, G32, G40, AG12, AG14, AG16, AG20N, AG25, AG26, AG30, AG32N, AG36, AG40N, AG50N
- Dextra Rolltec®, including:

  RS12, RS14, RS#5, RS16, RS18, RS19, RS20, RS#7, RS22, RS24, RS25, RS26, RS28, RS30, RS32, RS#10, RS34, RS35, RS36, RS38, RS40, RS43, RS50, RS57

UN CPC code:

The UN CPC code for Dextra rebar couplers is "42944", which is "Nails, tacks, staples (except staples in strips), screws, bolts, nuts, screw hooks, rivets, cotters, cotter-pins, washers and similar articles, of iron, steel, copper or aluminium". This UN CPC code corresponds to the HS code 3718.

Geographical scope:

The rebar couplers are manufactured in Thailand and sold to all the world.

LCA information

Declared unit:

1 kg of the steel rebar coupler product throughout its whole life cycle from cradle to grave.

Reference service life:

100 years.

The Dextra rebar couplers are used to connect steel bars in reinforced concrete construction. In this case, when properly installed and used, the product can have a service life of up to 100 years or until the demolishment of the building.

Time representativeness:

2022

Database(s) and LCA software used:

Gabi 10.7 (LCA for experts), Sphera database, Ecoinvent 3.8 database, Worldsteel database.

Description of system boundaries:

This study is a cradle-to-grave LCA, assessing the potential environmental impacts associated with the studied product. Detailly, according to the PCR and EN15804, this LCA analysis servers for a type (b) EPD which is from cradle to gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and A4-A5 and B1-B7), i.e., analysing the environment impacts from cradle to grave. An overview of the life cycle stages included in the LCA study is presented in the Table 2.1 according to the PCR and EN15804.

System diagram:

Modules	Life cycle stage	Key points	Included in the study (Yes/No)
A1-A3 Product Stage	A1 Raw material supply	A1 – raw material supply, including processing of secondary material input	Yes
	A2 Transport	A2 – transport of raw material and secondary material to the manufacturer	Yes
	A3 Manufacturing	A3 – manufacture of the construction products, and all upstream processes from cradle to gate	Yes
A4-A5 Construction Process Stage	A4 Transport	A4 – transport of construction products to the building site	Yes
	A5 Construction installation	A5 – the building installation/construction and associated waste	Yes
B Use Stage	B1 Use	B1 – use of the installed product, service or appliance	Yes
	B2 Maintenance	B2 – maintenance of the product	
	B3 Repair	B3 – repair of the product	
	B4 Replacement	B4 – replacement of the product	
	B5 Refurbishment	B5 – refurbishment of the construction product	
	B6 Operational energy use	B6 – operational energy	
	B7 Operational water use	B7 – operational water use	
C End of Life Stage	C1 Deconstruction, demolition	C1 – demolition of the building/building product	Yes
	C2 Transport	C2 – transport of the demolition waste comprising the end-of-life construction product to waste processing facility or to final disposal	Yes
	C3 Waste processing	C3 – waste processing operations for reuse, recovery or recycling	Yes
	C4 Disposal	C4 – final disposal of end-of-life construction product	Yes
D Benefits and Loads Beyond the System Boundary	D Reuse, recovery, recycling,	D – reuse/recovery/recycling potential evaluated as net impacts and benefits	Yes

More information

LCA practitioner

IVL Swedish Environmental Research Institute Beijing Office

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Juanjuan YAO, Project Manager, juanjuan.yao@ivl.se

Representative product:

The steel coupler products have three band i.e., Bartec®/Fortec®[1], Griptec®, and Rolltec®, while the production and the function of all 50 products included in these brands are quite similar so they are seen as the similar product to be analysed in a similar way. For Bartec®/Fortec®[1] brand, BF32 is the best seller of the series and it is also have a relatively complex production process, which is selected as the representative product of the Bartec®/Fortec®[1] brand. Similarly, AG40N is the representative product of Griptec® and RS43 the representative product of Rolltec®. The detailed data collection is conducted to the representative products, and they are the main analysed target in the LCA analysis.

Allocation:

Allocation rules for multifunctional products and multiproduct processes are mentioned in PCR. In this study, steel scrap is the co-product of the steel rebar coupler product. Thus, allocation between rebar coupler product and its co-product, steel scrap, has been conducted. Considering the big difference of the revenues of steel coupler product and steel scrap, the economic allocation of input, output as well as the corresponding environmental impacts of the studied system was allocated to the product and its co-product.

Meanwhile, normally it is hard to collect data corresponding to the functional/declared unit, especially for the input of energy and auxiliaries and the output of pollutants. In this case, allocation should be done according to physical relations (according to mass in most cases). Dextra has different production line to produce different kind of products. However, the production data (auxiliary materials and energy use) as well as emission data were collected at the plant level. In this case, mass allocation was applied to assign the correct burdens to the declared unit of product.

Cut-off rules:

The cut-off criteria established by the PCR is that data for elementary flows to and from the product system contributing to a minimum of 95% of the declared environmental impacts shall be included (not including processes that are explicitly outside the system boundary). This study strictly follows the cut-off rule and not cut any input material and energy data.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	Asia*	Asia to TH	TH	TH to GLO**	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Dextra purchases raw material mainly from Asia, especially from China. This study applied Chinese suppliers' information of Dextra.

**The product is sold to counties all over the world. In this study, to a conservative consideration, the longest distance from the manufacturing factory to the one of main oversea destination ports is considered as the representative shipping distance in A4, which is from Thailand to UK.

A1: The raw materials are supplied from the supplier to the Dextra.

A2: The transportation of the raw material and package material to the Dextra Thailand factory.

A3: The manufacturing of the steel rebar coupler products in the Dextra Thailand factory.

A4: The transportation of the steel rebar coupler products to the construction site. This stage contains the overseas shipping from Dextra Thailand factory to overseas.

A5: The construction of the steel rebar coupler products. The package will be wasted in the stage. During the construction, no product loss happens because the product is tailored to produce, and no auxiliary materials are used, also no waste or emissions generated here.

B1-B7: Depending on Dextra, the product does not consume energy or material during the use stage. Meanwhile, there is no environmental emissions during the use phase of this product.

C1: No energy and materials are consumed in the deconstruction stage. No wastes and emissions generated due to the product from the stage.

C2: The transportation of the waste product, to the recycling site and the landfill.

C3: The waste processing stage. No product waste is processed before the end-of-waste disposal.

C4: Waste steel rebar coupler products are sent to landfill as inert construction waste without waste processing.

D: Recycled waste steel rebar coupler products are assumed to be processed as steel scrap, which could generate credit and calculated in module D. Landfilled waste steel rebar coupler products are as inert construction waste, which is assumed that no benefits will be generated during the waste disposal.

Content information

Bartec®/Fortec®[1] BF32

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
S20C Steel	1	0%	0%,
TOTAL	1	0%	0%,
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Pine wood	0.08	8.0000%	
Steel	0.00	0.0769%	
PVC sticker	0.00	0.0009%	
PE	0.01	1.1667%	
PVC	0.02	1.8333%	
TOTAL	0.11	11.0778%	

Griptec® AG40N

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
ST52 Steel	1	0%	0%,
TOTAL	1	0%	0%,
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Pine wood	0.08	7.7228%	
Steel	0.00	0.0807%	
PVC sticker	0.00	0.0010%	
PE	0.00	0.3713%	
PVC	0.01	0.8416%	
TOTAL	0.09	9.0174%	

Rolltec® RS43

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
S45C Steel	1	0%	0%,
TOTAL	1	0%	0%,

Packaging materials	Weight, kg	Weight-% (versus the product)
Pine wood	0.06	6.2400%
Steel	0.00	0.0652%
PVC sticker	0.00	0.0008%
PE	0.00	0.3000%
PVC	0.01	0.6800%
TOTAL	0.07	7.2861%

There are no SVHC substances in the product.

Results of the environmental performance indicators

Bartec®/Fortec®[1] BF32

– also to represent the other products in the brand, including: BF16, BF20, BF22, BF25, BF28, BF#10, BF32, BFR36, BFC36, BFC38, BFR40, BFC40

The BF32 product - results per declared unit													
Mandatory impact category indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	2.71E+00	6.83E-02	3.92E-01	3.17E+00	1.16E-01	1.01E-01	0.00E+00	0.00E+00	9.45E-03	0.00E+00	2.25E-03	-1.47E+00
Global warming potential - biogenic (GWP-biogenic)	kg CO_2 eq.	-1.56E-01	0.00E+00	0.00E+00	-1.56E-01	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.48E-05	7.52E-04
Global warming potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	2.49E-03	1.93E-06	1.62E-03	4.12E-03	3.37E-06	6.74E-07	0.00E+00	0.00E+00	2.06E-07	0.00E+00	7.00E-06	-3.04E-05
Global warming potential - total (GWP-total)	kg CO_2 eq.	2.56E+00	7.03E-02	3.96E-01	3.02E+00	1.16E-01	2.74E-01	0.00E+00	0.00E+00	9.41E-03	0.00E+00	2.18E-03	-1.47E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	1.35E-07	1.39E-09	8.93E-09	1.45E-07	3.03E-09	2.30E-14	0.00E+00	0.00E+00	1.42E-15	0.00E+00	5.72E-15	-3.22E-15
Acidification potential, accumulated exceedance (AP)	mol H^+ eq.	1.20E-02	5.59E-04	3.45E-03	1.60E-02	1.87E-03	9.52E-05	0.00E+00	0.00E+00	1.19E-05	0.00E+00	1.60E-05	-3.16E-03
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	1.19E-03	7.07E-08	1.02E-05	1.20E-03	1.57E-07	4.06E-09	0.00E+00	0.00E+00	1.99E-09	0.00E+00	4.53E-09	-2.67E-07
Eutrophication potential - marine (EP-marine)	kg N eq.	2.85E-03	2.34E-04	5.41E-04	3.63E-03	7.93E-04	3.98E-05	0.00E+00	0.00E+00	4.53E-06	0.00E+00	4.13E-06	-5.56E-04
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	2.73E-02	2.57E-03	5.94E-03	3.58E-02	8.68E-03	5.03E-04	0.00E+00	0.00E+00	5.13E-05	0.00E+00	4.54E-05	-4.88E-03
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	1.20E-02	6.13E-04	1.67E-03	1.43E-02	2.12E-03	1.02E-04	0.00E+00	0.00E+00	1.12E-05	0.00E+00	1.25E-05	-2.26E-03
Abiotic depletion potential for non-fossil resources (ADPE)	kg Sb eq.	2.99E-05	1.47E-09	5.05E-07	3.05E-05	3.32E-09	2.33E-10	0.00E+00	0.00E+00	1.39E-10	0.00E+00	1.04E-10	-3.67E-06
Abiotic depletion for fossil resources potential (ADPF)	MJ	3.80E+01	9.41E-01	5.59E+00	4.46E+01	1.51E+00	7.36E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Water (user) deprivation potential (WDP)	m^3	1.27E+00	3.19E-04	2.04E-02	1.29E+00	2.74E-04	2.16E-02	0.00E+00	0.00E+00	1.17E-05	0.00E+00	2.47E-04	-2.74E-01
Additional mandatory environmental impact indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP-GHG)	kg CO_2 eq.	2.60E+00	6.75E-02	3.87E-01	3.06E+00	1.15E-01	1.01E-01	0.00E+00	0.00E+00	9.36E-03	0.00E+00	2.22E-03	-1.41E+00
Ressource use indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy as energy carrier (PERE)	MJ	5.00E+00	3.89E-03	1.87E+00	6.87E+00	1.45E-02	1.59E-02	0.00E+00	0.00E+00	7.28E-03	0.00E+00	4.88E-03	8.52E-01
Use of renewable primary energy resources used as raw materials (PERM)	MJ	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Total use of renewable primary energy (PERT)	MJ	5.00E+00	3.89E-03	1.87E+00	6.87E+00	1.45E-02	1.59E-02	0.00E+00	0.00E+00	7.28E-03	0.00E+00	4.88E-03	8.52E-01
Use of non renewable primary energy as energy carrier (PENRE)	MJ	3.81E+01	9.42E-01	5.59E+00	4.46E+01	1.52E+00	7.37E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Total use of non renewable primary energy resource (PENRT)	MJ	3.81E+01	9.42E-01	5.59E+00	4.46E+01	1.52E+00	7.37E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Use of secondary material (SM)	kg	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Use of renewable secondary fuels (RSF)	MJ	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Use of non-renewable secondary fuels (NRSF)	MJ	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Net use of fresh water (FW)	m^3	2.98E-02	8.35E-06	1.50E-03	3.13E-02	9.00E-06	5.08E-04	0.00E+00	0.00E+00	7.22E-07	0.00E+00	7.57E-06	-6.18E-03
Waste indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	2.07E-08	2.59E-13	3.21E-10	2.11E-08	1.06E-12	-5.29E-13	0.00E+00	0.00E+00	1.23E-14	0.00E+00	6.53E-13	-1.04E-10
Non-harzardous waste disposed (NHWD)	kg	9.12E-04	3.20E-05	2.84E-02	2.94E-02	1.93E-04	3.20E-03	0.00E+00	0.00E+00	9.26E-06	0.00E+00	1.50E-01	2.05E-01
Radioactive waste disposed (RWD)	kg	1.88E-05	2.80E-07	3.25E-06	2.24E-05	7.06E-07	2.35E-06	0.00E+00	0.00E+00	1.93E-07	0.00E+00	3.41E-07	1.68E-06
Output flow indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (CRU)	kg	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Materials for recycling (MFR)	kg	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	9.30E-01	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Materials for energy recovery (MER)	kg	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Exported electrical energy (EEE)	MJ	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Exported thermal energy (EET)	MJ	1.15E-90	0.00E+00	0.00E+00	2.15E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90

Griptec® AG40N

– also to represent the other products in the brand, including: G28, G32, G40, AG12, AG14, AG16, AG20N, AG25, AG26, AG30, AG32N, AG36, AG40N, AG50N

The AG40N product - results per declared unit													
Mandatory impact category indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	2.36E+00	4.65E-02	3.98E-01	2.81E+00	1.14E-01	5.93E-02	0.00E+00	0.00E+00	9.46E-03	0.00E+00	2.25E-03	-1.47E+00
Global warming potential - biogenic (GWP-biogenic)	kg CO_2 eq.	-1.52E-01	0.00E+00	0.00E+00	-1.52E-01	0.00E+00	1.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.48E-05	7.52E-04
Global warming potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	2.15E-03	1.31E-06	1.64E-03	3.79E-03	3.31E-06	4.50E-07	0.00E+00	0.00E+00	2.07E-07	0.00E+00	7.00E-06	-3.04E-05
Global warming potential - total (GWP-total)	kg CO_2 eq.	2.21E+00	4.76E-02	4.01E-01	2.66E+00	1.14E-01	2.26E-01	0.00E+00	0.00E+00	9.42E-03	0.00E+00	2.19E-03	-1.47E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	1.19E-07	1.16E-09	9.05E-09	1.30E-07	2.98E-09	1.77E-14	0.00E+00	0.00E+00	1.42E-15	0.00E+00	5.73E-15	-3.22E-15
Acidification potential, accumulated exceedance (AP)	mol H^+ eq.	1.05E-02	4.72E-04	3.50E-03	1.45E-02	1.84E-03	8.04E-05	0.00E+00	0.00E+00	1.19E-05	0.00E+00	1.60E-05	-3.16E-03
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	1.05E-03	5.79E-08	1.03E-05	1.06E-03	1.54E-07	2.93E-09	0.00E+00	0.00E+00	1.99E-09	0.00E+00	4.54E-09	-2.67E-07
Eutrophication potential - marine (EP-marine)	kg N eq.	2.50E-03	1.98E-04	5.49E-04	3.24E-03	7.78E-04	3.49E-05	0.00E+00	0.00E+00	4.54E-06	0.00E+00	4.13E-06	-5.56E-04
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	2.39E-02	2.18E-03	6.03E-03	3.21E-02	8.53E-03	4.31E-04	0.00E+00	0.00E+00	5.13E-05	0.00E+00	4.54E-05	-4.88E-03
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	1.05E-02	5.22E-04	1.69E-03	1.27E-02	2.08E-03	8.93E-05	0.00E+00	0.00E+00	1.12E-05	0.00E+00	1.25E-05	-2.26E-03
Abiotic depletion potential for non-fossil resources (ADPE)	kg Sb eq.	2.65E-05	1.16E-09	5.11E-07	2.70E-05	3.26E-09	1.83E-10	0.00E+00	0.00E+00	1.39E-10	0.00E+00	1.04E-10	-3.67E-06
Abiotic depletion for fossil resources potential (ADPF)	MJ	3.26E+01	6.34E-01	5.66E+00	3.89E+01	1.49E+00	5.89E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Water (user) deprivation potential (WDP)	m^3	1.12E+00	2.18E-04	2.07E-02	1.14E+00	2.69E-04	1.69E-02	0.00E+00	0.00E+00	1.18E-05	0.00E+00	2.47E-04	-2.74E-01
Additional mandatory environmental impact indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP-GHG)	kg CO_2 eq.	2.27E+00	4.59E-02	3.92E-01	2.70E+00	1.13E-01	5.92E-02	0.00E+00	0.00E+00	9.37E-03	0.00E+00	2.22E-03	-1.41E+00
Ressource use indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy as energy carrier (PERE)	MJ	4.47E+00	2.36E-03	1.89E+00	6.36E+00	1.43E-02	1.25E-02	0.00E+00	0.00E+00	7.29E-03	0.00E+00	4.89E-03	8.52E-01
Use of renewable primary energy resources used as raw materials (PERM)	MJ	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Total use of renewable primary energy (PERT)	MJ	4.47E+00	2.36E-03	1.89E+00	6.36E+00	1.43E-02	1.25E-02	0.00E+00	0.00E+00	7.29E-03	0.00E+00	4.89E-03	8.52E-01
Use of non renewable primary energy as energy carrier (PENRE)	MJ	3.27E+01	6.34E-01	5.67E+00	3.90E+01	1.49E+00	5.90E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Total use of non renewable primary energy resource (PENRT)	MJ	3.27E+01	6.34E-01	5.67E+00	3.90E+01	1.49E+00	5.90E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Use of secondary material (SM)	kg	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Use of renewable secondary fuels (RSF)	MJ	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Use of non-renewable secondary fuels (NRSF)	MJ	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Net use of fresh water (FW)	m^3	2.62E-02	5.66E-06	1.52E-03	2.77E-02	8.84E-06	3.98E-04	0.00E+00	0.00E+00	7.22E-07	0.00E+00	7.58E-06	-6.18E-03
Waste indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	9.51E-09	1.80E-13	3.25E-10	9.84E-09	1.04E-12	-3.34E-13	0.00E+00	0.00E+00	1.23E-14	0.00E+00	6.54E-13	-1.04E-10
Non-harzardous waste disposed (NHWD)	kg	4.13E-04	2.09E-05	2.88E-02	2.93E-02	1.89E-04	2.33E-03	0.00E+00	0.00E+00	9.27E-06	0.00E+00	1.50E-01	2.05E-01
Radioactive waste disposed (RWD)	kg	8.20E-06	1.77E-07	3.30E-06	1.17E-05	6.93E-07	1.87E-06	0.00E+00	0.00E+00	1.93E-07	0.00E+00	3.42E-07	1.68E-06
Output flow indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (CRU)	kg	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Materials for recycling (MFR)	kg	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	9.30E-01	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Materials for energy recovery (MER)	kg	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Exported electrical energy (EEE)	MJ	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Exported thermal energy (EET)	MJ	1.02E-90	0.00E+00	0.00E+00	2.02E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90

Rolltec® RS43

– also to represent the other products in the brand, including: RS12, RS14, RS#5, RS16, RS18, RS19, RS20, RS#7, RS22, RS24, RS25, RS26, RS28, RS30, RS32, RS#10, RS34, RS35, RS36, RS38, RS40, RS43, RS50, RS57

The RS43 product - results per declared unit													
Mandatory impact category indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	2.77E+00	5.38E-02	3.66E-01	3.19E+00	1.12E-01	4.78E-02	0.00E+00	0.00E+00	9.46E-03	0.00E+00	2.25E-03	-1.47E+00
Global warming potential - biogenic (GWP-biogenic)	kg CO_2 eq.	-1.18E-01	0.00E+00	0.00E+00	-1.18E-01	0.00E+00	1.35E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.48E-05	7.52E-04
Global warming potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	2.48E-03	1.48E-06	1.60E-03	4.09E-03	3.26E-06	3.63E-07	0.00E+00	0.00E+00	2.07E-07	0.00E+00	7.00E-06	-3.04E-05
Global warming potential - total (GWP-total)	kg CO_2 eq.	2.65E+00	5.51E-02	3.70E-01	3.08E+00	1.12E-01	1.83E-01	0.00E+00	0.00E+00	9.42E-03	0.00E+00	2.19E-03	-1.47E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	1.40E-07	1.10E-09	8.01E-09	1.49E-07	2.93E-09	1.43E-14	0.00E+00	0.00E+00	1.42E-15	0.00E+00	5.73E-15	-3.22E-15
Acidification potential, accumulated exceedance (AP)	mol H^+ eq.	1.23E-02	5.46E-04	3.35E-03	1.62E-02	1.81E-03	6.50E-05	0.00E+00	0.00E+00	1.19E-05	0.00E+00	1.60E-05	-3.16E-03
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	1.24E-03	5.61E-08	3.69E-06	1.24E-03	1.51E-07	2.36E-09	0.00E+00	0.00E+00	1.99E-09	0.00E+00	4.54E-09	-2.67E-07
Eutrophication potential - marine (EP-marine)	kg N eq.	2.92E-03	2.29E-04	5.17E-04	3.67E-03	7.66E-04	2.82E-05	0.00E+00	0.00E+00	4.54E-06	0.00E+00	4.13E-06	-5.56E-04
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	2.79E-02	2.52E-03	5.70E-03	3.61E-02	8.39E-03	3.48E-04	0.00E+00	0.00E+00	5.13E-05	0.00E+00	4.54E-05	-4.88E-03
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	1.23E-02	6.06E-04	1.58E-03	1.45E-02	2.05E-03	7.21E-05	0.00E+00	0.00E+00	1.12E-05	0.00E+00	1.25E-05	-2.26E-03
Abiotic depletion potential for non-fossil resources (ADPE)	kg Sb eq.	3.12E-05	1.16E-09	1.47E-07	3.13E-05	3.21E-09	1.47E-10	0.00E+00	0.00E+00	1.39E-10	0.00E+00	1.04E-10	-3.67E-06
Abiotic depletion for fossil resources potential (ADPF)	MJ	3.81E+01	7.32E-01	5.35E+00	4.41E+01	1.46E+00	4.76E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Water (user) deprivation potential (WDP)	m^3	1.32E+00	2.40E-04	1.27E-02	1.33E+00	2.65E-04	1.36E-02	0.00E+00	0.00E+00	1.18E-05	0.00E+00	2.47E-04	-2.74E-01
Additional mandatory environmental impact indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP-GHG)	kg CO_2 eq.	2.65E+00	5.31E-02	3.61E-01	3.07E+00	1.11E-01	4.78E-02	0.00E+00	0.00E+00	9.37E-03	0.00E+00	2.22E-03	-1.41E+00
Ressource use indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy as energy carrier (PERE)	MJ	4.41E+00	2.74E-03	1.85E+00	6.26E+00	1.41E-02	1.01E-02	0.00E+00	0.00E+00	7.29E-03	0.00E+00	4.89E-03	8.52E-01
Use of renewable primary energy resources used as raw materials (PERM)	MJ	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Total use of renewable primary energy (PERT)	MJ	4.41E+00	2.74E-03	1.85E+00	6.26E+00	1.41E-02	1.01E-02	0.00E+00	0.00E+00	7.29E-03	0.00E+00	4.89E-03	8.52E-01
Use of non renewable primary energy as energy carrier (PENRE)	MJ	3.81E+01	7.33E-01	5.35E+00	4.42E+01	1.46E+00	4.77E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Total use of non renewable primary energy resource (PENRT)	MJ	3.81E+01	7.33E-01	5.35E+00	4.42E+01	1.46E+00	4.77E-02	0.00E+00	0.00E+00	1.29E-01	0.00E+00	3.00E-02	-1.35E+01
Use of secondary material (SM)	kg	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Use of renewable secondary fuels (RSF)	MJ	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Use of non-renewable secondary fuels (NRSF)	MJ	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Net use of fresh water (FW)	m^3	3.07E-02	6.29E-06	1.32E-03	3.21E-02	8.69E-06	3.21E-04	0.00E+00	0.00E+00	7.22E-07	0.00E+00	7.58E-06	-6.18E-03
Waste indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed (HWD)	kg	7.69E-09	2.13E-13	3.19E-10	8.01E-09	1.02E-12	-2.70E-13	0.00E+00	0.00E+00	1.23E-14	0.00E+00	6.54E-13	-1.04E-10
Non-harzardous waste disposed (NHWD)	kg	3.34E-04	2.47E-05	1.18E-02	1.21E-02	1.86E-04	1.89E-03	0.00E+00	0.00E+00	9.27E-06	0.00E+00	1.50E-01	2.05E-01
Radioactive waste disposed (RWD)	kg	6.63E-06	2.09E-07	2.10E-06	8.93E-06	6.82E-07	1.51E-06	0.00E+00	0.00E+00	1.93E-07	0.00E+00	3.42E-07	1.68E-06
Output flow indicators	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use (CRU)	kg	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Materials for recycling (MFR)	kg	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	9.30E-01	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Materials for energy recovery (MER)	kg	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Exported electrical energy (EEE)	MJ	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90
Exported thermal energy (EET)	MJ	1.20E-90	0.00E+00	0.00E+00	2.20E-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-90

Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Information on biogenic carbon content

Bartec®/Fortec®[1] BF32

Results per declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.0470

Griptec® AG40N

Results per declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.0454

Rolltec® RS43

Results per declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.0367

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