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 include Bartec®/ Fortec®[1], Griptec®, and Rolltec® ranges, comprising a total of 50 products.

from

Dextra Group

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-09433
Publication date:	2023-06-30
Revision date:	2023-08-18 (Version 1.1)
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.

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® (Depending on the trademark registration in the considered country)
- Dextra Griptec®
- Dextra Rolltec®

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 7318.

Geographical scope:

The rebar couplers are produced in Thailand and distributed globally.

LCA information

Declared unit:

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

Reference service life:

100 years.

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, evaluating the potential environmental impacts associated with the studied products. Precisely, according to the PCR and EN15804, this LCA analysis serves to create a type (b) EPD, covering the life cycle stages from cradle to gate with options, including modules C1 to C4, module D and optional modules (A1 to A3 + C + D and A4 to A5 and B1 to B7), i.e. analysing the environment impacts from cradle to grave.

An overview of the life cycle stages incorporated in the LCA study is provided in the Table 2.1, following the criteria outlined in the PCR and EN 15804.

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 covered by this EPD include Bartec®/Fortec®[1], Griptec®, and Rolltec®. Given the close resemblance in production and function across all 50 products under these brands, they are considered as similar items and analysed accordingly. Among the Bartec®/Fortec®[1] series, BF32 emerges as the best-selling product, and due to its relatively intricate production process, it has been chosen as the representative product for the Bartec®/Fortec®[1] series. Likewise, AG40N has been chosen as the representative product for Griptec®, and RS43 for Rolltec®. The data collection has been carried out for these representative products, and they constitute the primary focus of the LCA analysis.

Allocation:

Allocation rules for multifunctional products and multiproduct processes are mentioned in PCR. In this study, the steel rebar coupler product generates steel scraps as a co-product. Thus, allocation between rebar coupler product and its co-product, steel scrap, has been carried out. Considering the significant disparity in revenues between the steel coupler product and steel scrap, the economic allocation of inputs, outputs, and the corresponding environmental impacts of the studied system has been attributed to both the product and its co-product.

Meanwhile, gathering data that corresponds to the functional or declared unit, particularly for the input of energy and auxiliary materials, and the output of pollutants, is often challenging. In this case, allocation should rely on physical relations, predominantly based on mass. Dextra operates distinct production lines to manufacture various product types. Despite this diversity, production data encompassing auxiliary materials, energy consumption, and emission data have been consolidated at the plant level. To this end, mass allocation has been employed to appropriately distribute the associated burdens to the declared unit of the product.

Cut-off rules:

According to the cut-off criteria established by the PCR, data concerning elementary flows entering and exiting the product system, which collectively contribute to a minimum of 95% of the declared environmental impacts, must be included (with exclusion of processes explicitly situated outside the system boundary). This study strictly adheres to the cut-off rule, retaining all input material and energy data without any omissions.

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. This study applied Chinese suppliers' information of Dextra.

**The product is sold to countries 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: Raw materials supplied from the supplier to Dextra.

A2: Transportation of raw materials and packaging materials to Dextra's Thailand factory.

A3: Manufacturing of steel rebar coupler products at Dextra's Thailand factory.

A4: Transportation of steel rebar coupler products to the construction site, including overseas shipping from Dextra's Thailand factory.

A5: Construction of steel rebar coupler products, resulting in packaging waste generation. No product loss occurs during construction since the products are tailored for production, and no auxiliary materials are used. Consequently, no waste or emissions are generated from the product.

B1-B7: Use stage. The product does not consume energy or materials during use, and there are no environmental emissions during this phase.

C1: Deconstruction demolition stage. No energy or materials are consumed during the deconstruction stage, and no waste or emissions are generated from the product.

C2: Transportation of waste products to recycling sites and landfills.

C3: Waste processing stage. No product waste undergoes processing before final disposal.

C4: Disposal stage. Wastes of steel rebar coupler products is disposed of in landfills as inert construction waste without undergoing processing.

D: Resource recovery stage. Recycled waste from steel rebar coupler products are assumed to undergo processing as steel scrap, potentially generating credits that are calculated in module D. Landfilled waste steel rebar coupler products are treated as inert construction waste, and it is assumed that no benefits are generated during the waste disposal process.

Content information

Bartec®/Fortec®[1]

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®

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®

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%

The product does not contain any SVHC substances.

Results of the environmental performance indicators

Bartec®/Fortec®[1]

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®

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

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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 should be used cautiously due to the high uncertainties associated with these findings or the limited experience with the indicator.

GWP-GHG: This indicator encompasses all greenhouse gases considered in GWP-total, except for biogenic carbon dioxide uptake and emissions, and biogenic carbon stored in the product. Therefore, this indicator closely resembles the GWP indicator originally outlined in EN 15804:2012+A1:2013.

Information on biogenic carbon content

Bartec®/Fortec®[1]

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®

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®

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

References

- General Programme Instructions of the International EPD® System. Version 3.01.
- PCR Construction, PCR 2019:14, Version 1.11, Valid until 2023-07-31.
- The International EPD system, https://www.environdec.com
- ISO (2006a). ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
- ISO (2006b). ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework.
- ISO (2006c). ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines.
- Gabi database. GaBi LCA Databases 2022 Edition.
- Gabi LCA software. The Gabi LCA software and corresponding database are provided by Sphera in Leinfelden-Echterdingen, Germany. Gabi version 10.7 was used.
- LCA database published by the ecoinvent association originally known as the ecoinvent Centre, the Swiss Centre for Life Cycle Inventories. Since June 2013 ecoinvent is a not-for-profit association founded by institutes of the ETH Domain and the Swiss Federal Offices. The version 3.8 was used.
- Sphera. The provider of the Gabi LCA software and database.
- Dextra products promotional documents (2022).
- Dextra technical files (2022).
- Dextra 2022 energy uses data (2022).
- Dextra 2022 transportation record data (2022).
- Dextra waste record (2022).
- Dextra emission monitoring report (2022).

Differences Versus Previous Versions

2023-06-30 Version 1

2023-08-18 Version 1.1

Editorial change: *Updated company's logo on cover page and header. Corrected spelling errors. Clarified unclear sentences.*

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