Environmental Product Declaration

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

from

TerraRoc

Programme:	The International EPD® System, www.environdec.com
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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

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): CONSTRUCTION PRODUCTS, 2019:14, version 1.1
PCR review was conducted by: The Technical Committee of the International EPD® System
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Andreas Ciroth, GreenDelta GmbH Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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.

About TerraRoc

TerraRoc is the market leader in geotechnical drilling consumables and we operate globally from Europe to North America to Asia. From specializing in casing advancement systems, down-the-hole hammers and core drilling, TerraRoc's strong R&D, thorough planning and exacting quality control enable us to deliver a full range of drilling tools and consumables.

The production facility connected to this EPD is based in Tampere in Finland. The target market for customers is mainly northern Europe but sales are made all over the globe.

Product-related or management system-related certifications: ISO 9001, 14001 and 45001.

Ring bits and ring bit sets

Casing advancement systems, or drilled casings, are today's preferred method for drilling in difficult ground conditions, for example, where there are boulders or loose formations. The Casing Advancement System is a drilling method where casing and drilling occurs at the same time. Installing the casing when you are drilling minimizes the hole collapsing risk and enables contractors to perform their work faster with higher quality. The system adds value whether the mission is to install foundation, support elements or simply case the hole in collapsing formation. The ring bit set is the part that goes on top of the drill and varies in size from 76 mm to 1219 mm in diameter.

LCA information

LCA information

Functional unit / declared unit: 1 kg
Reference service life: Not applicable
Time representativeness: The time representativeness of all the primary data usen in this study is of the year 2019
Database(s) and LCA software used: OpenLCA was used as software with Ecoinvent 3.7.1 database with the cut-off system model
Description of system boundaries:
Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D)

Content information for 1 kg of product

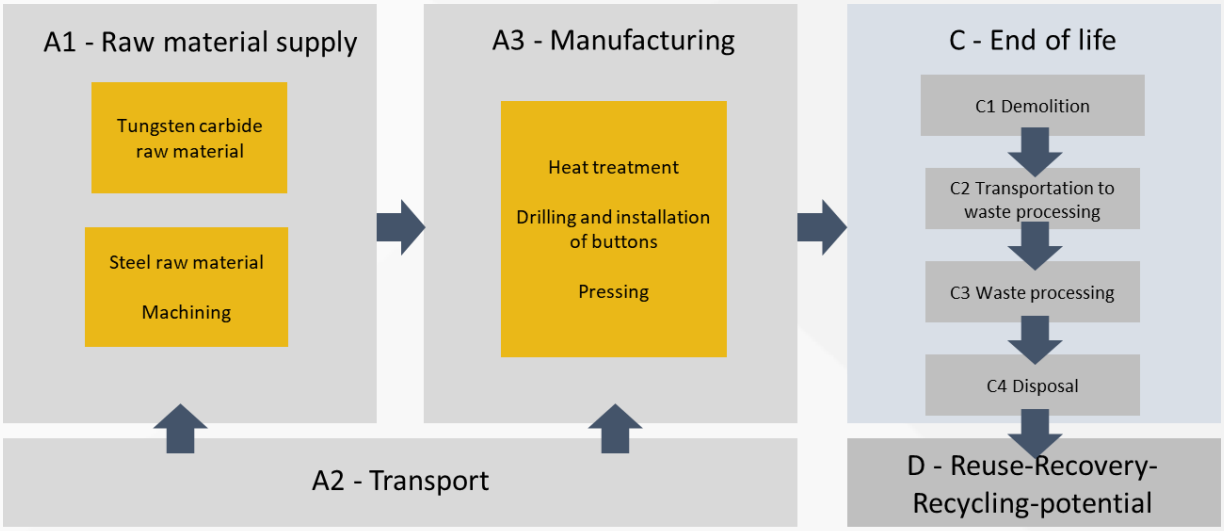
Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Tungsten carbide	0,015	0%	0%
Steel	0,985	37%	0%

Packaging materials	Weight, kg	Weight-% (versus the product)
Wood	0.069 kg	6.9%
Steel	0.0009 kg	0.09%
Cardboard	0.0064 kg	0.64%
Stuffing paper	0.0014 kg	0.14%
TOTAL	0.0777 kg	7.77%

Product variations: Ring bit and ring bit sets models V, W, T, SE, C and N
HS code: 820713 - Tools, interchangeable; rock drilling or earth boring tools, with working part of cermets, whether or not power operated

The product does not include any dangerous substances from the candidate list of SVHC for Authorisation.

System model



Modules declared

X=declared, MND=Module not declared

	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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	FI	-	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

Environmental Information

Environmental impacts of 1 kg ring bit sets

Indicator	Unit	Tot. A1-A3	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	4,40E+00	0,00E+00	3,48E-03	4,67E-03	3,59E-04	-2,80E-02
GWP-fossil	kg CO_2 eq.	4,40E+00	0.00E+00	3,47E-03	1,91E-03	3,54E-06	-2,87E-02
GWP-biogenic	kg CO_2 eq.	-5,08E-02	0.00E+00	8,35E-06	7,67E-03	9,87E-09	1,27E-01
GWP-luluc	kg CO_2 eq.	1,07E-02	0.00E+00	1,16E-06	2,76E-07	1,18E-09	-1,39E-04
GWP-total	kg CO_2 eq.	4,36E+00	0.00E+00	3,48E-03	9,57E-03	3,55E-06	9,85E-02
ODP	kg CFC 11 eq.	2,89E-07	0.00E+00	7,97E-10	4,09E-10	1,18E-12	-3,60E-09
AP	mol H^+ eq.	3,59E-02	0.00E+00	2,35E-05	1,92E-05	2,94E-08	-1,64E-04
EP-freshwater	kg PO_4^{3-} eq.	1,68E-02	0.00E+00	4.12E-06	9,16E-08	3,51E-10	-1,20E-05
EP-freshwater	kg P eq	3,75E-03	0.00E+00	2,34E-07	3,26E-08	2,09E-07	-1,21E-05
EP-marine	kg N eq.	8,87E-03	0.00E+00	9,28E-06	1,06E-05	1,04E-08	-4,55E-05
EP-terrestrial	mol N eq.	1,15E-01	0.00E+00	1,02E-04	9,02E-05	1,14E-07	-4,73E-04
POCP	kg NMVOC eq.	2,00E-02	0.00E+00	2,79E-05	2,59E-05	3,27E-08	-1,68E-04
ADP-minerals&metals*	kg Sb eq.	1,63E-04	0.00E+00	1,25E-08	1,64E-09	9,63E-12	-2,24E-07
ADP-fossil*	MJ	5,98E+01	0.00E+00	5,30E-02	2,68E-02	8,12E-05	-4,75E-01
WDP	m^3	3,09E+00	0.00E+00	2,31E-04	2,68E-04	2,95E-06	-2,31E-02

Acronyms: GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

** 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.*

[1] 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 equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Resource use for 1 kg ring bit sets

Indicator	Unit	Tot.A1-A3	C1	C2	C3	C4	D
PERE	MJ	6,86E+00	0.00E+00	7,10E-04	8,61E-05	6,37E-05	-1,60E+00
PERM	MJ	1,44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8,30E+00	0.00E+00	7,10E-04	8,61E-05	6,37E-05	-1,60E+00
PENRE	MJ	5,36E+01	0.00E+00	5,30E-02	4,61E-03	2,28E-03	-4,68E-01
PENRM	MJ.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5,36E+01	0.00E+00	5,30E-02	4,61E-03	2,28E-03	-4,68E-01
SM	kg	0.37E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2,79E+00	0.00E+00	0.00E+00	2,31E-04	2,02E-04	1,64E-04

Acronyms:PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Waste production and output flows for 1 kg ring bit sets

Indicator	Unit	Tot.A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	9,06E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	1,07E+00	0.00E+00	0.00E+00	0.00E+00	1,53E-01	-1,53E-01
Radioactive waste disposed	kg	4,93E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1,19E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7,14E-02	0.00E+00
Material for recycling	kg	1,07E+00	0.00E+00	0.00E+00	0.00E+00	2,76E-03	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.40E-03	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Acronyms: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Material for recycling; MER = Materials for energy recovery; EE = Exported energy

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.0384

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

Contacts

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References

- General Programme Instructions of the International EPD® System. Version 3.01.
- Product category rules (PCR): CONSTRUCTION PRODUCTS, 2019:14, version 1.1
- EN 15804:2012+A2:2019, Sustainability of construction works – Environmental product declarations – Core rules for product category of construction products
- ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
- ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines
- ISO 14025:2006: Environmental labels and declarations-Type III Environmental Declarations, Principles and procedures.
- ISO 14020:2000: Environmental labels and declarations — General principles.