ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

Pipes for non-pressure underground drainage and sewage

Krah Pipes OÜ

EPD HUB, HUB-0168
Publishing date 03 November 2022, last updated date 03 November 2022, valid until 03 November 2027

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Krah Pipes OÜ
Address	Gaasi tee 11, Rae, Estonia
Contact details	info@krah-pipes.ee
Website	http://krah-pipes.ee

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4 and D
EPD author	Jarmo Nisuma
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	E.A, as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	Pipes for non-pressure underground drainage and sewage
Additional labels	-
Product reference	VW, PR34-PR110, SPR34-SPR110, OP90-OP110, SOP90-SOP110
Place of production	Krah Pipes OÜ (Estonia)
Period for data	2021
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	-7,5%, +6,4%

ENVIRONMENTAL DATA SUMMARY

Declared unit	1kg of pipe
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO2e)	2.68
GWP-total, A1-A3 (kgCO2e)	2.65
Secondary material, inputs (%)	9.0
Secondary material, outputs (%)	70.0
Total energy use, A1-A3 (kWh)	9.64
Total water use, A1-A3 (m3e)	0.00654

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Krah Pipes OÜ was established at the end of 2009. The company specializes in large diameter plastic pipe production. Krah piping systems are permanent solutions that last through generations, are cost-effective and have wide range of applications, for example: drain, storm drain and sewer systems as well as sea outfall, manholes, pumping stations and reservoirs.

To meet the requirements of the infrastructure systems, Krah has developed the most robust and advantageous large bore-pipe systems. The main properties of plastic pipes are light weight, weldability, flexibility, good chemical, abrasion, impact, deformation, and UV-resistance. In addition, all our pipes are 100% recyclable and waste materials can be led back into the production cycle.

We offer design solutions in which products are designed according to installation conditions. Such a design approach provides optimal pipe parameters and price for our customers.

PRODUCT DESCRIPTION

The advanced production technology for large diameter thermoplastic pipes developed by German company Krah AG allows to produce the widest selection of pipe products. We offer a wide range of thermoplastic pipes in different diameters and stiffness classes. The length of produced pipes is up to 6 meters, and it is possible to produce them with or without socket connection. Products are made of PE and PP.

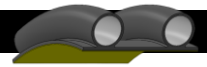
Our products have a bright coloured inspection friendly inner layer and UV-resistant outer surface. Using Krah technology, we can produce pipes with smooth inner and structured outside profile, also smooth inner and smooth outside layer with structured wall inside the profile, multi-profiles etc. It is also possible to use different pipe profiles along one pipe length.

Wide selection of different profiles creates a possibility to produce strong but lightweight pipes using less material. Using optimal amount of material is more cost-effective, than in standard pipe production.

VW PROFILE

This profile type is a homogeneous solid wall pipe with smooth inside and outside surfaces. Pipes can be used for internal working pressure.

PR PROFILE



The main properties of this profile type are the smooth inside and the profiled outside surface. The low weight and the high stiffness parameters are significant. The fields of application for this kind of profiles are pipeline systems like sewer, drain, storm drain and ventilation.

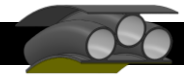
SPR PROFILE

This profile pipe has a smooth inside and outside surface including internal profile with one layer. This profile has a very high long-term stiffness therefore it is very suitable for extremely high loads and big diameters. This profile type is better suited to produce manholes, as the soil can be compacted better with the smooth outside surface of the pipe.

OP PROFILE

This profile has a smooth inside surface and the outside surface is profiled with an Olympic-rings-like pattern. The main characteristics of this profile are also its low weight and very high stiffness.

SOP PROFILE



This profile pipe has a smooth inside and outside including internal profiles with two layers. This profile has a very high long-term stiffness therefore it is very suitable for extremely high loads and big diameters.

Further information can be found at http://krah-pipes.ee/

PRODUCT RAW MATERIAL MAIN COMPOSITION VP

Raw material category	Amount, mass- %	Material origin
Metals	-	
Minerals	-	
Fossil materials	100	68% EU, 32% non-EU
Bio-based materials	-	

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate	
Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	0.009

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1kg of pipe
Mass per declared unit	1 kg
Functional unit	-
Reference service life	100 years

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission. Additional transportation is considered in A2.

Krah pipes are produced in an extrusion process, where a profile is wounded around a collapsible steel mandrel using high density polyethylene. This unique solution makes it possible to use different materials on different layers.

Beside the extensive pipe range that can be produced, the main features of the machine are a high production output, simple operation and short change-over times.

Gravimetric dosing system assures that parameters given to the production line are fulfilled precisely. This assures that product coming from the production line meets all requirements.

Different stages of manufacturing are:
*Raw material conveying, dosing and mixing
*Extrusion process
*Marking with thermal ink-jet printer
*Cooling with air
*Cutting and finishing the pipe
*Quality control by an automated station
*Manual inspection and final quality acceptance
*Packaging and dispatch

For packing wooden pallets are used to support the pipes when loading them into trucks.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The average transport distance from Krah Pipes factory to a construction site is assumed to be 580km. Products are delivered by trucks and ferry. There are no product or packaging losses during the transportation. Installation accounts for the treatment of packaging waste. Empty returns are not taken into account as it is assumed that return trips are managed by transportation company.
The installation scenarios are based on TEPPFA's (The European Plastic Pipe and Fittings Association) industry averaged EPDs. These documents and their background reports include industry consensus estimates of the resource use, emissions and affluents of typical European installations, including the size of installation trenches, machinery used for digging/excavation, volume of backfilling sand required for the installation, etc.

PRODUCT USE AND MAINTENANCE (B1-B7)

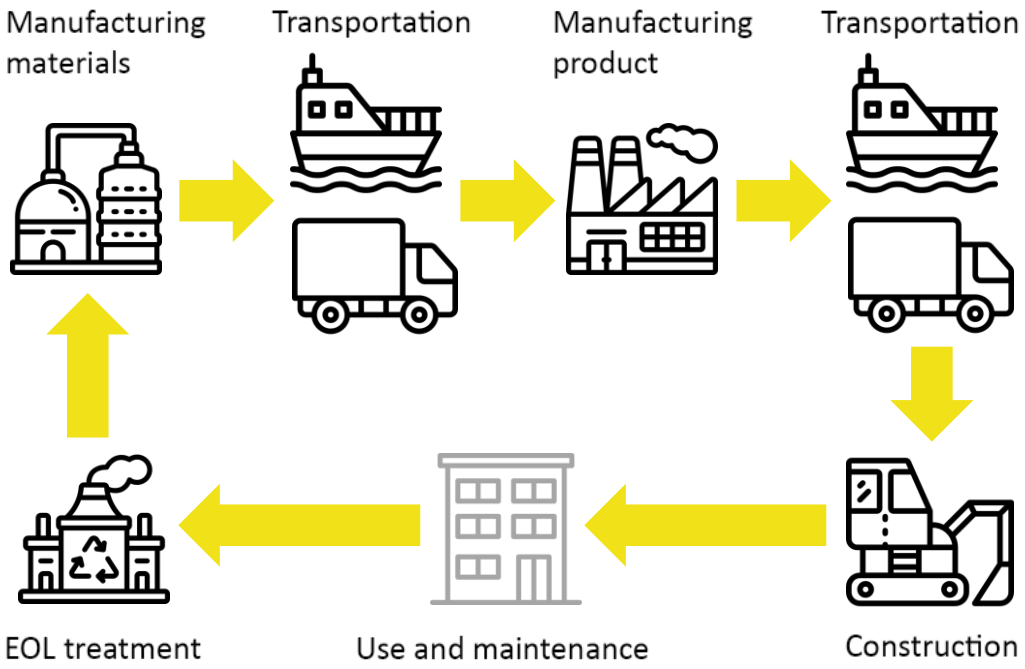
This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Since the consumption of energy and natural resources is negligible for disassembling the end-of-life product, the impacts of demolition are assumed to be zero (C1) (TEPPFA). It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed to have the same weight as the declared product. After ca 100 years of service life (TEPPFA) all end-of-life product is assumed to be collected from the demolition site. Transportation distance to the closest waste-handling facility is estimated to be 50 kms and the transportation method is assumed to be by trucks (C2). It is assumed that 70% of the end-of-life product is recycled (C3), 20% is incinerated (C3) and 10% is landfilled (C4). Due to the recycling and incineration potential of polyethylene/polypropylene, the end-of-life product is converted into recycled material, while energy and heat are produced from its incineration (D) (Eriksson, O & Finnveden, G. 2017). The benefits and loads of waste packaging materials in A5 are also considered in module D.

MANUFACTURING PROCESS

PRODUCT LIFE-CYCLE PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	Allocated by mass or volume
Ancillary materials	Not applicable
Manufacturing energy and waste	No allocation

AVERAGES AND VARIABILITY VP-026

Type of average	Multiple products
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	-7,5%, +6,4%

All averaging is calculated as weighted averages based on actual distribution between materials in 2021.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	2,03E0	7,6E-2	5,33E-1	2,64E0	1,12E-1	5,48E-1	MND	MND	MND	MND	MND	MND	MND	0E0	8,34E-3	8,62E-1	1,48E-2	-1,19E0
GWP – fossil	kg CO_2e	2,02E0	7,59E-2	5,78E-1	2,67E0	1,13E-1	5,48E-1	MND	MND	MND	MND	MND	MND	MND	0E0	8,33E-3	8,63E-1	1,48E-2	-1,26E0
GWP – biogenic	kg CO_2e	1,01E-2	3,8E-5	-4,56E-2	-3,55E-2	4,51E-5	1,61E-4	MND	MND	MND	MND	MND	MND	MND	0E0	4,45E-6	-1,07E-3	1,14E-5	6,26E-2
GWP – LULUC	kg CO_2e	6,11E-4	2,79E-5	4,19E-4	1,06E-3	4,55E-5	2,36E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,96E-6	1,51E-4	5,67E-7	-1,99E-4
Ozone depletion pot.	kg CFC_{-11}e	5,06E-8	1,72E-8	9,54E-8	1,63E-7	2,52E-8	1,01E-7	MND	MND	MND	MND	MND	MND	MND	0E0	1,89E-9	1,93E-8	3,28E-10	-6,21E-8
Acidification potential	mol H^+e	7,25E-3	4,41E-4	4,2E-3	1,19E-2	1,05E-3	4,45E-3	MND	MND	MND	MND	MND	MND	MND	0E0	3,4E-5	8,2E-4	9,24E-6	-6,76E-3
EP-freshwater[2)]	kg Pe	3,44E-5	6,15E-7	6,9E-6	4,19E-5	8,64E-7	7,69E-6	MND	MND	MND	MND	MND	MND	MND	0E0	6,97E-8	4,36E-6	1,99E-8	-1,28E-5
EP-marine	kg Ne	1,27E-3	1,24E-4	6,48E-4	2,04E-3	2,79E-4	1,71E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,01E-5	2,42E-4	5,65E-6	-9,58E-4
EP-terrestrial	mol Ne	1,4E-2	1,37E-3	6,83E-3	2,22E-2	3,09E-3	1,89E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,12E-4	2,64E-3	3,4E-5	-1,07E-2
POCP ("smog")[3)]	kg NMVOCe	6,72E-3	4,02E-4	2,15E-3	9,27E-3	8,58E-4	5,3E-3	MND	MND	MND	MND	MND	MND	MND	0E0	3,42E-5	8,23E-4	1,3E-5	-4,75E-3
ADP-minerals & metals[4)]	kg Sbe	1,81E-5	1,91E-6	1,27E-6	2,13E-5	2,65E-6	1,55E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2,25E-7	3,26E-6	1,14E-8	-6,22E-6
ADP-fossil resources	MJ	7,07E1	1,14E0	8,02E0	7,99E1	1,66E0	8,13E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,26E-1	2,59E0	2,51E-2	-4,28E1
Water use[5)]	m^3e depr.	1,37E0	3,62E-3	3,56E-2	1,41E0	5,01E-3	1,81E0	MND	MND	MND	MND	MND	MND	MND	0E0	4,05E-4	5,56E-2	1,11E-3	-7,81E-1

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	1,16E0	1,55E-2	9,97E-1	2,18E0	2,14E-2	1,93E-1	MND	MND	MND	MND	MND	MND	MND	0E0	1,77E-3	1,26E-1	4,44E-4	-1,13E0
Renew. PER as material	MJ	0E0	0E0	4,65E-1	4,65E-1	0E0	4,65E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,16E0	1,55E-2	1,46E0	2,64E0	2,14E-2	1,98E-1	MND	MND	MND	MND	MND	MND	MND	0E0	1,77E-3	1,26E-1	4,44E-4	-1,13E0
Non-re. PER as energy	MJ	2,32E1	1,14E0	8,02E0	3,24E1	1,66E0	7,65E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,26E-1	2,59E0	2,51E-2	-1,41E1
Non-re. PER as material	MJ	4,75E1	0E0	0E0	4,75E1	0E0	4,76E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-9,56E0	0E0	-2,87E1
Total use of non-re. PER	MJ	7,07E1	1,14E0	8,02E0	7,99E1	1,66E0	8,13E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,26E-1	-6,97E0	2,51E-2	-4,28E1
Secondary materials	kg	4,29E-3	0E0	0E0	4,29E-3	0E0	1,09E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	5,97E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	5,19E-3	1,92E-4	1,14E-3	6,52E-3	2,63E-4	4,13E-2	MND	MND	MND	MND	MND	MND	MND	0E0	2,15E-5	9,05E-4	2,81E-5	-2,09E-3

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	4,53E-2	1,15E-3	1,05E-2	5,69E-2	1,71E-3	1,58E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,28E-4	0E0	4,58E-5	-2,16E-2
Non-hazardous waste	kg	1,52E0	7,88E-2	2,47E-1	1,85E0	1,01E-1	4,1E-1	MND	MND	MND	MND	MND	MND	MND	0E0	8,76E-3	0E0	1E-1	-2,76E-1
Radioactive waste	kg	3,85E-5	7,8E-6	4,51E-5	9,14E-5	1,14E-5	4,68E-5	MND	MND	MND	MND	MND	MND	MND	0E0	8,61E-7	0E0	1,5E-7	-2,95E-5

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	7E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	2,89E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	2E-1	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	3,25E0	0E0	0E0

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,86E0	7,53E-2	5,66E-1	2,5E0	1,12E-1	5,39E-1	MND	MND	MND	MND	MND	MND	MND	0E0	8,26E-3	8,57E-1	1,05E-2	-1,15E0
Ozone depletion Pot.	kg CFC_{-11}e	4,97E-8	1,37E-8	7,8E-8	1,41E-7	2,01E-8	8,09E-8	MND	MND	MND	MND	MND	MND	MND	0E0	1,51E-9	1,61E-8	2,61E-10	-5,17E-8
Acidification	kg SO_2e	6,1E-3	2,62E-4	3,52E-3	9,88E-3	7,18E-4	1,24E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,67E-5	5,21E-4	9,99E-6	-5,88E-3
Eutrophication	kg PO_4^3e	1,46E-3	4,28E-5	4,31E-4	1,94E-3	9,81E-5	3,27E-4	MND	MND	MND	MND	MND	MND	MND	0E0	3,43E-6	5,84E-4	5,22E-4	-2,87E-4
POCP (“smog”)	kg C_2H_4e	5,83E-4	1,25E-5	1,5E-4	7,45E-4	2,59E-5	1,09E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1,1E-6	4,5E-5	2,18E-6	-4,26E-4
ADP-elements	kg Sbe	1,81E-5	1,91E-6	1,27E-6	2,13E-5	2,65E-6	1,55E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2,25E-7	3,26E-6	1,14E-8	-6,22E-6
ADP-fossil	MJ	7,07E1	1,14E0	8,02E0	7,99E1	1,66E0	8,13E0	MND	MND	MND	MND	MND	MND	MND	0E0	1,26E-1	2,59E0	2,51E-2	-4,28E1

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Elma Avdyli, as an authorized verifier acting for EPD Hub Limited
03.11.2022

VERIFIED ISO 14025