

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

HPE B02



HYPEX BIO

The Norwegian EPD Foundation

Owner of the declaration:

Hypex Bio Norge AS

Product:

HPE B02

Declared unit:

1 kg

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR and NPCR 024 Explosives and Initiation Systems, ver. 2.0
NPCR 024 version 1.0 Explosives and Initiation Systems

Program operator:

The Norwegian EPD Foundation

Declaration number:

NEPD-6956-6347-EN

Registration number:

NEPD-6956-6347-EN

Issue date: 24.06.2024

Valid to: 24.06.2029

ver-030724

EPD software:

LCAno EPD generator ID: 271333

General information

Product

HPE B02

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
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Declaration number:

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NPCR 024 Explosives and Initiation Systems, ver. 2.0
NPCR 024 version 1.0 Explosives and Initiation Systems

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Declared unit:

1 kg HPE B02

Declared unit with option:

A1,A2,A3,A4,A5

Functional unit:**Verification:**

Independent verification of the declaration and data, according to ISO14025:2010

Third party verifier:

Børge Heggen Johansen, Energiråd AS, Energiråd AS

(no signature required)

Owner of the declaration:

Hypex Bio Norge AS
Contact person: Tim Hunt
Phone: 9926 4774
e-mail: Tim.hunt@hypexbio.com

Manufacturer:

Hypex Bio Norge AS

Place of production:

Hypex Bio Norge AS
Glåmveien 8
2500 Tynset, Norway

Management system:**Organisation no:**

927 168 103

Issue date:

24.06.2024

Valid to:

24.06.2029

Year of study:

2023

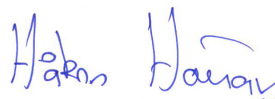
Comparability:

EPD of construction products may not be comparable if they do not comply with EN 15804 and seen in a building context.

The EPD has been worked out by:

Mie Vold, LCA.no AS

Inger Johanne Brodal Dahl

Approved:

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Hypex Bio B02 is a bulk emulsion explosive for use in civil blasting applications. HPE B02 is compatible with all types of civil surface and underground blasting operations.

HPE B02 is a highly viscous, white emulsion, containing a hydrogen peroxide-based component, an oil type fuel phase component, and a sensitizing component. The sensitizing component is added immediately prior to charging the emulsion into the drill hole, converting the emulsion into an explosive.

Product specification

Hypex Bio is a nitrate free emulsion explosive

Materials	Value	Unit
Hydrogen Peroxide	0,47	kg
Water	0,47	kg
Mineral oil	0,05	kg

Technical data:

The Hypex Bio technology and product have been developed and extensively tested by a competent team based in Stockholm Sweden. Testing has been done in partnership with strong mining, chemical and production partners. The first Hypex emulsion products are fully CE certified, transport regulation (UN/ADR) approved with patents pending.

The Hypex emulsion may be pumped and charged using similar or identical procedures used for AN based emulsions (i.e bulk loading using a charging hose with chemical, delayed, in-situ sensitization) in identical or very similar drill patterns commonly used in the underground or surface extractive industries.

Similarly to the status-quo, Hypex emulsion is fully waterproof and is not an explosive until sensitization is achieved. This can be achieved either by mechanical addition of microballoons or by chemical sensitization. This allows for a wide array of in situ (in-hole) densities and sensitivity ranges.

Production can be done in a cold emulsification process, functional down to +5 °C, and does not exhibit any crystallization issues.

The emulsion is stable in moderate temperatures for significant time periods and is comparable, or better, to AN based emulsions in detonation speeds, fragmentation and texture.

Metric	Hypex Bio	Reference AANE
Density	1.16 [g/cm ³] (unsensitized)	1,4 [g/cm ³] (unsensitized)
Velocity of detonation	3800-5500 [m/s]	4300-5800 [m/s]
Gas volume	1186 [dm ³ /kg]	1064 [dm ³ /Kg]
Min. drill hole diameter	28 [mm]	30 [mm]
Detonation energy	3,51 [Mj/Kg]	3,2 [Mj/Kg]
Oxygen balance	-0,48 [%]	-3,9 [%]
Detonation pressure	7,12 [GPa]	6,85 [GPa]
Detonation temperature	1936 [K]	2273 [K]
Operating temperature	-15 to +30 [°C]	+10 to +50 [°C]
Storage temperature	-10 to +30 [°C]	+10 to +60 [°C]
Maximum sleep time	10 [Days]	90 [Days]
Recommended primer	20 gram PETN/RDX	20 gram PETN/RDX

Market:

Norway

Reference service life, product

Not relevant

Reference service life, building or construction works

Not relevant

LCA: Calculation rules

Declared unit:

1 kg HPE B02

Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Data quality:

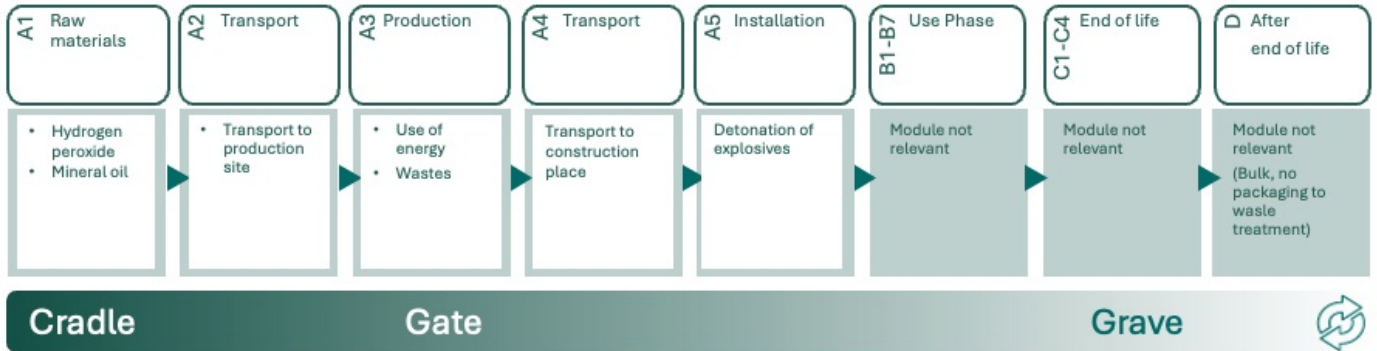
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

Materials	Source	Data quality	Year
Chemical	S-P-11034	EPD	2023
Mineral oil	ecoinvent 3.6	Database	2019

System boundaries (X=included, MND=module not declared, MNR=module not relevant)

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

System boundary:



Additional technical information:














LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck (tank) (per kgkm)	53,3 %	200	0,023	l/tkm	4,60
Assembly (A5)	Unit	Value			
Carbon dioxide, CO2 (kg)	kg/DU	0,12			
Carbon monoxide, CO to air (kg)	kg/DU	0,00			
Carbon, C (kg)	kg/DU	0,00			
Methane, CH4 (kg)	kg/DU	0,00			
Nitrogen oxides, NOx (kg)	kg/DU	0,00			
Nitrogen, N2 (kg)	kg/DU	0,00			
Sodium Carbonate, Na2CO3 (kg)	kg/DU	0,00			
Water (vapor), H2O (kg)	kg/DU	0,78			

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact							
Indicator	Unit	A1	A2	A3	A4	A5	
 GWP-total	kg CO ₂ -eq	5,22E-01	4,75E-02	2,75E-03	1,82E-02	1,22E-01	
 GWP-fossil	kg CO ₂ -eq	5,21E-01	4,75E-02	2,66E-03	1,82E-02	1,22E-01	
 GWP-biogenic	kg CO ₂ -eq	1,01E-03	1,96E-05	7,90E-05	7,46E-06	0,00E+00	
 GWP-luluc	kg CO ₂ -eq	1,05E-04	1,39E-05	1,17E-05	5,31E-06	0,00E+00	
 ODP	kg CFC11 -eq	8,48E-08	1,10E-08	1,77E-10	4,20E-09	0,00E+00	
 AP	mol H+ -eq	1,50E-03	1,96E-04	1,07E-05	7,64E-05	0,00E+00	
 EP-FreshWater	kg P -eq	7,84E-05	3,64E-07	1,14E-07	1,39E-07	0,00E+00	
 EP-Marine	kg N -eq	2,38E-04	5,77E-05	1,86E-06	2,30E-05	0,00E+00	
 EP-Terrestrial	mol N -eq	2,37E-03	6,39E-04	2,33E-05	2,54E-04	0,00E+00	
 POCP	kg NMVOC -eq	8,30E-04	2,08E-04	6,11E-06	8,17E-05	1,71E-04	
 ADP-minerals&metals ¹	kg Sb-eq	5,80E-07	8,15E-07	6,68E-08	3,10E-07	0,00E+00	
 ADP-fossil ¹	MJ	1,12E+01	7,42E-01	3,70E-02	2,83E-01	0,00E+00	
 WDP ¹	m ³	2,86E-01	5,69E-01	6,86E+00	2,17E-01	0,00E+00	







GWP-total = Global Warming Potential total; 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

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Remarks to environmental impacts











Additional environmental impact indicators							
Indicator	Unit	A1	A2	A3	A4	A5	
 PM	Disease incidence	8,19E-10	4,20E-09	9,90E-11	1,60E-09	0,00E+00	
 IRP ²	kgBq U235 -eq	1,03E-02	3,24E-03	7,08E-04	1,24E-03	0,00E+00	
 ETP-fw ¹	CTUe	1,03E+00	5,43E-01	6,46E-02	2,07E-01	8,56E-05	
 HTP-c ¹	CTUh	7,00E-12	0,00E+00	4,00E-12	0,00E+00	0,00E+00	
 HTP-nc ¹	CTUh	2,30E-10	5,25E-10	6,70E-11	2,00E-10	4,05E-09	
 SQP ¹	dimensionless	2,68E-01	8,51E-01	1,74E-02	3,24E-01	0,00E+00	

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed




1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Resource use								
Indicator	Unit	A1	A2	A3	A4	A5		
 PERE	MJ	1,44E+00	9,34E-03	5,09E-01	3,56E-03	0,00E+00		
 PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00		
 PERT	MJ	1,44E+00	9,34E-03	5,09E-01	3,56E-03	0,00E+00		
 PENRE	MJ	9,21E+00	7,42E-01	3,71E-02	2,83E-01	0,00E+00		
 PENRM	MJ	2,04E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00		
 PENRT	MJ	1,12E+01	7,42E-01	3,71E-02	2,83E-01	0,00E+00		
 SM	kg	1,03E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00		
 RSF	MJ	1,19E-04	3,27E-04	3,98E-04	1,24E-04	0,00E+00		
 NRSF	MJ	4,49E-04	1,09E-03	1,05E-03	4,17E-04	0,00E+00		
 FW	m ³	-2,45E-02	8,45E-05	3,80E-03	3,22E-05	0,00E+00		

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 resources; SM = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"






*INA Indicator Not Assessed

End of life - Waste							
Indicator		Unit	A1	A2	A3	A4	A5
	HWD	kg	4,50E-03	4,06E-05	7,00E-06	1,55E-05	0,00E+00
	NHWD	kg	1,15E-03	6,45E-02	2,92E-03	2,46E-02	0,00E+00
	RWD	kg	2,53E-05	5,07E-06	3,46E-07	1,93E-06	0,00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

*Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3} = 0,009$

*INA Indicator Not Assessed

End of life - Output flow							
Indicator		Unit	A1	A2	A3	A4	A5
	CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	9,85E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MER	kg	1,24E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EEE	MJ	4,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EET	MJ	6,51E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

*Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3} = 0,009$

*INA Indicator Not Assessed

Biogenic Carbon Content		
Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	0,00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂

Additional requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Electricity mix	Source	Amount	Unit
Electricity mix, Norway	ecoinvent 3.6	21,18	g CO ₂ -eq/kWh

Dangerous substances

The product contains no substances given by the REACH Candidate list.

Indoor environment

Additional Environmental Information






Additional environmental impact indicators required in NPCR Part A for construction products						
Indicator	Unit	A1	A2	A3	A4	A5
GWPIOBC	kg CO ₂ -eq	5,21E-01	4,75E-02	3,09E-03	1,82E-02	1,22E-01

GWPIOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Bibliography

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 EN 15804:2012+A2:2019 Environmental product declaration - Core rules for the product category of construction products.
 ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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 NPCR Part B 024 Explosives and Initiation Systems, ver. 2.0, 2021, EPD Norway.

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