



**epd-norge.no**  
The Norwegian EPD Foundation

# ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:	Orica Norway AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-1844-791-EN
Registration number:	NEPD-1844-791-EN
ECO Platform reference number:	
Issue date:	26.08.2019
Valid to:	26.08.2024

## Non-electric initiation system Exel™

Orica Norway AS



[www.epd-norge.no](http://www.epd-norge.no)



## General information

### Product:

Exel™ - Non-electric initiation system:  
Exel™ Connectadet™, Exel™ Connectadet™ SL, Exel™  
Handidet™, Exel™ LP, Exel™ MS, Exel™ Starter

### Program operator:

The Norwegian EPD Foundation  
Postboks 5250 Majorstuen, 0303 Oslo  
Phone: +47 977 22 020  
e-mail: [post@epd-norge.no](mailto:post@epd-norge.no)

### Declaration number:

NEPD-1844-791-EN

### ECO Platform reference number:

### Owner of the declaration:

Orica Norway AS  
Contact person: Johan Røneid  
Phone: +47 32 22 91 00  
e-mail: [johan.roeneid@orica.com](mailto:johan.roeneid@orica.com)

### Manufacturer:

Orica Norway AS

### Place of production:

Gyttorp, Sweden

### Management system:

ISO 9001

### This declaration is based on Product Category Rules:

CEN Standard EN 15804 serves as core PCR  
NPCR 024 version 1.0 Explosives and Initiation Systems  
(03/2016)

### 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 ea (detonator) manufactured, installed and used product

### Declared unit with option:

A1-A3, A4, A5

### Functional unit:

### Organisation no:

981 413 156

### Issue date:

26.08.2019

### Valid to:

26.08.2024

### Year of study:

LCA conducted in 2018/19. Production data is from 2017/18.

### Comparability:

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

### The EPD has been worked out by:

Mie Fuglseth  
Asplan Viak AS

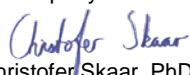



### Verification:

The CEN Norm EN 15804 serves as the core PCR.  
Independent verification of the declaration and data,  
according to ISO14025:2010

internal  external

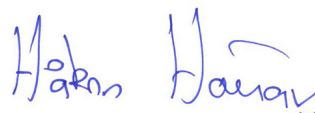
Third party verifier:



Christofer Skaar, PhD

(Independent verifier approved by EPD Norway)

Approved



Håkon Hauan  
Managing Director of EPD-Norway

## Product

### Product description:

Exel™ system is a non-electric initiation system based on a shock tube of low energy type. Detonators are manufactured at Orica's detonator factory at Gyttopp, Sweden. After production they are transported to customer in Sweden, Norway, Finland or other countries where they are stored at suitable storage facilities, before being transported to the mine, quarry or construction site where they are used in blasting activities by the end user.

### Technical data:

1 ea non electric detonator  
Weight: ca. 50g  
Average shock tube length: 7,4m

EC-type examination certificate:  
0589.EXP.2783/18

### Product specification:

Energy content of declared products:

Exel: 3000 J/ea (=3 kJ/ea = 3\*10<sup>-3</sup> MJ/ea)

In this EPD the declared product is based on average values for all different Exel detonators and contains the following substances:

Materials	Amount (%)
Plastic	83 %
Aluminium	8 %
Steel	4 %
Delay element and explosives, consisting of:	5 %
RDX	25-40%
Lead azide (Exel™ Connectadet™ only)	40-60%
PETN	5-40%
HMX	5-60%
Lead tetroxide	1-25%
Aluminium powder	1-5%

### Market:

Nordic countries (Norway, Sweden, Finland)

### Reference service life, product:

Not relevant. Explosives cannot be used more than once.

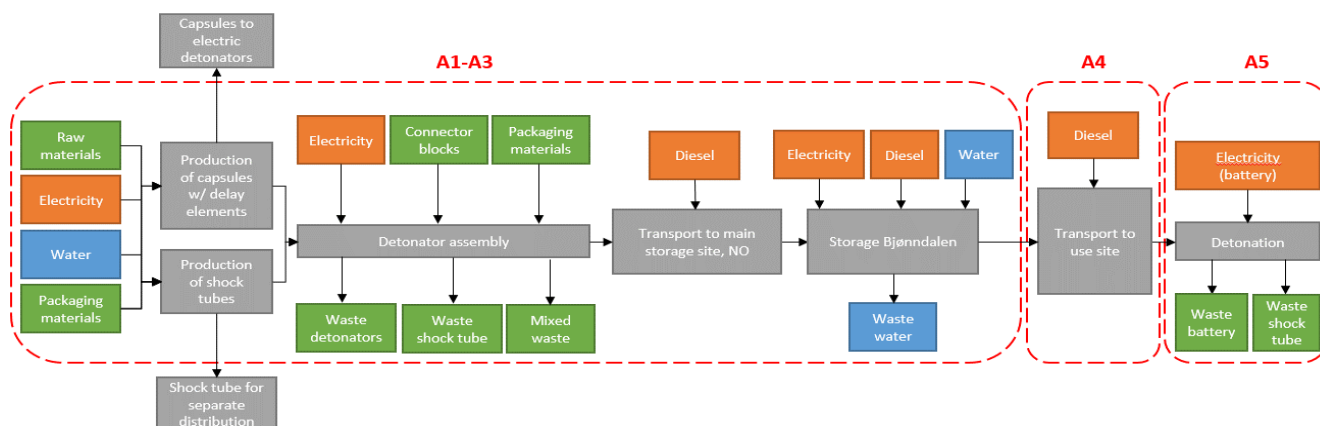
## LCA: Calculation rules

### Declared unit:

1 ea (detonator) manufactured, installed and used product

### System boundary:

The flow chart for production, transport and use of non electric detonator is shown in the figure below.



### Data quality:

Data has been collected in 2017/18 and is representative of those years. Data for production, transport and storage of detonators (A1-A3) is based on specific consumption data for the factory at Gyttopp and storage facility at Bjonndalen.

Generic data is from ecoinvent v3.4, Allocation cut-off by classification (2018) and SimaPro v 8.5. Characterization factors from EN15804: 2012 + A1: 2013.

### 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 allocated to the main product in which the material was used.

### Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

## LCA: Scenarios and additional technical information

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

This declaration is based on a "cradle to gate with options" assessment, including production at factory in Sweden, and storage at storage facility at Bjønndalen, Norway. Distance from factory to storage site is 340 km. As detonators are used alongside explosives products, the production stage, A1-A3, is defined to include the storage process, as well as transport to storage, in accordance with system boundaries defined for product systems in EPDs for explosives. Use of detonators in detonation of explosives at site is included, as it represents the part of the life cycle in which the detonator is fulfilling its intended function. Average transport to a construction site (A4) has been added, to show the importance of this transport. On average, detonators are transported 60 km from storage to use site.

The scenario for detonation at site (A5) includes energy use (battery power) required for ignition, as well as treatment of waste shock tube.

### Transport from factory to storage site (A1-A3)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/energy consumption	Unit
Truck	100 %	Lorry	340	0,38	l/tkm

### Transport from storage site to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/energy consumption	Unit
Van	100 %	Light commercial vehicle	60	0,15	l/tkm

### Detonation of explosives (A5)

	Unit	Value
Alkaline battery	kg	9,00E-08
Waste detonator	kg	0,04

### Additional information

Unused Exel detonators are classified as explosives and must only be handled by personnel with approvals/licences to handle such products. Remaining plastic tubes from used (detonated) Exel detonators should be collected and treated as general residual waste.

## LCA: Results

The LCA results show environmental impacts, resource use and outflows calculated according to EN 15804: 2012 + A1: 2013. The results are per detonator, manufactured, installed and used at site. Results are given for A1-A3, A4 and A5. Transport in A4 is 60 km to a construction site.

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

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Detonation	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

### Environmental impact

Parameter	Unit	A1-A3	A4	A5
GWP	kg CO <sub>2</sub> -eqv	1,39E-01	1,19E-02	9,59E-02
ODP	kg CFC11-eqv	2,98E-08	1,94E-09	1,49E-10
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	4,87E-05	6,51E-06	6,00E-07
AP	kg SO <sub>2</sub> -eqv	7,44E-04	4,69E-05	1,79E-05
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	2,57E-04	1,38E-05	2,20E-05
ADPM	kg Sb-eqv	1,42E-06	4,07E-08	4,56E-09
ADPE	MJ	2,11E+00	1,71E-01	2,43E-02

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

### Resource use

Parameter	Unit	A1-A3	A4	A5
RPEE	MJ	1,51E+00	3,74E-03	1,26E-03
RPEM	MJ	1,78E-03	0,00E+00	0,00E+00
TPE	MJ	1,51E+00	3,74E-03	1,26E-03
NRPE	MJ	4,62E+00	1,73E-01	2,69E-02
NRPM	MJ	2,48E+00	0,00E+00	0,00E+00
TRPE	MJ	7,10E+00	1,73E-01	2,69E-02
SM	kg	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00
W	m <sup>3</sup>	3,08E-04	1,42E-06	2,24E-05

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE 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; W Use of net fresh water

### End of life - Waste

Parameter	Unit	A1-A3	A4	A5
HW	kg	1,05E-03	2,68E-06	1,40E-07
NHW	kg	4,22E-02	5,40E-03	1,60E-03
RW	kg	4,13E-05	1,12E-06	1,02E-07

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

### End of life - Output flow

Parameter	Unit	A1-A3	A4	A5
CR	kg	0,00E+00	0,00E+00	0,00E+00
MR	kg	2,96E-08	0,00E+00	0,00E+00
MER	kg	3,46E-06	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

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

## Additional Norwegian requirements

### Greenhous gas emission from the use of electricity in the manufacturing phase

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

Data source	Amount	Unit
Swedish production mix, econinvent v3.4 (April 2019)	43	g CO <sub>2</sub> -eqv/kWh
Norwegian production mix, econinvent v3.4 (April 2019)	31	g CO <sub>2</sub> -eqv/kWh

### Dangerous substances

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product is classified as hazardous waste (Avfallsforskiten, §11-2), see table.

Name	CAS no.	Amount*
RDX	121-82-4	25-40%
Lead azide	13424-46-9	40-60%
PETN	78-11-5	5-40%
HMX	2691-41-0	5-60%
Lead tetroxide	1314-41-6	1-25%
Aluminium powder	7429-90-5	1-5%

\* Share of delay element and explosives in detonator, as given in safety data sheets

### Indoor environment





Not relevant. No tests have been carried out on the product concerning indoor climate.

### Carbon footprint

Carbon footprint has not been worked out for the product.

## Bibliography

ISO 14025:2010	<i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>
ISO 14044:2006	<i>Environmental management - Life cycle assessment - Requirements and guidelines</i>
EN 15804:2012+A1:2013	<i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i>
ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
Ecoinvent v3.4, March 2018	Swiss Centre of Life Cycle Inventories. <a href="https://www.ecoinvent.org/">https://www.ecoinvent.org/</a>
SimaPro	LCA software, developed by PRé Sustainability <a href="https://simapro.com/">https://simapro.com/</a>
NPCR 024 2016 ver. 1.0	<i>Explosives and Initiation Systems</i>
Fuglseth, Mie, 2019	<i>LCA Report Exel Non electric detonators Orica Norway AS 15.04.2018</i>

 <b>epd-norge.no</b> The Norwegian EPD Foundation	<b>Program operator</b> The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway	Phone: +47 977 22 020  e-mail: <a href="mailto:post@epd-norge.no">post@epd-norge.no</a> web: <a href="http://www.epd-norge.no">www.epd-norge.no</a>
 <b>epd-norge.no</b> The Norwegian EPD Foundation	<b>Publisher</b> The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway	Phone: +47 977 22 020  e-mail: <a href="mailto:post@epd-norge.no">post@epd-norge.no</a> web: <a href="http://www.epd-norge.no">www.epd-norge.no</a>
	<b>Owner of the declaration</b> Orica Norway AS Røykenveien 18, 3427 Gullaug Norway	Phone: +47 32 22 91 00 Fax: +47 32 22 91 01 e-mail: <a href="mailto:nordics@orica.com">nordics@orica.com</a> web: <a href="http://www.oricaminingservices.com">www.oricaminingservices.com</a>
	<b>Author of the Life Cycle Assessment</b> Asplan Viak AS Mie Fuglseth Kjørboveien 20, 1300 Sandvika, Norway	Phone: +47 41 44 09 04 Fax: e-mail: <a href="mailto:mie.fuglseth@asplanviak.no">mie.fuglseth@asplanviak.no</a> web: <a href="http://www.asplanviak.no">www.asplanviak.no</a>