Product Environmental Profile

Family technical name: EXQJ 1 kV

Family brand name: EXQJ 1kV / IFSI 1kV

Reference product name : EXQJ 1KV 4X 6 _6

1224	0,34058	56,3	24366
kg CO_2 eq.	kg Sb eq.	m^3	MJ
Climate change - total	Resource use - minerals & metals (ADPe)	Net use of fresh water	Total Primary Energy

The above environmental impacts are "cradle to gate" or "Manufacturing phase" values (A1-A3)

PEP ecopassport N°:	NXNS-00273-V01.01-EN	Product Category Rules:	PEP-PCR-ed4-EN-2021 09 06
		Product Specific Rules:	PSR-0001-ed4-EN-2022 11 16
Verifier accreditation N°:	VH08	Program information & documents:	**www.pep-ecopassport.org**
Date of publication:	04-2023	Validity period:	**5 years**

Independent verification of the declaration and data, in accordance with ISO 14025 : 2006

Internal ☐ External ☒

The PCR critical review was conducted by a panel of experts chaired by Julie Orgelet (Ddemain).

PEP are compliant with XP C08-100-1 :2016 or EN 50693
The elements of the present PEP cannot be compared with elements from another program.

Compliant with ISO 14025: 2006 "Environmental labels and declarations - Type III environmental declarations".

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Nexans Corporate Social Responsibility commitment

Corporate Social Responsibility which is the confluence between environmental, economic and social aspects, is an integral part of the Nexans's strategy. Nexans has been supporting the **United Nations Global Compact** since December 2008 and has implemented internal action plans to integrate Sustainable Development at all levels. It includes responsible governance, healthy and safe working environment for employees, reduced global carbon footprint through the **Nexans Carbon Neutrality strategy.**

Reference Product description

EXQJ 1KV 4X 6 _6

The cable may be used for fixed installation indoors and outdoors in air, ground and water.

Products covered:

The aforementioned products belong to the category Wires, Cables and Accessories of the Product Category Rules (PCR) from the PEP ecopassport® program.

The PEP concern all the products in the range EXQJ 1 kV and the reference product of the PEP is EXQJ 1KV 4X 6 _6.

Functional unit:

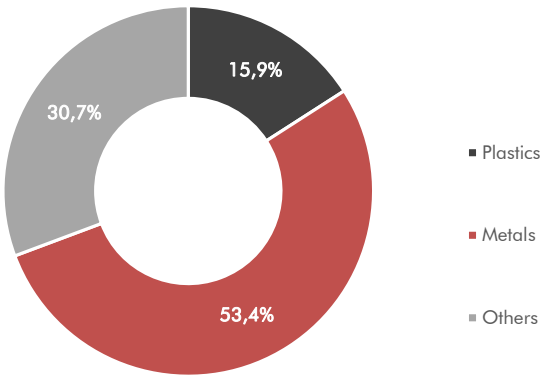
To transmit energy expressed for 1A over a distance of 1km during 40 years and a 100% use rate, in accordance with the relevant standards, detailed in the data sheet available on our website www.nexans.com.
Lifetime and use rate correspond to the Infrastructure - Energy distribution networks application as defined in the table given in Appendix 1 of the specific rules for wires, cables and accessories.

This PEP has been drawn up considering the following parameters:

- 1km for manufacturing, distribution and end-of-life stages
- 1km and 1A for the use stage

The potential impact of the use stage shall be calculated by the PEP user considering the real amperage through the product during the use phase by multiplying the impact by the square of the intensity. This PEP is valid in the intensity range taking into account the maximum allowable intensity.

Constituent materials



The total mass of the reference product and packaging is 473,71kg/km. Constituent materials are distributed as given in the graph.

Nexans has implemented necessary procedures to ensure product compliance with the relevant standards when products are put on the market.

II. LIFE CYCLE ASSESSMENT

Manufacturing

- All the products in the range EXQJ 1 kV are manufactured in Sweden.
- The electricity mix model for the manufacturing stage is from Sweden.
- All Nexans sites in Sweden have implemented a certified Environmental Management System according to ISO14001 standard.

Packaging designed to reduce environmental impacts:

- Packaging was designed according to the applicable standard (Directive 94/62/EC).
- The packaging considered to transport the reference product is a Drum K8. It is considered to be used 8 times.

Distribution

The transportation scenario for the impact assessment of the distribution stage is local, considering:

- 1000 km covered by truck.

Installation

Installation processes for the reference product are considered out of the scope of the study, according to the Product Specific Rules document for "Wires, Cables and Accessories" from PEP ecopassport® program. Only 5% of product losses and packaging disposal is considered inthis stage

Use

The use scenario considers the operation of the reference product in Infrastructure - Energy distribution networks, with:

- Reference Lifetime (RLT) = 40 years
- Current intensity (A): 1
- Number of active conductor(s): 4
- Use rate = 100 %
- Cable resistance* (ohm/km): 1,23E+01

*(*According to standard IEC 60228)*

Considering the aforementioned hypotheses, the energy consumption over the RLT at use stage is 4316,93 kWh/km.

This value is calculated for I=1 A. For the effective consumption of the cable installed, multiply the value given by the square of intensity.

- The electricity mix considered at use stage is Sweden.
- No maintenance is necessary to ensure the operation of the cable during the considered reference lifetime.

The reference lifetime mentioned in this PEP corresponds to an average data used for impact calculation, taking into account the average time a cable might be installed in a system before being disposed. **It CANNOT BE considered as an equivalent to the guaranteed product technical lifetime.**

End-of-life

- The transportation scenario chosen for the impact analysis associated with end-of-life stage is 1000 km covered by truck.
- The assumed electricity mix model for end-of-life stage is Sweden.

The cables are recycled through a grinding process for the separation of polymers and metal parts. The separated materials are then assumed to be recycled, incinerated or landfilled.

If the customer wants to recycle their cables at the end-of-life, Nexans has the know-how of cables recycling at their end-of-life through the structure named Nexans Recycling Services (recycling.services@nexans.com), to offer a complete solution for the recycling of polymers and metals.

III. ENVIRONMENTAL IMPACTS

The reference product EXQJ 1KV 4X 6 _6 belongs to the Product Category Rules (PEP-PCR-ed4-EN-2021 09 06) and Product Specific Rules (PSR-0001-ed4-EN-2022 11 16) from the PEP ecopassport® program. According to the PCR, the life cycle impact assessment of the reference product takes into account manufacturing, distribution, installation, use and end-of-life stages.

All the necessary hypotheses to evaluate the environmental impacts of the reference product lifecycle are presented in the previous sections (electricity mix models, use scenario, etc). The software used to perform the evaluation is EIME 5.9.4, with the Nexans 2022-11 database.

Representativeness: the study is representative of cable production in Sweden with a local scenario for distribution. The electricity model for use is Sweden and the model for end-of-life is Sweden.

Impact results for 1000 m of EXQJ 1KV 4X 6 _6

Mandatory indicators:

Environmental indicator/flows	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation* (A5)	Use (B6) (for 1 A)	End-of-life (C1-C4)	TOTAL (for 1 A)
Climate change - total (GWP)	kg CO_2 eq.	1,22E+03	2,61E+01	6,01E+01	1,29E+02	5,83E+02	2,02E+03
Climate change - fossil (GWPf)	kg CO_2 eq.	1,16E+03	2,61E+01	5,73E+01	1,28E+02	5,33E+02	1,91E+03
Climate change - biogenic (GWPb)	kg CO_2 eq.	5,96E+01	0,00E+00	2,84E+00	7,78E-01	5,00E+01	1,13E+02
Climate change - land use & land use change (GWPlu)	kg CO_2 eq.	1,04E-04	0,00E+00	0,00E+00	0,00E+00	1,90E-03	2,00E-03
Ozone layer depletion (ODP)	kg CFC-11 eq.	2,34E-04	4,00E-08	1,16E-05	2,51E-06	3,51E-05	2,83E-04
Acidification potential of soil and water (AP)	mol H+ eq.	4,77E+01	1,65E-01	2,23E+00	2,09E+00	6,69E+00	5,89E+01
Eutrophication - freshwater (Epf)	kg PO43- eq.	1,04E-01	9,78E-06	3,57E-04	7,94E-03	1,77E+00	1,89E+00
Eutrophication - marine (Epm)	kg N eq.	1,81E+00	7,74E-02	5,52E-02	1,74E-01	1,02E+00	3,14E+00
Eutrophication - terrestrial (Ept)	mol N eq.	2,07E+01	8,49E-01	6,18E-01	7,58E+00	1,29E+01	4,27E+01
Photochemical ozone formation - human health (POCP)	kg NMVOC eq.	8,74E+00	2,14E-01	3,32E-01	3,79E-01	3,00E+00	1,27E+01
Resource use - minerals & metals (ADPe)	kg Sb eq.	3,41E-01	1,03E-06	1,69E-02	1,33E-04	4,99E-02	4,07E-01
Resource use - fossils (ADPf)	MJ	2,23E+04	3,64E+02	1,03E+03	3,09E+04	6,31E+03	6,09E+04
Water use (WU)	m3 eq.	2,42E+03	9,90E-02	1,15E+02	1,24E+01	1,34E+03	3,88E+03
Use of renewable primary energy excluding renewable primary energy used as raw material (PERE)	MJ	1,95E+03	4,85E-01	9,33E+01	1,31E+04	1,50E+03	1,66E+04
Use of renewable primary energy used as raw material (PERM)	MJ	1,19E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,19E+02
Total use of renewable primary energy resources (PERT)	MJ	2,07E+03	4,85E-01	9,33E+01	1,31E+04	1,50E+03	1,67E+04
Non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	MJ	1,85E+04	3,64E+02	8,35E+02	3,09E+04	6,31E+03	5,69E+04
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ	3,83E+03	0,00E+00	1,92E+02	0,00E+00	0,00E+00	4,03E+03
Total use of non-renewable primary energy resources (PENRT)	MJ	2,23E+04	3,64E+02	1,03E+03	3,09E+04	6,31E+03	6,09E+04
Use of secondary material (SM)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water (FW)	m3	5,63E+01	2,31E-03	2,68E+00	2,89E-01	3,11E+01	9,04E+01
Hazardous waste disposed (HWD)	kg	3,11E+04	0,00E+00	1,55E+03	4,17E+00	1,46E+02	3,28E+04
Non hazardous waste disposed (NHWD)	kg	2,07E+02	9,15E-01	1,65E+01	3,18E+01	8,19E+01	3,38E+02
Radioactive waste disposed	kg	6,32E-02	6,52E-04	3,13E-03	3,31E-03	8,08E-03	7,83E-02
Components for reuse (CRU)	kg	6,25E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,25E+00
Materials for recycling (MFR)	kg	1,62E+01	0,00E+00	1,07E-01	0,00E+00	2,57E+02	2,74E+02
Materials for energy recovery (MER)	kg	2,79E+00	0,00E+00	3,14E+00	0,00E+00	3,90E+01	4,49E+01
Exported Energy (EE)	MJ	0,00E+00	0,00E+00	2,77E+00	0,00E+00	0,00E+00	2,77E+00
Biogenic carbon content - product (BC-pro)	kg of C	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Biogenic carbon content - packaging (BC-pack)	kg of C	2,47E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+00

* Installation stage includes only packaging disposal. Impacts related to installation processes might be completed by the PEP user.

Optional indicators:

Environmental indicator/flow	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation* (A5)	Use (B6) (for 1 A)	End-of-life (C1-C4)	TOTAL (for 1 A)
Total Primary Energy (TPE)	MJ	2,44E+04	3,64E+02	1,12E+03	4,40E+04	7,81E+03	7,77E+04
EF-particulate matter (EF-PM)	Disease occurance	2,87E-04	1,34E-06	1,35E-05	4,44E-05	3,49E-05	3,82E-04
Ionising radiation, human health (IR)	kg U235 eq.	9,09E+04	6,35E-02	4,54E+03	4,32E+03	1,73E+02	9,99E+04
Ecotoxicity, freshwater (Eco-fw)	CTUe	3,22E+04	1,76E+01	1,14E+03	1,17E+03	1,82E+05	2,16E+05
Human toxicity, cancer (HT-c)	CTUh-c	4,75E-03	4,58E-10	2,37E-04	2,34E-08	3,23E-06	4,99E-03
Human toxicity, non-cancer (HT-nc)	CTUh-nc	5,86E-04	4,96E-08	2,90E-05	1,10E-06	1,20E-04	7,36E-04
Land use (LU)	No dimension	3,19E+02	0,00E+00	2,94E+00	1,47E+01	4,75E+03	5,09E+03

V. EXTRAPOLATION RULES FOR THE PRODUCT FAMILY EXQJ 1kV / IFSI 1kV

General information

The extrapolation rules have been calculated based on the environment impact assessment results of 6 products in the range EXQJ 1 kV. The reference product is EXQJ 1KV 4X 6 _6. The weight of reference product is 467,46 kg/km.

The reference product has 4 active conductor(s) and a resistivity of 12,32 ohm/km/active conductor.

The extrapolation rules below apply to 1000m of product. In the following sections, the product weight is expressed in kg for 1000m of cable, where applicable.

Extrapolation rules for each life cycle stage

	Life cycle stage	Applicable extrapolation principle	Formula to calculate each environmental indicator	Example: If the product weight is 477,46 kg/km, each indicator value shall be calculated with:	Mean deviation of extrapolation rule
	Manufacturing	Linear variation versus weight	Indicator = a x Cable weight + b	Indicator = (477,46 x a) + b	3,97%
	Distribution	Linear variation versus weight	Indicator = a x Cable weight + b	Indicator = 477,46 x a + b.	0,46%
	Installation	Linear variation versus weight	Indicator = a x Cable weight + b	Indicator = 477,46 x a + b.	4,49%
	Use	Variation versus resistivity ratio	Indicator = (Product Resistivity / Reference product Resistivity) x (Nb of active conductors / Nb of active conductors in the reference product) x Indicator value for Reference Product	Example: If the product resistivity is 1,2 ohm/km & has 1 active conductor, Indicator = (1,2/12,32) x (1/4) x indicator of reference product.	0,00%
	End of life	Linear variation versus weight	Indicator = a x Cable weight + b	Indicator = (477,46 x a) + b	4,54%

Table to be considered for extrapolation calculations of different life cycle stages:

	Manufacturing				Distribution		Installation		End of life	
	a	b	a	b	a	b	a	b	a	b
GWP	2,15E+00	1,29E+02	-	-	5,38E-02	1,10E+00	9,88E-02	1,01E+01	1,50E+00	-1,40E+02
GWPf	1,99E+00	1,49E+02	-	-	5,38E-02	1,10E+00	9,11E-02	1,11E+01	1,34E+00	-1,18E+02
GWPb	1,64E-01	-1,95E+01	-	-	0,00E+00	0,00E+00	7,79E-03	-9,14E-01	1,51E-01	-2,22E+01
GWPlu	1,89E-07	9,34E-06	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,46E-06	1,71E-04
ODP	5,41E-07	-3,15E-05	-	-	8,25E-11	1,69E-09	2,67E-08	-1,54E-06	1,01E-07	-1,36E-05
AP	1,38E-01	-1,86E+01	-	-	3,41E-04	6,98E-03	6,43E-03	-8,66E-01	1,99E-02	-2,84E+00
Epf	3,00E-04	-4,07E-02	-	-	2,02E-08	4,13E-07	4,11E-07	1,44E-04	5,35E-03	-7,92E-01
Epm	4,01E-03	-1,66E-01	-	-	1,60E-04	3,27E-03	9,95E-05	5,32E-03	2,99E-03	-4,10E-01
Ept	4,60E-02	-1,95E+00	-	-	1,75E-03	3,59E-02	1,15E-03	4,19E-02	3,78E-02	-5,18E+00
POCP	2,06E-02	-1,36E+00	-	-	4,42E-04	9,05E-03	7,38E-04	-3,16E-02	8,76E-03	-1,20E+00
ADPe	1,03E-03	-1,52E-01	-	-	2,12E-09	4,34E-08	5,10E-05	-7,56E-03	1,51E-04	-2,23E-02
ADPf	4,18E+01	1,54E+03	-	-	7,51E-01	1,54E+01	1,88E+00	8,91E+01	1,80E+01	-2,32E+03
WU	6,43E+00	-6,90E+02	-	-	2,04E-04	4,19E-03	3,10E-01	-3,51E+01	3,95E+00	-5,57E+02
PÈRE	4,26E+00	-1,25E+02	-	-	1,00E-03	2,05E-02	2,01E-01	-5,03E+00	4,23E+00	-5,22E+02
PERM	1,61E-01	5,20E+01	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	4,42E+00	-7,30E+01	-	-	1,00E-03	2,05E-02	2,01E-01	-5,03E+00	4,23E+00	-5,22E+02
PENRE	3,83E+01	-4,41E+02	-	-	7,51E-01	1,54E+01	1,71E+00	-9,91E+00	1,80E+01	-2,32E+03
PENRM	3,45E+00	1,98E+03	-	-	0,00E+00	0,00E+00	1,73E-01	9,89E+01	0,00E+00	0,00E+00
PENRT	4,18E+01	1,54E+03	-	-	7,51E-01	1,54E+01	1,88E+00	8,91E+01	1,80E+01	-2,32E+03
SM	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	1,50E-01	-1,61E+01	-	-	4,76E-06	9,75E-05	7,22E-03	-8,17E-01	9,19E-02	-1,30E+01
HWD	9,38E+01	-1,39E+04	-	-	0,00E+00	0,00E+00	4,69E+00	-6,96E+02	1,28E-01	8,80E+01
NHWD	2,98E-02	1,63E+02	-	-	1,89E-03	3,87E-02	9,80E-03	1,10E+01	8,75E-02	3,55E+01
RWD	1,41E-04	-6,50E-03	-	-	1,35E-06	2,76E-05	6,90E-06	-2,72E-04	1,16E-05	2,28E-03
CRU	8,47E-03	2,74E+00	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	4,69E-02	-6,36E+00	-	-	0,00E+00	0,00E+00	3,23E-04	-4,79E-02	7,40E-01	-9,87E+01
MER	4,18E-03	7,04E-01	-	-	0,00E+00	0,00E+00	4,29E-03	1,36E+00	4,96E-02	1,32E+01
EE	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	3,76E-03	1,21E+00	0,00E+00	0,00E+00
BC-pro	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BC-pack	3,35E-03	1,08E+00	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	4,62E+01	1,47E+03	-	-	7,52E-01	1,54E+01	2,08E+00	8,40E+01	2,23E+01	-2,84E+03
EF-PM	8,26E-07	-1,10E-04	-	-	2,77E-09	5,68E-08	3,89E-08	-5,20E-06	1,01E-07	-1,36E-05
IR	2,09E+02	-1,25E+04	-	-	1,31E-04	2,69E-03	1,05E+01	-6,24E+02	4,25E-01	-2,90E+01
Eco-fw	8,52E+01	-9,20E+03	-	-	3,62E-02	7,43E-01	2,80E+00	-2,30E+02	5,45E+02	-7,99E+04
HT-c	1,43E-05	-2,12E-03	-	-	9,45E-13	1,94E-11	7,16E-07	-1,06E-04	7,30E-09	-2,74E-07
HT-nc	1,76E-06	-2,60E-04	-	-	1,02E-10	2,10E-09	8,71E-08	-1,28E-05	3,62E-07	-5,36E-05
LU	8,18E-01	-7,79E+01	-	-	0,00E+00	0,00E+00	2,61E-03	1,50E+00	1,40E+01	-1,98E+03

VI. PRODUCTS COVERED BY THE PEP

The products covered by the given PEP are represented in the below table with a: ●

The below table also provides the maximun linear resistance (ohm/km) of core at 20°C in D.C for 21 wires according to the standard IEC 60228 for each cable included in the cable in the family EXQJ 1kV / IFSI 1kV.

Section (mm^2)	Resistance (ohm/km)	N° of CONDUCTORS																		
		1	2	3	4	5	6	7	8	9	10	12	14	19	21	24	27	30	37	40
0,5	36																			
0,75	24,5																			
1	18,1																			
1,5	12,1																			
2,5	7,41		●	●	●															
4	4,61																			
6	3,08		●	●	●															
10	1,83			●	●															
16	1,15																			
25	0,727																			
35	0,524																			
50	0,387																			
70	0,268																			
95	0,193																			
120	-																			
150	-																			
185	-																			
240	-																			
300	-																			
400	0,0465																			
500	-																			
630	-																			
800	-																			
1000	-																			
1200	-																			
1400	-																			
1600	-																			
1800	-																			
2000	-																			
2500	-																			

For all products covered by this PEP, weight (kg/km) of each product & number of active conductors* in the cable are mentioned in the technical datasheet, which can be obtained from the Nexans website.

*Number of active conductors = total number of conductors - neutral conductor (if applicable). If there is no neutral conductor in the cable, the number of active conductors = total number of conductors. The technical datasheet mentions if there is a neutral or not in a given cable.