Product Environmental Profile

Family technical name: FXQJ/IFSI/MCMK HF EMC 1KV

Reference product name: FXQJ/IFSI/MCMK HF EMC 1KV 3x2,5/2,5

Contribution to Global Warming	Contribution to Depletion of abiotic resources - elements	Net volume of Freshwater consumed	Total Primary Energy consumed
9,7E+02	1,1E-01	1,9E+04	4,5E+04
kg CO_2 eq.	kg Sb eq.	m^3	MJ

PEP ecopassport N°:	NXNS-00030.V02.01-EN	Product Category Rules:	PEP-PCR-ed3-EN-2015 04 02
		Product Specific Rules:	PSR-0001-ed3-EN-2015 10 16
Verifier accreditation N°:	VH-18	Program information & documents:	www.pep-ecopassport.org
Date of publication:	09-2021	Validity period:	5 years

Independent verification of the declaration and data, in accordance with ISO 14025 : 2010

Internal ☐ External ☒

The PCR critical review was conducted by a panel of experts chaired by Philippe Osset (Solinnen).

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

Compliant with ISO 14025: 2010 "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

FXQJ/IFSI/MCMK HF EMC 1KV 3x2,5/2,5

FXQJ/IFSI/MCMK HF EMC is a halogen free, XLPE-insulated, HFFR-sheathed cable with class 2 stranded copper conductors (circular for cross-sections up to 35 mm2. and sector shaped for larger cross-sections). FXQJ/MCMK HF EMC is designed according to HD 604. The cable has a screen of annealed copper wires with opposite overlapping helix of copper tape. The copper screen has an optical coverage of 100 % and fullfil the EMC directive when it is correct installed. The outer sheath is UV-protected. FXQJ/MCMK HF EMC meets the requirements for flame class Dcas2d2a2 according to CPR and emits no corrosive gases during fire. The cable is certified by Intertek SEMKO.

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 FXQJ/IFSI/MCMK HF EMC 1KV and the reference product of the PEP is FXQJ/IFSI/MCMK HF EMC 1KV 3x2,5/2,5.

Functional unit:

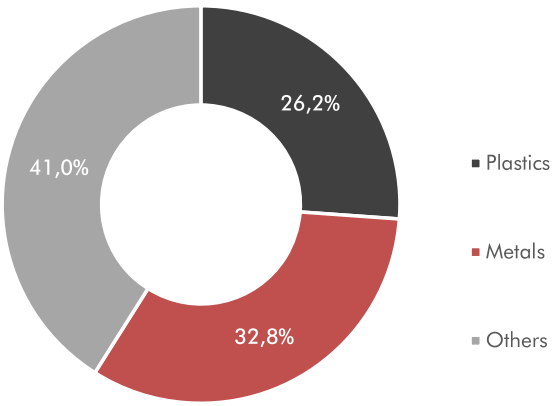
To transmit energy expressed for 1A over a distance of 1km during 30 years and a 70% use rate, in accordance with the relevant standards, detailed in the data sheet available on our website www.nexans.com.
Lifetime and use rate correspond to the Building - Residential / Tertiary / Industrial application 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 290,43kg/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.

Manufacturing

- All the products in the range FXQJ/IFSI/MCMK HF EMC 1KV are manufactured in Sweden.
- The electricity mix model for the manufacturing stage is Sweden, >1 kV.
- 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 Wooden drum. It is considered to be used 8 times.
- The considered packaging is a PEFC™ (Program for the Endorsement of Forest Certification) certified wooden drum, ensuring responsible sourcing and sustainable forests management.

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 packaging disposal is considered at this stage.

Use

The use scenario considers the operation of the reference product in Building - Residential / Tertiary / Industrial, with:

- Reference Lifetime (RLT) = 30 years
- Current intensity (A): 1
- Number of active conductor(s): 3
- Use rate = 70 %
- Cable resistance* (ohm/km): 7,41E+00

*(*According to standard IEC 60228)*

Considering the aforementioned hypotheses, the energy consumption over the RLT at use stage is 4089,43 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, ≤1 kV.
- 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, >1 kV.

The cables are recycled through a grinding process for the separation of polymers and metal parts. It was considered that 100% of metals are recycled and 100% of other materials are landfilled.

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 FXQJ/IFSI/MCMK HF EMC 1KV 3x2,5/2,5 belongs to the Product Category Rules (PEP-PCR-ed3-EN-2015 04 02) and Product Specific Rules (PSR-0001-ed3-EN-2015 10 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 5.9.1, with the Nexans-2021-02 database.

Representativeness: the study is representative of cable production in Sweden with a local scenario for distribution. The electricity model for use is Sweden, ≤1 kV and the model for end-of-life is Sweden, >1 kV.

Impact results for 1000 m of FXQJ/IFSI/MCMK HF EMC 1KV 3x2,5/2,5

Mandatory indicators:

Environmental indicator/flows	Unit	Manufacturing	Distribution	Installation*	Use (for 1 A)	End-of-life	TOTAL (for 1 A)
Contribution to Global Warming	kg CO_2 eq.	6,82E+02	1,62E+01	3,10E-01	2,30E+02	4,70E+01	9,75E+02
Contribution to Ozone Depletion	kg CFC-11 eq.	8,63E-05	3,28E-08	2,12E-09	2,39E-07	6,85E-06	9,35E-05
Contribution to Acidification of soil and water	kg SO_2 eq.	1,97E+00	7,28E-02	1,52E-03	6,58E-01	2,80E-01	2,98E+00
Contribution to Water Eutrophication	kg PO_4^{3-} eq.	3,89E-01	1,67E-02	1,64E-03	8,03E-02	8,90E-02	5,77E-01
Contribution to Photochemical Ozone Creation	kg C_2H_4 eq.	2,40E-01	5,17E-03	1,07E-04	6,42E-02	1,56E-02	3,25E-01
Contribution to Depletion of abiotic resources - elements	kg Sb eq.	1,12E-01	6,48E-07	1,35E-08	4,45E-04	2,35E-06	1,12E-01
Total Primary Energy consumed	MJ	1,30E+04	2,29E+02	4,27E+00	3,10E+04	7,96E+02	4,50E+04
Net volume of Freshwater consumed	m^3	8,03E+02	1,45E-03	9,70E-05	1,82E+04	8,30E-02	1,90E+04

Optional indicators:

Environmental indicator/flow complete name	Unit	Manufacturing	Distribution	Installation*	Use (for 1 A)	End-of-life	TOTAL (for 1 A)
Contribution to Depletion of abiotic resources - fossil fuels	MJ	9,44E+03	2,28E+02	4,14E+00	1,88E+03	5,15E+02	1,21E+04
Contribution to Water Pollution	m^3	6,71E+04	2,66E+03	4,80E+01	1,08E+04	4,06E+03	8,46E+04
Contribution to Air Pollution	m^3	4,57E+05	6,64E+02	3,92E+01	1,87E+04	3,30E+03	4,80E+05
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	8,94E+02	3,05E-01	4,88E-02	1,20E+04	4,24E+01	1,29E+04
Use of renewable primary energy resources as raw materials	MJ	7,50E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,50E+01
Total use of renewable primary energy resources	MJ	9,69E+02	3,05E-01	4,88E-02	1,20E+04	4,24E+01	1,30E+04
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	8,01E+03	2,29E+02	4,22E+00	1,90E+04	7,54E+02	2,80E+04
Use of non-renewable primary energy resources as raw materials	MJ	4,06E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,06E+03
Total use of non-renewable primary energy resources	MJ	1,21E+04	2,29E+02	4,22E+00	1,90E+04	7,54E+02	3,20E+04
Use of renewable secondary fuels	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	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of secondary materials	kg	1,48E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,48E+01
Hazardous waste disposed	kg	1,03E+04	0,00E+00	1,13E-03	1,47E+00	6,63E-02	1,03E+04
Non-hazardous waste disposed	kg	2,11E+02	5,76E-01	5,14E+00	6,61E+02	3,13E+02	1,19E+03
Radioactive waste disposed	kg	3,62E-01	4,10E-04	2,64E-05	7,05E+00	8,60E-02	7,50E+00
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	4,42E+00	0,00E+00	0,00E+00	0,00E+00	9,52E+01	9,96E+01

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

IV. EXTRAPOLATION RULES FOR THE PRODUCT FAMILY FXQJ/IFSI/MCMK HF EMC 1KV

General information

The extrapolation rules have been calculated based on the environment impact assessment results of 3 products in the range FXQJ/IFSI/MCMK HF EMC 1KV. The reference product is FXQJ/IFSI/MCMK HF EMC 1KV 3x2,5/2,5. The weight of reference product is 285,43kg/km.

The reference product has 3 active conductor(s) and a resistivity of 7,41 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 295,43 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 = 295,43 x a + b.	5,50%
	Distribution	Linear variation versus weight	Indicator = a x Cable weight + b	Indicator = 295,43 x a + b.	0,16%
	Installation	Maximum impact value	The maximum impact values (MIV) indicated in the table below are applicable to the whole range for installation stage impacts	N/A	N/A
	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 = (1,2/7,41) x (1/3) x indicator of reference product.	0,00%
	End of life	Linear variation versus weight	Indicator = a x Cable weight + b	Indicator = 295,43 x a + b.	0,10%

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

	Manufacturing				Distribution		Installation		End of life	
	a	b	a	b	a	b	MIV		a	b
Contribution to Global Warming	N/A	N/A	2,17E+00	4,76E+01	5,38E-02	8,67E-01	6,99E+00	-	1,47E-01	5,12E+00
Contribution to Ozone Depletion	N/A	N/A	4,45E-07	-4,23E-05	1,09E-10	1,76E-09	4,77E-08	-	2,33E-08	1,95E-07
Contribution to Acidification of soil and water	N/A	N/A	1,09E-02	-1,18E+00	2,42E-04	3,89E-03	3,43E-02	-	9,06E-04	2,13E-02
Contribution to Water Eutrophication	N/A	N/A	1,66E-03	-9,45E-02	5,56E-05	8,95E-04	3,69E-02	-	1,18E-04	5,52E-02
Contribution to Photochemical Ozone Creation	N/A	N/A	8,43E-04	-6,49E-03	1,72E-05	2,77E-04	2,42E-03	-	4,89E-05	1,67E-03
Contribution to Depletion of abiotic resources - elements	N/A	N/A	1,02E-03	-1,82E-01	2,15E-09	3,47E-08	3,04E-07	-	6,84E-09	3,85E-07
Total Primary Energy consumed	N/A	N/A	3,99E+01	1,26E+03	7,61E-01	1,23E+01	9,60E+01	-	2,62E+00	4,88E+01
Net volume of Freshwater consumed	N/A	N/A	1,89E+00	2,26E+02	4,82E-06	7,76E-05	2,18E-03	-	2,66E-04	7,07E-03
Contribution to Depletion of abiotic resources - fossil fuels	N/A	N/A	0,00E+00	0,00E+00	7,56E-01	1,22E+01	9,33E+01	-	1,67E+00	3,93E+01
Contribution to Water Pollution	N/A	N/A	2,60E+01	1,75E+03	8,85E+00	1,43E+02	1,08E+03	-	1,26E+01	4,43E+02
Contribution to Air Pollution	N/A	N/A	1,82E+02	1,37E+04	2,21E+00	3,55E+01	8,83E+02	-	7,03E+00	1,29E+03
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	N/A	N/A	3,91E+03	-6,69E+05	1,01E-03	1,63E-02	1,10E+00	-	1,39E-01	2,68E+00
Use of renewable primary energy resources as raw materials	N/A	N/A	4,41E+00	-3,99E+02	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Total use of renewable primary energy resources	N/A	N/A	1,53E-01	3,27E+01	1,01E-03	1,63E-02	1,10E+00	-	1,39E-01	2,68E+00
Use of non-renewable primary energy,excluding non-renewable primary	N/A	N/A	4,56E+00	-3,67E+02	7,60E-01	1,22E+01	9,49E+01	-	2,48E+00	4,61E+01
Use of non-renewable primary energy resources as raw materials	N/A	N/A	3,19E+01	-1,28E+03	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	N/A	N/A	3,45E+00	2,91E+03	7,60E-01	1,22E+01	9,49E+01	-	2,48E+00	4,61E+01
Use of renewable secondary fuels	N/A	N/A	3,53E+01	1,63E+03	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Use of secondary materials	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Hazardous waste disposed	N/A	N/A	1,35E-01	-2,40E+01	0,00E+00	0,00E+00	2,55E-02	-	4,48E-05	5,32E-02
Non-hazardous waste disposed	N/A	N/A	9,39E+01	-1,67E+04	1,91E-03	3,08E-02	1,16E+02	-	4,99E-01	1,71E+02
Radioactive waste disposed	N/A	N/A	2,45E-01	1,34E+02	1,36E-06	2,19E-05	5,94E-04	-	2,93E-04	2,43E-03
Components for reuse	N/A	N/A	9,80E-04	6,52E-02	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Exported energy	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Materials for energy recovery	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-	0,00E+00	0,00E+00
Materials for recycling	N/A	N/A	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-	9,00E-01	-1,62E+02

V. 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 copper - non tinned wires according to the standard IEC 60228.

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	0,153			●	●															
150	0,124			●	●															
185	0,0991			●	●															
240	0,0754			●	●															
300	0,0601			●	●															
400	0,047																			
500	0,0366																			
630	0,0283																			
800	0,0221																			
1000	0,0176																			
1200	0,0151																			
1400	0,0129																			
1600	0,0113																			
1800	0,0101																			
2000	0,009																			
2500	0,0072																			

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 link below:

https://www.nexans.se/products/Power-cables-1-145-kV/LV-power-cables-1-kV/Copper-cables/FXQJ-1kV29781.html

*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.