Connector System

AC 166® G and AC 164

Cables

Environmental Product Declaration

In accordance with ISO 14040 and 14044, EN 15804+A2 (2019) and ISO 14025

EPD Owner:	Adels–Contact Elektrotechnische Fabrik GmbH & Co. KG
Program operator:	Nederlandse Milieu Database (NMD)
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Connector System AC 166 G VLC 5

Cord Set	
	
Type	
extension cable socket extension cable plug connection cable latch	extension cable socket extension cable plug connection cable
Number of Poles	
3 pole 4 pole 5 pole	2 pole 3 pole 4 pole 5 pole
Core Cross-Section	
1.5 mm^2 2.5 mm^2	1.5 mm^2 2.5 mm^2
Rated Current	
20 A	16 A

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Introduction

Modern electrical installations must be faster, safer, and more flexible than ever before. This is exactly where the AC 166® G cables according to EN 61535 comes into play. It brings the logic of industrial “plug & play” systems directly into building installation — Savings up to 70% in installation time and around 30% of total cost.

The advantage lies in its deliberately engineered functionality. No cutting. No stripping. No tools. Conductors are connected safely, quickly, and in full compliance with the standard. This reduces error rates, ensures consistent installation quality, and keeps workflows predictable even under challenging construction site conditions.

To demonstrate the environmental performance of its connector systems, Environmental Product Declaration (EPD) has been developed. The EPD provides transparent, independently verified information about the environmental impact of the **AC 166® G Building Installation Connector System and cord sets** throughout their entire life cycle. It shows how these products perform from raw material extraction and manufacturing to use, reuse, and end-of-life recycling. In addition, the report also includes the Environmental Cost Indicator (ECI), a single score expressed in euros that combines multiple environmental impacts into one easy-to-understand value, helping customers assess the sustainability of the products.

Product Information

Product Description

The AC 166 G VLC 5 cables are used wherever flexible, pre-assembled, or rapidly installed solutions are essential. In modern building installations, it enables efficient lighting and power distribution concepts — From residential buildings to demanding commercial projects and prefab.

In furniture and display construction, its compact design and tool free connection make it ideal for shop-fitting modules or electrified furniture. In lighting, trade fair, and event construction, it ensures fast setup and dismantling times and reliable performance even with frequent reuse of components.

Whether in modular ceiling systems, open cable trays, pre-assembled wiring harnesses, or custom project solutions. The AC 166® G & AC 164 supports an installation approach that is faster, cleaner, and more sustainable. It creates a modern infrastructure that aligns with cross trade workflows and is optimally designed for both initial installations and later modifications.

Product Composition and Manufacturing Process

The cord set AC 166 G VLC 5 includes a PA6.6 housing, which is injection molded by Adels-Contact in Germany. In addition, this module requires brass material that is supplied as wire on coil. The brass is cut and machined into the necessary shapes into pins at Adels-Contact's German facility, after which it is transported to an external facility for galvanization to improve corrosion resistance and electrical performance. Once the galvanized pins are returned to Adels-Contact's facility in Germany, they are also transported together with the PA6.6 parts to the facility in Poland for final assembly into the cord set.

Life Cycle Inventory

The cord set AC 166 G VLC 5 (Connectors System AC 166® G – Cables) weights 0,2335 kg. In addition to the product weight, the manufacturing data referring to electricity, water, and compressed air consumption in injection moulding of PA 6.6 parts (IK 166) and cutting and machining of brass pins at Adels-Contact's factory has been calculated based on weight allocation of the data provided as shown in Table 1 and Table 2 for cord set AC 166 G VLC 5. The data has been provided based on the consumption to manufacture 1 piece of each part by different machines. Product packaging data is also given in Table 3.

Table 1 – Manufacturing process data per piece of cord set AC 166 G VLC 5

Reference Name	Piece Reference Number	Machine Reference Nr.	Weight / piece (kg)	kWh / piece (kWh)	Water / piece (m3)	Compressed air / piece (m3)
IK 166 Cable						
	IK 166 GSTF/5	102	5.56E-03	2.61E-02	1.53E-05	1.90E-02
	IK 166 GBUF/5	112	5.90E-03	1.77E-02	1.53E-05	1.90E-02
	IK 166 ZUF/5 US	106	4.72E-03	2.12E-02	1.63E-05	1.90E-02
	IK 166 ZOF/5 1,5²	106	6.60E-03	2.12E-02	1.63E-05	1.90E-02
Brass contact						
	ST 166 FC 1² - 1,5²	na	1.44E-03	5.96E-03	6.75E-04	na
	ST 166 FC N 1² - 1,5²	na	1.55E-03	5.96E-03	6.75E-04	na
	BU 166 FC 1² - 1,5²	na	1.69E-03	5.83E-03	6.60E-06	na

Table 2 – Manufacturing data for cord set AC 166 G VLC 5

Input / Output	Quantities	Unit	Transport distance	Chemical designation/ CAS number /Comments	Survey (measures/calculated/ estimated)
Input					
IK 166 Cable					
Electricity from grid mix	4.40E-03	kWh		German production mix	Calculated
Water	3.26E-06	kg		German production	Calculated
Compressed Air	3.88E-03	m3		European production	Calculated
Polyamide 6.6	3.44E-02	kg	Truck: 1.117 km	Mono-material	Measured
Brass contact					
Electricity from grid mix	9.39E-04	kWh		German production mix	Calculated
Water	1.06E-06	kg		German production	Calculated
Brass wire (tin plated**)	1.59E-02	kg	Truck: 1.385 km	Brass, Tin	Measured
Cables					
Cable 1,5mm²	4.98E-02	kg	Truck: 2.265 km	1m cable (PE, copper)	Measured

	Cable 2,5mm²	1.34E-01	kg	Truck: 2.265 km	1m cable (PE, copper)	Measured
	Upstream Packaging of Polyamide 6.6					
	Cardboard	1.36E-03	kg	Truck: 117 km	Cardboard	Estimated
	Plastic bag	3.41E-04	kg	Truck: 117 km	PE film	Estimated
	Upstream Packaging of Brass contact					
	Plastic drum	1.57E-04	kg	Truck: 385 km	PP	Estimated
	Upstream Packaging of Cables					
	Plastic drum	9.18E-03	kg	Truck: 1.1265 km	PP	Estimated
Output						
	Product	2.33E-01	kg			Measured
	Waste IK 166 (disposed externally)	3.41E-04	kg		Plastic waste	Estimated
	Waste Brass (disposed externally)	1.57E-04	kg		Copper waste	Estimated
	Waste Cardboard (disposed externally)	1.36E-03	kg		Packaging waste	Estimated
	Waste Plastic bag (disposed externally)	9.68E-03	kg		Packaging waste	Estimated

Table 3 – Manufacturing data for product packaging

Input / Output		Quantities	Unit	Transport distance	Chemical designation/ CAS number /Comments	Survey (measures/calculated/ estimated)
Input						
	Packaging of cord set 166 G VLC 5	2.67E-02	kg		Cardboard box	Measured
Output						
	Packaging of cord set 166 G VLC 5	2.67E-02	kg		Cardboard box	Measured

Reference Service Life (RSL)

In accordance with the PEP ecopassport PSR-0001-ed4-EN-2022 11 16, Specific Rules for Wires, Cables and Accessories, the reference service life for the connector system under study has been set to 21 years, which is set by this PCR document as the typical used time for a cable in residential buildings.

Functional Unit (FU)

The functional unit has been defined based on PEP Ecopassport PSR-0001-ed4-EN-2022 11 16, Specific Rules for Wires, Cables and Accessories. It defines the functional unit relatively to the following physical quantities:

- Current, expressed in amperes. PEP Ecopassport fixes the current to 1A for means of comparability of EPDs within the PEP Ecopassport program. Representative value for the average load of a cable in a residential building was set to 2,73A.
- Distance expressed in meters. PEP Ecopassport fixes the distance to 1km for means of comparability of EPDs within the PEP Ecopassport program. We chose here to use a representative value for Adels-Contact's products and set this value to 1m.
- Used time, expressed in years. PEP Ecopassport fixes the typical used time for a cable in residential buildings to 21 years.
- Use rate, expressed in percents. PEP Ecopassport fixes the typical use rate for a cable in residential buildings to 70%.

Consequently, the functional unit is set to: "To transmit energy expressed for 2,73A over a distance of 1m during 21 years and a 70% use rate, in accordance with the relevant standards.

Declared Unit (DU)

The declared unit is one piece of product. The guaranteed service life of Adels-Contact's connector system exceeds the reference service life defined above.

Product Life Cycle

A product's life cycle consists of several phases. The EPDs for the Cord Set AC 166 G VLC have examined the following:

• The supply of raw materials (A1)

• Transport to the factory (A2)

• Manufacturing (A3)

• Transport from the factory (A4)

• Construction or installation (A5)

• Use (B1)

• Maintenance (B2)

- Repair (B3)
- Replacement (B4)
- Refurbishment (B5)
- Operational energy (B6)
- Operational water (B7)
- Dismantling (C1)
- Transport following dismantling (C2)
- Waste treatment (C3)
- Landfill (C4)
- Benefits and costs outside the boundaries of the product system (D)

Product Stage (A1 – A3)

Module A1 includes the manufacture of primary material, PA6.6 granulate and brass wire or parts are supplied from external vendors and transported to Adels-Contact's production facility. These materials serve as the primary feedstock for subsequent manufacturing processes. Upstream packaging of the parts that arrive at Adels-Contact's facility are also included in module A1.

Module A2 includes the transport of all raw materials that are transported from their respective suppliers to Adels-Contact's site for processing, and finished modules are further transported to Poland for assembly and packaging. Transport stages include road and regional freight, contributing to logistical impacts within the system boundaries.

Module A3 includes the material processing as well as packaging. At Adels-Contact's facility, PA6.6 components are injection moulded and brass wire is cut and machined, with subsequent galvanisation of brass parts performed off-site. Intermediate transportation of injection moulded parts and brass pins from Adels-Contact's facility in Germany to off-site facilities are cut-off, while cardboard intermediate packaging that is used to transport small plastic parts are included in module A3. Transportation from Adels-Contact's facility in Germany to the assembly facility in Poland (1.000km using road freight) is included in module A3. This module also considers impacts from the disposal of upstream packaging material (cardboard and plastic bag) and Product packaging (cardboard) for distribution to the consumer site.

Construction Stage (A4 – A5)

The modules A4 and A5 encompass the environmental impacts associated with transporting the product to the customer site (A4) and the installation processes (A5). Module A4 includes the distribution from the assembly facility in Poland to customers or distributors in Utrecht in the Netherlands using road freight (1.200 km). Module A5 covers the end-of-life treatment of packaging for the Adels-Contact connectors. Installation itself is assumed to have a marginal impact since installation is done by hand and does not involve material losses or cut-outs. The end-of-life of the 3% of product and packaging lost in installation is declared in module A5, as well as the end-of-life (EoL) of the packaging material. EoL management for these materials includes regional recycling, incineration, and landfill practices, with breakdowns specific to each material and is modelled in accordance to the instructions of the Assessment Method Section 2.6.4.3. Individual waste streams are allocated to different waste treatments according to the scenarios given in "Forfaitaire waarden voor verwerking-scenario's einde leven behorende bij: Bepalingsmethode Milieuprestatie Bouwwerken" as displayed in the table below.

Table 4 - Allocation of waste streams to waste treatments used in A5 – from the Assessment Method

Stream	ID	Stroom	Specificatie	Laten zitten	Stort	AVI	Recyclin g	Hergebr uik
Plastics	43	kunststoffen	via restmateriaal	0	20	80	0	0
Paper	NA*	NA*	NA*	0	9	9	82	0

Use Stage (B1 – B7)

The use of the product does not involve any input or output that would not be covered by other modules (e.g. B6 and B7). Therefore, **module B1** is zero. Maintenance, repair, replacements, and renewals, are not necessary to fulfil the functional unit over the reference services life. Therefore, **modules B2-B5** are zero. The connector system contributes to module **B6** via Joule losses. Joule losses are calculated following the requirements of PEP ecopassport PSR-0001-ed4-EN-2022 11 16, Specific Rules for Wires, Cables and Accessories. The use phase does not require any operational water consumption. Therefore, **B7** is zero.

End of Life Stage (C1 – C4)

Modules C1 to C4 cover the product's EoL. It starts when the product is replaced, dismantled or disposed by the user and does not provide any further function. These modules cover transport to waste processing (C2), waste processing for reuse, recovery and/or recycling (C3) and disposal (C4).

The product collection rate is assumed to be 100%.

Deconstruction (C1) only requires the use of hand tools (e.g., screwdriver) and is assumed to be associated with negligible loads. Therefore, module C1 is zero.

Default values for transport distances to sorting site, recycling site, landfill site, and waste incineration plants have been defined in accordance with the requirements of §2.6.3.7 of the Assessment Method.

- incineration plant (AVI): 150 km;
- transport distance single journey from the demolition location to the landfill location: 100 km;
- transport distance single journey from the demolition location to the sorting and/or crushing plant for recycling: 50 km.

The environmental impact in C3 and C4 is calculated via the end-of-life processing scenarios as published on the National Environmental Database website, Section 2.6.4.3. Individual waste streams are allocated to different waste treatments according to the scenarios given in "Forfaitaire waarden voor verwerking-scenario's einde leven behorende bij: Bepalingsmethode Milieuprestatie Bouwwerken" as shown in the table below.

Table 5 - Allocation of waste streams to waste treatments used in Module C – from the Assessment Method

Stream	ID	Stroom	Specificatie	Laten zitten	Stort	AVI	Recycling	Hergebruik
Plastics	43	kunststoffen	via restmateriaal	0	20	80	0	0
Copper	41	koper	o.a. platen, leidingen	0	5	0	95	0
Paper	NA*	NA*	NA*	0	9	9	82	0

Benefits and Loads Beyond The System Boundaries Stage (D)

No benefits and loads from for co-products are declared as part of A1 to A3 as there are no co-products considered.

In accordance with the requirements of EN 15804+A2, material and energy credits are excluded from the system boundaries and are grouped separately in **Module D**. These credits include:

- Benefits for avoided primary production of materials recovered from the recycling of metals from other products and to be used in the product and in the electronics.
- Electric and thermal energy generated from the incineration of plastics contained in the product at EoL in Module C3 or from the product packaging incinerated in A5.

Module D includes benefits and loads arising from module A5 i.e. EOL processes for packaging and module C3 i.e. processing of waste. The benefits are based on following datasets as described in the NMD document of Environmental Performance Assessment method for construction work.

➔ For saved electricity: 'Electricity, high voltage {NL}| heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical | Cut-off, U'

➔ For saved heat: 'Heat, district or industrial, natural gas {Europe without Switzerland}| heat production, natural gas, at industrial furnace >100kW | Cut-off, U'

The average net efficiency of Dutch waste incineration plants (AVI), as prescribed in the NMD methodology, was applied. An average efficiency of 18% for electricity generation and 31% for thermal energy recovery was assumed. Lower Heating Values (LVHs) for recycling processes in Module D have been taken from the Assessment Method, as displayed in the table below.

Table 6 - Considered lower heating values – from the Assessment Method

Material category	LHV	Source
Mixed plastics parts	34,78	Documentation of the Ecoinvent dataset "treatment of waste plastic" (Documentation of the Ecoinvent dataset "treatment of waste plastic" (https://ecoquery.ecoinvent.org/3.9.1/cutoff/dataset/9478/documentation)
Copper parts	no incineration	NA
Cables	34,78	Only the plastic part is incinerated. We used the same LHV as for the mixed plastic parts.
Packaging paper	14,11	Assessment method p29

It is assumed that copper reaches the end of its waste properties immediately after dismantling/demolition. The impacts of copper recycling and the credits achieved as a result of material substitution (net-scrap approach) are included in this module. This module also includes energy credits from incineration, i.e., the replacement of electricity (electricity mix) and heat energy (from natural gas) as a result of the incineration of plastic and paper.

Life Cycle Impact Assessment

The following table compares the various phases against indicators defined by EN15804+2.

Table 7 – Environmental impact indicators EN15804 + A2: Cable AC 166 G VLC 5

Parameter	Unit	Total	A1	A2	A3	A4	A5	B6	C2	C3	C4	D
GWP total	kg CO2-eq.	7,41E+00	1,55E+00	3,74E-02	2,06E-01	4,79E-02	1,67E-02	5,97E+00	3,87E-03	2,39E-01	2,02E-03	-6,63E-01
GWP fossil	kg CO2-eq.	7,38E+00	1,54E+00	3,74E-02	2,26E-01	4,78E-02	8,73E-03	5,97E+00	3,87E-03	2,39E-01	2,02E-03	-6,98E-01
GWP biogenic	kg CO2-eq.	2,38E-02	2,83E-03	3,14E-05	-2,14E-02	4,01E-05	7,95E-03	-1,63E-03	3,24E-06	1,23E-05	1,50E-06	3,59E-02
GWP luluc	kg CO2-eq.	2,22E-03	2,20E-03	1,83E-05	5,67E-04	2,34E-05	5,17E-07	6,42E-04	1,89E-06	1,20E-06	2,37E-07	-1,24E-03
ODP	kg CFC-11-eq.	2,02E-07	1,38E-08	8,20E-10	3,43E-09	1,05E-09	2,74E-11	1,96E-07	8,48E-11	1,22E-10	7,44E-12	-1,35E-08
AP	mole of H+-eq.	4,36E-02	8,18E-02	1,75E-04	9,82E-04	2,23E-04	9,82E-06	9,52E-03	1,81E-05	5,96E-05	2,20E-06	-4,92E-02
EP - freshwater	kg P eq.	3,04E-03	6,33E-03	2,70E-06	1,98E-04	3,45E-06	2,81E-07	1,21E-03	2,79E-07	2,60E-06	4,16E-08	-4,71E-03
EP - marine	kg N eq.	5,43E-03	4,65E-03	6,94E-05	2,41E-04	8,87E-05	1,19E-05	2,99E-03	7,18E-06	3,96E-05	4,15E-05	-2,71E-03
EP - terrestrial	mole of N eq.	5,72E-02	5,91E-02	7,42E-04	2,14E-03	9,49E-04	4,24E-05	3,16E-02	7,67E-05	3,13E-04	8,36E-06	-3,78E-02
POCP	kg NMVOC eq.	1,79E-02	1,72E-02	2,59E-04	6,76E-04	3,31E-04	1,52E-05	9,62E-03	2,68E-05	7,72E-05	3,35E-06	-1,03E-02
ADPE	kg Sb eq.	4,04E-04	1,03E-03	1,16E-07	4,10E-06	1,49E-07	6,37E-09	2,67E-06	1,20E-08	8,41E-09	6,33E-10	-6,32E-04
ADPF	MJ	1,15E+02	2,63E+01	5,45E-01	3,49E+00	6,97E-01	1,81E-02	9,42E+01	5,64E-02	4,55E-02	7,02E-03	-9,92E+00
WDP	m3 world eq.	2,40E+00	1,67E+00	3,49E-03	7,36E-02	4,46E-03	4,64E-04	1,37E+00	3,61E-04	6,19E-03	3,09E-04	-7,28E-01

*EPD Modules not included in this table are 0 (zero).

GWP= Global warming potential, ODP= Depletion potential of stratospheric ozone layer, AP= Acidification potential of soil and water, EP= Eutrophication potential, POCP= Formation potential of tropospheric ozone, ADPE= Abiotic depletion potential (minerals & metals), ADPF= Abiotic depletion potential (fossil), WDP= Water deprivation potential

Environmental Cost Indicator

The Environmental Cost Indicator (ECI) is a single-score indicator expressed in Euro. It unites all relevant environmental impacts into a single score of environmental costs.

To calculate the ECI score, proceed as follows

- associate each environmental indicator with a conversion price expressed in euros
- multiply the conversion factor by the environmental impact of the corresponding indicator
- add up all the prices obtained for the individual indicators analysed

The conversion factors are provided by the Assessment Method and are shown in the tables below divided by application methodology (15804+A2).

Table 7 – ECI score used for EN15804+A2 indicators

Indicator	Conversion factor	Unit
Global warming potential (GWP) – total	0,116	€ / kg CO2 eq.
Global warming potential (GWP) – fossil	0,116	€ / kg CO2 eq.
Global warming potential (GWP) – biogenic	0,116	€ / kg CO2 eq.
Global warming potential (GWP) – luluc	0,116	€ / kg CO2 eq.
Depletion potential of the stratospheric ozone layer (ODP)	32	€ / kg CFC -11 eq.
Acidification potential of soil and water (AP)	0,39	€ / Mole of H+ eq.
Eutrophication potential (EP) – freshwater	1,96	€ / kg P eq.
Eutrophication potential (EP) – marine	3,28	€ / kg N eq.
Eutrophication potential (EP) – terrestrial	0,36	€ / Mole of N eq.
Formation potential of tropospheric ozone (POCP)	1,22	€ / kg NMVOC eq.
Abiotic depletion potential (ADP-minerals&metals)	0,30	€ / kg Sb eq.
Abiotic depletion potential (ADP-fossil)	0,00033	€ / MJ
Water (user) deprivation potential (WDP)	0,00506	€ / m3 world equiv.
Potential incidence of disease due to PM emissions (PM)	549750	€ / Disease incidence
Potential Human exposure efficiency relative to U235 (IRP)	0,049	€ / kBq U235eq
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	0,00013	€ / CTUe
Potential Comparative Toxic Unit for humans (HTP-c)	1096368	€ / CTUh
Potential Comparative Toxic Unit for humans (HTP-nc)	147588	€ / CTUh
Potential Soil quality index (SQP)	0,000087	€ / Pt

Table 9 – ECI calculated for the various life cycle stages

Module EN15804	ECI Score	Share in total (%)
A1	7,77E-01	38,03%
A2	1,16E-02	0,57%
A3	6,19E-02	3,03%
A4	1,48E-02	0,73%
A5	4,15E-03	0,20%
B6	1,51E+00	73,88%
C2	1,20E-03	0,06%
C3	5,73E-02	2,81%
C4	2,43E-03	0,12%
D	-3,97E-01	-19,46%
Sum	2,04E+00	

Verification and Declaration Information

EPD Owner:

Adels-Contact Elektrotechnische Fabrik GmbH & Co. KG
Buchholzstraße 40-46
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Products Covered:

AC 166® G & AC 164 Connector Systems

The environmental impacts presented in this Environmental Product Declaration (EPD) are based on a cradle-to-grave Life Cycle Assessment (LCA).

This EPD has been developed in accordance with:
EN 15804+A2 / ISO 14025 / ISO 14040 / ISO 14044

The Life Cycle Assessment was performed according to the requirements of the Dutch National Environmental Database (NMD) Environmental Performance Assessment Method for Construction Works, Version 1.2 (January 2025) including applicable addenda.

LCA Study

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Background report:

EPD of Connector Systems - Background Report
Version 2.1
11 March 2026

Independent Verification Statement

This Environmental Product Declaration and the underlying Life Cycle Assessment have been independently reviewed by an acknowledged verifier of the Dutch National Environmental Database (NMD).

Verifier

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Verification reference: B001_01_L251045 - Verification Statement dated 31 March 2026