ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A1*

Owner of the Declaration	JORDAHL GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-JDL-20200261-IBB1-EN
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Valid to	14.03.2026

Punching shear reinforcement system

JORDAHL GmbH

Institut Bauen und Umwelt e.V.

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1. General Information

JORDAHL GmbH	JORDAHL Punching and shear reinforcement system
Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** JORDAHL GmbH Nobelstraße 51 12057 Berlin Germany Europe
Declaration number EPD-JDL-20200261-IBB1-EN	**Declared product / declared unit** The declared unit is one meter of JORDAHL GmbH's punching shear reinforcement with a weight of 3.852 kg per meter. The punching shear reinforcement is illustrated using the example of JDA (1000 mm /-five double-headed anchor Ø16 mm, height 295 mm).
This declaration is based on the product category rules: Thin walled profiles and profiled panels of metal, 01.2019 (PCR checked and approved by the SVR)	**Scope:** This document refers to the JORDAHL GmbH punching shear reinforcement, manufactured in Trebbin, Germany. The declared unit refers to 1 meter of JDA punching shear reinforcement as specific product. The data collection was collected on a plant-specific basis with current annual data from 2019. The declaration holder is responsible for the underlying data and its verification. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences. The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.
Issue date 15.03.2021	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2010* ☐ internally ☒ externally
Valid to 14.03.2026	
 Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	 Christina Bocher (Independent verifier)
 Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	

2. Product

2.1 Information about the enterprise

Since its foundation in 1907, JORDAHL has been manufacturing products for fastening, reinforcement, connection and assembly technology as well as façade fastening, which are used worldwide in demanding construction projects. Owned by the Pohl family of shareholders since 1977, JORDAHL stands over more than 100 years for fastening and connection technology. In-house developments such as the “Kahneisen” and the cast-in anchor channel have become milestones in construction technology and have changed architecture worldwide in a lasting way.

2.2 Product description/Product definition

The product portfolio of JORDAHL® reinforcement systems includes punching shear reinforcement of the type JDA, JDA-FT-KL, JDA-S.
JORDAHL® punching shear reinforcement is a system consisting of a flat steel bar with at least two (welded or clicked) double-headed anchors in ribbed design fixed to the bar (see Fig.1).

Figure 1: Punching shear reinforcement JDA in ribbed design

JORDAHL® punching shear reinforcements are designed in accordance with:

- Punching shear reinforcement: *EOTA TR 060* or *EN 1992-1-1* and
- European Technical Approval *ETA-13/0136*
- Shear reinforcement: General construction supervision approval *Z-15.1-268* of the German Institute for Building Technology (DIBt)

For placing the product on the market in the EU/EFTA (except Switzerland), Regulation (EU) No. 305/2011 (*CPR*) applies. The product requires a declaration of performance taking into account *ETA-13/0136, March 20, 2018, Jordahl Punching shear reinforcement JDA* and the CE marking. The respective national provisions apply to its use. For the application and use the respective national provision apply.

2.3 Application

The JORDAHL® punching shear reinforcement is used for the transfer of high shear forces in flat slabs with low reinforcement requirements. This means that floor heights can be used optimally. It can be used both in foundations and in-situ concrete as well as in element ceilings (except shear reinforcement for element ceilings) and can be integrated into the reinforcement from above and below. Through its use, the punching resistance and the load-bearing capacity can be increased by up to 96 %.
JORDAHL® punching shear reinforcements are available in various designs, depending on the static requirements of a project.
Examples are:

- **JDA** for flat slabs, reinforced concrete slabs, footings, ground slabs
- **JDA-FT-KL** for Element slabs
- **JDA-S** for heavy-duty line supports (shear reinforcement)

2.4 Technical Data

The following technical data apply to punching shear reinforcement JDA. The test standard is dimensioned according to the European Technical Assessment *(ETA) ETA-13/0136.*

The test standard for the JDA-S is dimensioned in accordance with the national technical building approval *Z-15.1-268.*
All geometrical dimensions, product-specific parameters and static load capacities of the different shear, punching shear reinforcement JDA, JDA-FT-KL and JDA-S are given in the following technical specifications:

JDA und JDA-FT-KL System:

- *ETA-13/0136*

JDA-S system:

- *Z-15.1-268*

Constructional data
structural steel acc. to *DIN 488*

Name	Value	Unit
Thermal expansion coefficient	10	10-6K-1
Tensile strength	550	N/mm²
Modulus of elasticity	210000	N/mm²
Melting point	1250 - 1460	°C
Thermal conductivity	40 - 60	W/(mK)
Electrical conductivity at 20°C	10	Ω-1m-1
Density	7850	kg/m³

Constructional data
steel acc. to EN *10027*

Name	Value	Unit
Coefficient of thermal expansion	10,5	$10^{-6}K^{-1}$
Tensile stength	360 - 510	N/mm²
E-modulus	19000 -214000	N/mm²
Melting point	1250 - 1460	°C
Thermal conductivity	54	W/(mK)
Electrical conductivity at 20°C	10,5	$\Omega^{-1}m^{-1}$
Density	7850	kg/m³

Performance data of the product accoridng to harmonized standards, based on provisions for harmonization.

2.5 Delivery status

The dimensions of the punching shear reinforcement in the delivery condition for the anchor diameters are at least 10 mm to a maximum of 25 mm. The anchor length is at least 75 mm and the bar length at least 150 mm.

2.6 Base materials/Ancillary materials

The most important components of JORDAHL Punching shear reinforcement JDA are:

- Bar: Steel: 90 - 95 M.-%
- Double head anchor: construction steel: 5 - 10 M.-%
- Patented plastic lock and Spacer: plastic / fibre concrete: < 1 M.-%

This product or at least one partial article contains substances listed in the *candidate list* (27.06.2018) exceeding 0.1 percentage by mass: no.

This product or at least one partial article contains other *CMR substances* in categories 1A or 1B which are not on the ECHA candidate list, exceeding 0.1 percentage by mass: no.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on *Biocide Products* No. 528/2012): no.

2.7 Manufacture

The bars, double-headed anchors as well as the spacers and patented plastic locks (plastic or fibre concrete) of the punching and shear reinforcements are produced or purchased from qualified suppliers as ribbed reinforcing steel. After delivery, JORDAHL punching shear reinforcements are produced. The individual double-headed anchors are turned into reinforcement elements with at least two anchors each, attached to the steel bars by tack welding.
For exclusive use in precast elements, the anchors are attached to the steel bars by means of patented plastic locks. The accumulated metal scrap and filter dust are stored in containers and disposed of by a certified waste disposal company in accordance with legal requirements.
The click system or the spacers made of plastic / fiber-reinforced concrete are added in the JORDAHL factory before packing.

2.8 Environment and health during manufacturing

During the entire manufacturing process, no health protection measures beyond the usual industrial safety measures for commercial enterprises are required.

The following certifications exist:

- *ISO 9001* (Quality Management)
- *ISO 50001* (Energy Management)

2.9 Product processing/Installation

The JORDAHL punching shear reinforcement JDA, JDA-FT-KL and JDA-S are supplied as ready-to-install reinforcement elements or integrated and fully concreted into the reinforcement of flat slabs, element slabs (except shear reinforcement), floor slabs, reinforced concrete slabs or foundations. They transfer high shear forces and ensure the transition between punching through and shear force bearing capacity.

2.10 Packaging

JORDAHL Punching shear reinforcement is packed in cardboards or loaded on Euro pallets for transport. The packaging material is easily separable and can be reused if used properly.

The remaining part can be collected by type and sent to the regional recycling supplier. Residual materials must be disposed of in accordance with the respective national regulations.

2.11 Condition of use

JORDAHL punching shear reinforcement is a durable building material. The material composition does not change during the service life.

2.12 Environment and health during use

No environmental pollution is caused by processing/installation of the products mentioned. No special measures to protect the environment are to be taken.
No risks can arise to water, air and soil if the products are used as designated.

2.13 Reference service life

The reference service life could not be determined in compliance with *ISO 15686*. According to the service lives of components for life cycle analyses according to the Sustainable Building Assessment System (*BBSR*), the reference service life of steel components is at least 50 years.
The product is made of steel, the spacers and patended plastic locks are made of plastic or fibre concrete. The product is protected against external influences after installation. It therefore shows no weathering per year.

2.14 Extraordinary effects

Fire

The punching shear reinforcements JDA declared here correspond to building material class A1 according to *EN 13501.*

Fire protection

Name	Value
Building material class	A1
Burning droplets	-

Water

No water-endangering ingredients are washed out.

Mechanical destruction

In the event of mechanical destruction, all substances remain in bound state. There are no relevant environmental impacts associated with mechanical destruction.

2.15 Re-use phase

The mounting and cast-in anchor channels can be recycled after dismantling. The punching shear reinforcement system cannot be used again.

2.16 Disposal

The waste codes are according to the Waste Catalogue Ordinance
(Abfall Verzeichnis Verordnung *AVV*) and European Waste Catalogue *(EWC*):

- 17 04 05 – Iron and Steel

2.17 Further information

JORDAHL products are sold centrally in Germany through PohlCon Vertriebs GmbH. Further information and downloads are available on www.pohlcon.com.

3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the production of 1 m punching shear reinforcement JDA with five double-headed anchor Ø16 mm and a height of 295 mm.

Declared unit

Name	Value	Unit
Declared unit	1	m
Grammage	3.852	kg/m
Conversion factor to 1 kg	0.259	-

The product group of punching shear reinforcement JDA varies in size, weight and slightly in its composition.

3.2 System boundary

The Life Cycle Assessment considers the system boundaries "cradle to gate - with options" and follows the modular construction system described by *EN 15804*. The LCA takes into account the following modules:

- A1: Raw material supply: extraction of raw material, production of precursors, processing of secondary material
- A2: Transport: transport of raw materials to manufacturing plant
- A3: Manufacturing: Production of punching shear reinforcement
- C2: Transportation towards disposal: transport of discarded product as part of waste processing
- C3: Waste processing: Waste management for reuse, recovery and/or recycling
- C4: Disposal
- D: Reuse, recovery or recycling potential as net flows and credits (benefits) for steel & structural steel

3.3 Estimates and assumptions

Plant-specific and data regarding the production process was provided by JORDAHL GmbH. Missing data was supplemented by estimates based on comparable substitutes or data used from the secondary literature, which have no significant relevance for the results. Missing data set in the database were modeled by the life cycle assessor.

3.4 Cut-off criteria

All relevant data, i.e. all applied materials according to the recipe and the energy used originate from the production data acquisition and have been considered within the inventory analysis.
The actual transport distances were used for the inputs and outputs taken into account.
Material- and energyflows with a proportion of less than 1 % were collected. It can be assumed, that the sum of the neglected processes does not exceed 5 % of the impact categories.

The operating expanses for the provision of the infrastructure (machines, buildings, etc.) of the entire foreground system were not taken into account.

3.5 Background data

All background data required for the Life Cycle Assessment originates form the database *ecoinvent 3:6*.

3.6 Data quality

For modelling the Life Cycle of punching and shear reinforcement JDA, data from the production year 2019 was collected by JORDAHL GmbH at the Trebbin production plan, according to *ISO 14044*. All other relevant background has been taken from the database of *ecoinvent 3:6* and is not older than 5 years. For the Life Cycle Inventory all relevant input and output flows have been respected.
The selection of the background data was made in accordance to technological, geographical and time-related representativeness of the data basis. Absent of specific data was supplemented with generic data sets or a representative average data.
The representativeness and data quality is therefore classified as good.

3.7 Period under review

The amount of raw materials, input energy and the volume of waste relate to the year 2019. It corresponds to the best currently available technology and thus is representative for the considered time period. The reference area is Europe.

3.8 Allocation

Co-product allocation does not exist in the manufacturing process.
All product-related data refer to the declared product. More detailed information on the allocation in the background data can be found in the documentation for the ecoinvent 3.6 database.

After the use phase, the product can be subjected to material recycling. When modeling the end-of-life (EoL), a collection rate of 95% after the use phase was assumed ("cut-off" approach).

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The LCA background database *ecoinvent 3:6* was used.

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4. LCA: Scenarios and additional technical information

The following technical information models the basis for the declared modules or can be used for developing specific scenarios within the context of a building assessment.

The reference life span according to *ISO 15686* could not be determined. The information on service life is taken from Table *BBSR* 2017, Service life of components for - Life cycle analyses according to the Sustainable Building Assessment System (Bewertungssystem Nachhaltiges Bauen BNB).

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	≥ 50	a

End of life (C1 - C4)

Name	Value	Unit
Collected as mixed construction waste	3.852	kg
Recycling	3.659	kg
Landfilling (recycling loss 5%)	0.193	kg

The product is made almost entirely from secondary material, therefore the net amount of steel scrap is negative (-0,201 kg). It results from a steel scrap input of 3.84 kg and an amount of steel scrap at the end of its life of 0.95 kg, taking into account a recycling loss of 5%. Cuttings within production were recorded. The collection rate is set at 100%, the recycling loss at 5%.

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Steel scrap End of Life volume	3.659	kg
Net steel scrap volume	-0.201	kg

5. LCA: Results

The table displayed below summarizes the results of the Life Cycle Assessment (LCA). The results of the impact assessment do not provide any information on endpoints of the impact categories, exceedances of thresholds,safety margins or risks. The results refer to the declared unit of 1 m cast-in anchor channels. The Impact Assessment is based on *CML IA baseline*.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m punching shear reinforcement JDA

Parameter	Unit	A1-A3	C2	C3	C4	D
Global warming potential	[kg CO_2-Eq.]	2.96E+0	1.80E-1	0.00E+0	9.33E-4	3.06E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.10E-7	3.28E-8	0.00E+0	1.63E-10	1.60E-8
Acidification potential of land and water	[kg SO_2-Eq.]	1.04E-2	4.68E-4	0.00E+0	5.61E-6	1.16E-3
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.69E-3	7.98E-5	0.00E+0	1.17E-6	1.53E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	8.97E-4	1.72E-5	0.00E+0	1.96E-7	2.36E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	6.43E-6	1.06E-8	0.00E+0	2.56E-10	2.99E-7
Abiotic depletion potential for fossil resources	[MJ]	3.81E+1	2.53E+0	0.00E+0	1.29E-2	3.20E+0

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m punching shear reinforcement JDA

Parameter	Unit	A1-A3	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	1.07E+0	9.94E-4	0.00E+0	3.50E-5	5.91E-3
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	1.07E+0	9.94E-4	0.00E+0	3.50E-5	5.91E-3
Non-renewable primary energy as energy carrier	[MJ]	4.15E+1	2.68E+0	0.00E+0	1.37E-2	3.38E+0
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	4.15E+1	2.68E+0	0.00E+0	1.37E-2	3.38E+0
Use of secondary material	[kg]	3.84E+0	0.00E+0	0.00E+0	0.00E+0	-2.01E-1
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m^3]	2.19E+0	-5.58E-4	0.00E+0	-1.68E-5	-7.53E-3

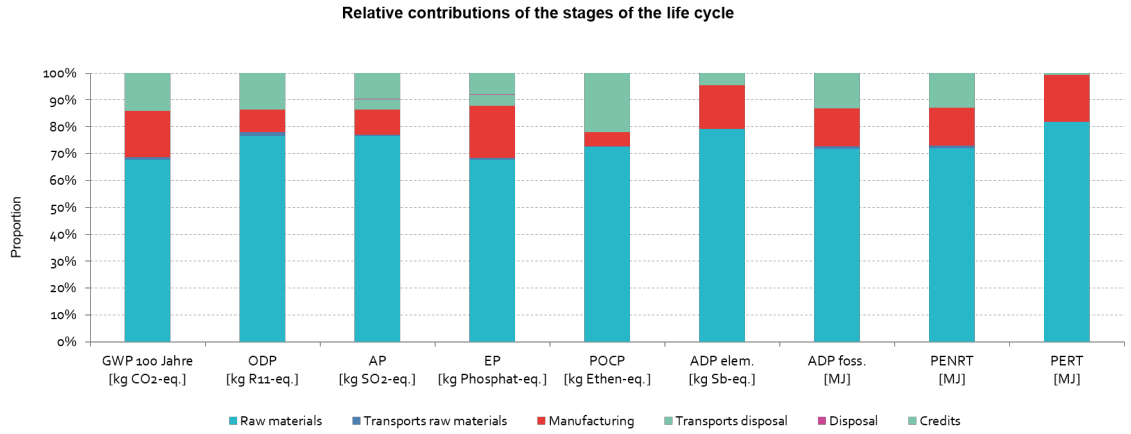
RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 m punching shear reinforcement JDA

Parameter	Unit	A1-A3	C2	C3	C4	D
Hazardous waste disposed	[kg]	6.22E-5	6.70E-6	0.00E+0	3.28E-8	3.34E-5
Non-hazardous waste disposed	[kg]	6.81E-1	1.05E-4	0.00E+0	1.91E-1	1.81E-2
Radioactive waste disposed	[kg]	2.42E-4	1.84E-5	0.00E+0	9.32E-8	3.53E-6
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	3.66E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

6. LCA: Interpretation

The following figure shows the relative contributions of different Life Cycle processes and the primary energy demand in the form of a dominance analysis.

The present impact assessment relates to a specific product with a weight of 3,852 kg/ m. The final products can differ in their dimensions. The results of the impact assessment can be scaled linearly over the weight.



Indicators of the impact assessment
The impact categories of punching shear reinforcement systems are determined along the life cycle mainly by the supply of raw materials.
The main driver is the use of reinforcing steel and structural steel, which contributes approx. 79 % to greenhouse gas potential (GWP) within production (A1-A3). Compared to the supply of raw materials, the contributions to environmental impacts from the transport (A2) of the preliminary products are less pronounced. The energy input for production (A3) within the production stage contributes 18 % of the GWP.
For the product, the end of life (EoL) results in credits (-0.189 kgCO2eqv.) and charges resulting from the net flow statement for the secondary materials used over the entire life cycle. The secondary raw materials contained in the product result in charges at the end of the life cycle.

Global warming potential (GWP)
The GWP factor is determined in particular by the raw material supply with approx. 79 % within the production (A1-A3), followed by the required energy source electricity (18 %) and natural gas (approx. 1 %).

Depletion potential of the stratospheric ozone layer (ODP)
The ozone depletion potential (ODP) is almost exclusively determined by the precursors (approx. 88 %). Transportation causes 2 % of the ODP factor within the production module (A3), the use of electricity about 8 % and natural gas about 1 %.

Acidification potential of land and water (AP)
The acidification potential (AP) is determined within the production with 88 % by the use of stainless steel. The use of energy sources in A3 contributes with 10 % to the AP.

Eutrophication potential (EP)
The eutrophication potential is determined to 77 % by the precursors, followed by the use of the energy sources electricity with 21 % in A3.

Potential of tropospheric ozone photochemical oxidants (POCP)
The POCP value is dominated to approx. 93 % by the use of stainless steel.

Abiotic depletion potential for non-fossil resources (ADP elem.)
The ADP elem. value is determined by the extraction of the precursors (83 %). The use of electricity contributes to the factor with 4 %.

Abiotic depletion potential for fossil resources (ADP foss.)
Within the production (A1-3), the ADP fossil value results mainly from the provision of the steel types reinforcing steel and structural steel (approx. 82%) and the use of electricity (approx. 14%) and natural gas (approx. 2%).

The **total primary energy demand** within the production (A1-A3) is divided into about 97 % from non-renewable energy sources and about 3 % from renewable energies.

7. Requisite evidence

Not relevant.

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ISO15686
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EN 10027
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