

# ENVIRONMENTAL PRODUCT DECLARATION



According to ISO 14025 and EN 15804

Registered under the scope of mutual recognition between  
The International EPD® System and The Norwegian EPD Foundation

Program operator: The Norwegian EPD Foundation  
Publisher: International EPD® System  
Declaration number: NEPD-1235-389-EN  
Registration number: S-P-04378  
Issue date: 2017-01-10  
Valid to: 2022-01-10

## Permanent Strand Anchor Type 0.60, 12 strands Dywidag Norge AS



## General information

### Product:

Permanent Strand Anchor Type 0.60, 12 strands

### Owner of the declaration:

Dywidag Norge AS  
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### Manufacturer:

DYWIDAG-Systems International GmbH Construction  
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Phone: +49-8231-96 07-0  
e-mail: [geotechnik@dywidag-systems.com](mailto:geotechnik@dywidag-systems.com)

### Declaration number:

NEPD-1235-389-EN

### Place of production:

Koenigsbrunn, Germany

### ECO Platform reference number:

-

### Management system:

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

CEN Standard EN 15804 serves as core PCR  
NPCR 013 Steel as Construction Material Rev 1 (08/2013)

### Organisation no.(Norway):

929063376

### 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.

### Issue date:

10.01.2017

### Declared unit:

1 kg strand anchor

### Valid to:

10.01.2022

### Year of study:

2016

### Comparability:

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

### The EPD has been worked out by:



Annik Magerholm Fet

Annik Magerholm Fet

### Verification:

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

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internal

☒

external

Third party verifier:

Marte Leenaas

(Independent verifier approved by EPD Norway)

Approved

Håkon Hauan

Håkon Hauan  
Managing Director of EPD-Norway

## Product

### Product description:

The permanent strand anchor type 0.60, 12 strands, is a steel anchor with corrosion protection, mounted in the ground - used to anchor large constructions such as i.e. bridges, buildings etc.

### Product specification:

Components from suppliers are transported to Dywidags factory in Königsbrunn, Germany, where the strand anchors are assembled, before they are transported to construction sites in Norway.

### Technical data:

In compliance with standards DIN 4125 and EN 1537. The main component of the anchor analysed, the steel strands, has the nominal diameter of 15,2 mm each. Total weight of the anchor with 12 strands, with the average length 15m: 284 kg.

### Market:

Norway

### Reference service life, product:

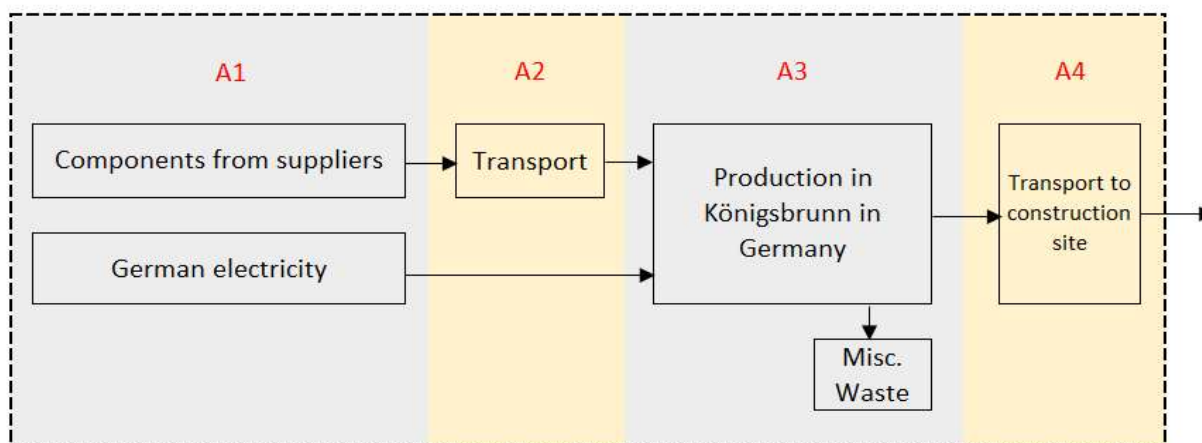
110

Materials	kg	%
Steel	249,9	88
Plastic	26,9	9
Grease	7,2	3

## LCA: Calculation rules

### Declared unit:

1 kg strand anchor, with the expected service life of 110 years



### System boundary:

System boundaries are shown in the flowchart. Cradle to gate (A1-A3) plus transport to construction site (A4).

### Data quality:

General requirements and guidelines concerning use of generic and specific data and the quality of those are as described in EN 15804: 2012, clause 6.3.6 and 6.3.7. The data is representative according to temporal, geographical and technological requirements.

### Temporal:

Data for use in module A3 is supplied by the manufacturer and consists of the recorded amount of specific material and energy consumption for the product studied. Specific data has been collected in 2016. Generic data has been created or updated within the last 10 years.

### Geographical:

The geographic region of the production sites included in the calculation is Europe.

### Technological:

Data represents technology in use. All generic (background) data has been gathered from the PE International GaBi 6 Professional Database and the Ecoinvent V3 database.

### 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.

### Allocation:

The production process at the company plant includes material and process data for the total manufacturing and assembly of the bar anchor, including energy consumption. The data was gathered specifically for the production of one bar anchor, including energy consumption for the duration of the product manufacturing. Thus, no allocation has been necessary.

## LCA: Scenarios and additional technical information

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

### Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck-trailer, diesel driven, Euro 5, cargo	85	34 - 40 t gross weight / 27t payload capacity	1930 km	0,0153 l/tkm	29,5

Truck transport is modelled using a generic 34-40t truck dataset for European conditions. The transport conditions may vary something from delivery to delivery, as products are transported directly from manufacturer to construction site, and varies depending on the product delivered. A average/default utilization rate has therefore been set to 85%, and a average distance to the Oslo-area where most products are delivered, is set to 1930 km.

## LCA: Results

All key assumptions and estimates are either presented in the EPD or can be found in NPCR13Rev1 (08/2013). The impacts generated in the life cycle stages described within the system boundaries are calculated using GaBi 6. Background data is from the GaBi 6 professional database and Ecoinvent v3. The impact assessment methodology used is CML 2001.

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

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	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	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	

### Environmental impact

Parameter	Unit	A1	A2	A3	A1- A3	A4
GWP	kg CO <sub>2</sub> -eqv	2,32E+00	6,55E-02	4,82E-03	2,39E+00	8,84E-02
ODP	kg CFC11-eqv	1,39E-10	1,65E-13	9,72E-14	1,39E-10	2,24E-13
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	1,07E-03	-4,72E-05	4,89E-08	1,02E-03	-6,37E-05
AP	kg SO <sub>2</sub> -eqv	7,43E-03	1,56E-04	1,04E-06	7,59E-03	2,12E-04
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	6,34E-04	3,84E-05	1,86E-07	6,72E-04	5,18E-05
ADPM	kg Sb-eqv	1,65E-07	5,10E-09	2,06E-10	1,70E-07	6,86E-09
ADPE	MJ	2,92E+01	8,94E-01	4,19E-03	3,01E+01	1,20E+00

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

The negative POCP from the trucks in A2 is caused by the division of the NO<sub>x</sub> emissions into the two single emissions NO<sub>2</sub> and NO during the upgrade from GaBi 4 to GaBi 5/6. The NO has a negative effect on the POCP since it reduces the close ground ozone formation.

## Resource use

Parameter	Unit	A1	A2	A3	A1-A3	A4
RPEE	MJ	1,76E+00	6,17E-02	8,59E-02	1,91E+00	8,32E-02
RPEM	MJ	1,77E-06	2,44E-13	4,95E-12	1,77E-06	3,29E-13
TPE	MJ	1,76E+00	6,17E-02	8,59E-02	1,91E+00	8,32E-02
NRPE	MJ	2,98E+01	8,97E-01	4,01E-01	3,11E+01	1,21E+00
NRPM	MJ	4,78E-04	8,57E-05	2,99E-05	5,93E-04	1,16E-04
TRPE	MJ	2,98E+01	8,97E-01	4,01E-01	3,11E+01	1,21E+00
SM	kg	1,28E-01	0,00E+00	0,00E+00	1,28E-01	0,00E+00
RSF	MJ	-1,21E-02	3,44E-06	3,31E-06	-1,21E-02	4,65E-06
NRSF	MJ	-1,86E-01	5,24E-05	5,01E-05	-1,86E-01	7,07E-05
W	m <sup>3</sup>	9,28E-01	4,59E-03	3,86E-02	9,71E-01	6,19E-03

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	A2	A3	A1- A3	A4
HW	kg	2,97E-08	1,14E-07	4,11E-10	1,44E-07	1,54E-07
NHW	kg	2,95E-02	1,13E-04	2,34E-04	2,98E-02	1,53E-04
RW	kg	3,64E-04	1,55E-06	1,89E-05	3,85E-04	2,10E-06

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

## End of life - Output flow

Parameter	Unit	A1	A2	A3	A1- A3	A4
CR	kg	-	-	-	-	-
MR	kg	-	-	9,89E-04	9,89E-04	-
MER	kg	-	-	-	-	-
EEE	MJ	-	-	1,53E+00	1,53E+00	-
ETE	MJ	-	-	3,78E+00	3,78E+00	-

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

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

## Additional Norwegian requirements

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

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

Data source	Amount	Unit
GaBi 6 Electricity mix (DE) (2012)	0,629	kg 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 contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforsikten, Annex III), see table.

### 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>
LCA-Report Dywidag Norge AS	Life Cycle Assessment Report: Permanent Strand Anchor Type 0.60, 12 strands
NPCR 013-2013	Product Category Rules: Steel as Construction Material

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