

Environmental product declaration

In accordance with ISO 14025 and EN15804+A2

TSS 101 G



The Norwegian EPD Foundation

Owner of the declaration:

Invisible Connections AS

Product:

TSS 101 G

Declared unit:

1 pcs

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR

NPCR 013:2021 Part B for Steel and aluminium construction products

Program operator:

The Norwegian EPD Foundation

Declaration number:

NEPD-8960-8632

Registration number:

NEPD-8960-8632

Issue date: 05.02.2025

Valid to: 05.02.2030

EPD software:

LCAno EPD generator ID: 309374

General information

Product

TSS 101 G

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Declaration number:

NEPD-8960-8632

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 013:2021 Part B for Steel and aluminium construction products

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.

Declared unit:

1 pcs TSS 101 G

Declared unit with option:

A1-A3,A4,A5,C1,C2,C3,C4,D

Functional unit:

Telescopic stair connector.
Inner and outertube made of steel with a total capacity of 100kN.

General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Verification of each EPD is made according to EPD-Norway's guidelines for verification and approval requiring that tools are i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPD-Norway, and iii) the process is reviewed annually by an independent third party verifier. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools

Verification of EPD tool:

Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPD-Norway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Alexander Borg, Asplan Viak AS

(no signature required)

Owner of the declaration:

Invisible Connections AS
Contact person:
Phone:
e-mail: terje@invisi.no

Manufacturer:

Invisible Connections AS

Place of production:

Invisible Connections AS

, Norway

Management system:

NS-EN 1090

Organisation no:

992435194

Issue date:

05.02.2025

Valid to:

05.02.2030

Year of study:

2023

Comparability:

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

Development and verification of EPD:

The declaration is created using EPD tool lca.tools NEPDT038, developed by LCA.no. The EPD tool is integrated in the company's management system, and has been approved by EPD Norway.

Developer of EPD: Terje Berg

Reviewer of company-specific input data and EPD: John Egil Sæther

Approved:


Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Stair connector to be casted in concrete landings.

<https://invisibleconnections.no/produkter/trapp-reposforbindelser/rvk/tss-101/>

Product specification

Inner and outer tube made of galvanized steel. 100kN capacity

| Materials | kg | % |
|-------------------------------|------|--------|
| Plastic - Nylon (PA) | 0,02 | 0,24 |
| Plastic - Polyethylene (HDPE) | 0,04 | 0,54 |
| Metal - Stainless steel | 0,03 | 0,33 |
| Metal - Steel | 7,87 | 95,96 |
| Metal - Zinc | 0,24 | 2,93 |
| Total | 8,20 | 100,00 |

| Packaging | kg | % |
|-----------------------|------|--------|
| Packaging - Pallet | 0,18 | 50,00 |
| Packaging - Wood | 0,18 | 50,00 |
| Total incl. packaging | 8,56 | 100,00 |

Technical data:

Certificated after NS EN 1090 and EN 1090 UK

Market:

Global

Reference service life, product

Same as building

Reference service life, building or construction works

100 years

LCA: Calculation rules

Declared unit:

1 pcs TSS 101 G

Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Data quality:

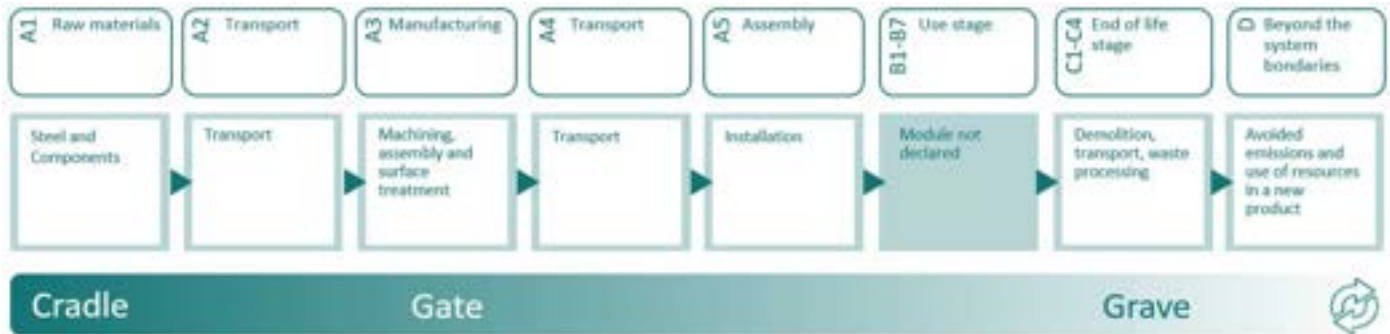
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

| Materials | Source | Data quality | Year |
|-------------------------------|------------------------|--------------|------|
| Metal - Stainless steel | ecoinvent 3.6 | Database | 2019 |
| Metal - Steel | ecoinvent 3.6 | Database | 2019 |
| Metal - Steel | S-P-02241 | EPD | 2020 |
| Metal - Steel | S-P-05669 | EPD | 2022 |
| Metal - Zinc | ecoinvent 3.6 | Database | 2019 |
| Packaging - Pallet | Modified ecoinvent 3.6 | Database | 2019 |
| Packaging - Wood | ecoinvent 3.6 | Database | 2019 |
| Plastic - Nylon (PA) | ecoinvent 3.6 | Database | 2019 |
| Plastic - Polyethylene (HDPE) | ecoinvent 3.6 | Database | 2019 |

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

| Product stage | | | Construction installation 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 | X | MND | MND | MND | MND | MND | MND | MND | X | X | X | X | X |

System boundary:



Additional technical information:

<https://invisibleconnections.no/en>

LCA: Scenarios and additional technical information

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














Products are sent to the factory or building sites that makes the concrete landing.

Packaging are 100% recyclabel. Or can be reused. (pallets and frames)

| Transport from production place to user (A4) | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit | Value (Liter/tonne) |
|--|---------------------------------------|---------------|-------------------------|-------|---------------------|
| Truck, 16-32 tonnes, EURO 6 (km) | 36,7 % | 1000 | 0,043 | l/tkm | 43,00 |
| Assembly (A5) | | | | | |
| | Unit | Value | | | |
| Waste, packaging, wood beam, softwood, raw, dried, u=20%, average treatment (kg) - A5, inkl. 85 km transp. | kg | 0,18 | | | |
| Waste, packaging, pallet, EUR wooden pallet, reusable, average treatment (kg) - A5, inkl. 85 km transp. | kg | 0,18 | | | |
| Transport to waste processing (C2) | | | | | |
| | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit | Value (Liter/tonne) |
| Truck, 16-32 tonnes, EURO 6 (km) | 36,7 % | 250 | 0,043 | l/tkm | 10,75 |
| Waste processing (C3) | | | | | |
| | Unit | Value | | | |
| Materials to recycling (kg) | kg | 7,31 | | | |
| Waste treatment per kg Polyethylene (PE), incineration with fly ash extraction (kg) - CH - C3 | kg | 0,064 | | | |
| Disposal (C4) | | | | | |
| | Unit | Value | | | |
| Waste, scrap steel, to landfill (kg) | kg | 0,81 | | | |
| Landfilling of ashes from incineration of Polypropylene (PP), process per kg ashes and residues (kg) - CH - C4 | kg | 0,0019 | | | |
| Waste, scrap steel, for incineration (kg) | kg | 0,0089 | | | |
| Benefits and loads beyond the system boundaries (D) | | | | | |
| | Unit | Value | | | |
| Substitution of primary steel with net scrap (kg) | kg | 6,50 | | | |
| Substitution of electricity (MJ) | MJ | 0,10 | | | |
| Substitution of thermal energy, district heating, in Norway (MJ) | MJ | 1,57 | | | |

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

| Environmental impact | | | | | | | | | | |
|--|------------------------|-----------|----------|----------|----|----------|----------|----------|-----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  GWP-total | kg CO ₂ -eq | 2,04E+01 | 1,33E+00 | 5,54E-01 | 0 | 3,33E-01 | 1,93E-01 | 3,71E-03 | -7,17E+00 | |
|  GWP-fossil | kg CO ₂ -eq | 2,10E+01 | 1,33E+00 | 5,09E-03 | 0 | 3,33E-01 | 1,93E-01 | 3,71E-03 | -7,16E+00 | |
|  GWP-biogenic | kg CO ₂ -eq | -6,14E-01 | 5,51E-04 | 5,48E-01 | 0 | 1,38E-04 | 1,56E-06 | 3,96E-06 | -3,97E-03 | |
|  GWP-luluc | kg CO ₂ -eq | 1,08E-02 | 4,74E-04 | 1,31E-06 | 0 | 1,18E-04 | 2,29E-07 | 7,34E-07 | -3,52E-03 | |
|  ODP | kg CFC11 -eq | 5,96E-07 | 3,02E-07 | 8,13E-10 | 0 | 7,54E-08 | 1,48E-10 | 1,74E-09 | -6,66E-04 | |
|  AP | mol H+ -eq | 1,86E-01 | 3,83E-03 | 4,09E-05 | 0 | 9,56E-04 | 2,42E-05 | 3,53E-05 | -3,56E-02 | |
|  EP-FreshWater | kg P -eq | 1,96E-04 | 1,06E-05 | 6,10E-08 | 0 | 2,66E-06 | 1,48E-08 | 2,96E-08 | -4,41E-04 | |
|  EP-Marine | kg N -eq | 2,05E-02 | 7,57E-04 | 1,76E-05 | 0 | 1,89E-04 | 1,16E-05 | 1,32E-05 | -7,38E-03 | |
|  EP-Terrestrial | mol N -eq | 7,02E-01 | 8,47E-03 | 1,88E-04 | 0 | 2,12E-03 | 1,26E-04 | 1,45E-04 | -7,55E-02 | |
|  POCP | kg NMVOC -eq | 5,19E-02 | 3,24E-03 | 4,84E-05 | 0 | 8,11E-04 | 3,01E-05 | 4,16E-05 | -3,59E-02 | |
|  ADP-minerals&metals ¹ | kg Sb-eq | 1,86E-02 | 3,68E-05 | 8,26E-08 | 0 | 9,19E-06 | 6,76E-09 | 3,29E-08 | -1,24E-04 | |
|  ADP-fossil ¹ | MJ | 2,50E+02 | 2,01E+01 | 5,98E-02 | 0 | 5,03E+00 | 1,26E-02 | 1,16E-01 | -6,03E+01 | |
|  WDP ¹ | m ³ | 1,80E+02 | 1,95E+01 | 9,21E-02 | 0 | 4,87E+00 | 2,86E-02 | 2,52E-01 | 3,69E+02 | |

GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption







"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Remarks to environmental impacts

Additional environmental impact indicators









| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|-------------------|----------|----------|----------|----|----------|----------|----------|-----------|
|  PM | Disease incidence | 1,44E-06 | 8,15E-08 | 5,01E-10 | 0 | 2,04E-08 | 9,50E-11 | 7,54E-10 | -5,98E-07 |
|  IRP ² | kgBq U235 -eq | 5,67E-01 | 8,80E-02 | 2,17E-04 | 0 | 2,20E-02 | 2,13E-05 | 5,02E-04 | 2,48E-02 |
|  ETP-fw ¹ | CTUe | 7,74E+01 | 1,49E+01 | 6,81E-02 | 0 | 3,73E+00 | 3,77E-02 | 6,19E-02 | -3,99E+02 |
|  HTP-c ¹ | CTUh | 1,05E-08 | 0,00E+00 | 7,00E-12 | 0 | 0,00E+00 | 4,00E-12 | 2,00E-12 | -3,44E-08 |
|  HTP-nc ¹ | CTUh | 1,99E-07 | 1,63E-08 | 3,63E-10 | 0 | 4,08E-09 | 1,62E-10 | 3,80E-11 | 7,47E-07 |
|  SQP ¹ | dimensionless | 6,32E+01 | 1,41E+01 | 3,35E-02 | 0 | 3,52E+00 | 1,53E-03 | 4,17E-01 | -5,38E+00 |

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed




1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

| Resource use | | | | | | | | | | |
|---|----------------|----------|----------|-----------|----|----------|----------|----------|-----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  PERE | MJ | 1,96E+01 | 2,88E-01 | 1,23E-03 | 0 | 7,20E-02 | 3,71E-04 | 1,84E-03 | -5,70E+00 | |
|  PERM | MJ | 5,06E+00 | 0,00E+00 | -5,02E+00 | 0 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  PERT | MJ | 2,47E+01 | 2,88E-01 | -5,02E+00 | 0 | 7,20E-02 | 3,71E-04 | 1,84E-03 | -5,70E+00 | |
|  PENRE | MJ | 2,48E+02 | 2,01E+01 | 5,98E-02 | 0 | 5,03E+00 | 1,26E-02 | 1,16E-01 | -6,03E+01 | |
|  PENRM | MJ | 2,53E+00 | 0,00E+00 | 0,00E+00 | 0 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  PENRT | MJ | 2,50E+02 | 2,01E+01 | 5,98E-02 | 0 | 5,03E+00 | 1,26E-02 | 1,16E-01 | -6,03E+01 | |
|  SM | kg | 8,56E-01 | 0,00E+00 | 0,00E+00 | 0 | 0,00E+00 | 0,00E+00 | 4,02E-03 | 0,00E+00 | |
|  RSF | MJ | 1,06E-01 | 1,03E-02 | 3,59E-05 | 0 | 2,58E-03 | 1,05E-05 | 3,84E-05 | 2,58E-01 | |
|  NRSF | MJ | 9,54E-02 | 3,69E-02 | 4,08E-04 | 0 | 9,21E-03 | 0,00E+00 | 3,50E-04 | 7,47E+00 | |
|  FW | m ³ | 6,80E-02 | 2,15E-03 | 4,36E-05 | 0 | 5,38E-04 | 3,57E-05 | 1,37E-04 | -1,61E-02 | |

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = 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; FW = Net use of fresh water

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"






*INA Indicator Not Assessed

| End of life - Waste | | | | | | | | | | |
|--|------|----------|----------|----------|----|----------|----------|----------|-----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  HWD | kg | 2,41E-02 | 1,04E-03 | 0,00E+00 | 0 | 2,60E-04 | 0,00E+00 | 7,51E-03 | -3,72E-02 | |
|  NHWD | kg | 2,61E+00 | 9,79E-01 | 1,89E-01 | 0 | 2,45E-01 | 0,00E+00 | 8,18E-01 | -2,93E+00 | |
|  RWD | kg | 1,60E-03 | 1,37E-04 | 0,00E+00 | 0 | 3,43E-05 | 0,00E+00 | 1,64E-08 | 1,90E-05 | |

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

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

*INA Indicator Not Assessed

| End of life - Output flow | | | | | | | | | | |
|---|------|----------|----------|----------|----|----------|----------|----------|----------|--|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D | |
|  CRU | kg | 0,00E+00 | 0,00E+00 | 1,71E-01 | 0 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | |
|  MFR | kg | 6,76E-01 | 0,00E+00 | 4,47E-06 | 0 | 0,00E+00 | 7,32E+00 | 4,22E-03 | 0,00E+00 | |
|  MER | kg | 7,26E-03 | 0,00E+00 | 1,89E-01 | 0 | 0,00E+00 | 6,40E-02 | 1,21E-08 | 0,00E+00 | |
|  EEE | MJ | 8,38E-04 | 0,00E+00 | 1,32E-01 | 0 | 0,00E+00 | 1,24E-01 | 2,47E-04 | 0,00E+00 | |
|  EET | MJ | 1,27E-02 | 0,00E+00 | 1,99E+00 | 0 | 0,00E+00 | 1,88E+00 | 3,74E-03 | 0,00E+00 | |

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

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

*INA Indicator Not Assessed

| Biogenic Carbon Content | | |
|---|------|---------------------|
| Indicator | Unit | At the factory gate |
| Biogenic carbon content in product | kg C | 0,00E+00 |
| Biogenic carbon content in accompanying packaging | kg C | 1,64E-01 |

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂

Additional requirements

Greenhouse gas emissions 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).

| Electricity mix | Source | Amount | Unit |
|---------------------------|---------------|--------|---------------------------|
| Electricity, Norway (kWh) | ecoinvent 3.6 | 24,33 | g CO ₂ -eq/kWh |

Dangerous substances

The product contains no substances given by the REACH Candidate list.

Indoor environment

Additional Environmental Information

| Additional environmental impact indicators required in NPCR Part A for construction products | | | | | | | | | |
|--|------------------------|----------|----------|----------|----|----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| GWPIOBC | kg CO ₂ -eq | 2,15E+01 | 1,33E+00 | 5,09E-03 | 0 | 3,33E-01 | 1,93E-01 | 3,72E-03 | -1,07E+01 |

GWPI-IOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Bibliography

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NPCR Part A: Construction products and services. Ver. 2.0. April 2021, EPD-Norge.

NPCR 013 Part B for Steel and Aluminium Construction Products , Ver. 4.0, 06.10.2021, EPD Norway.

| | | |
|--|--|---|
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