

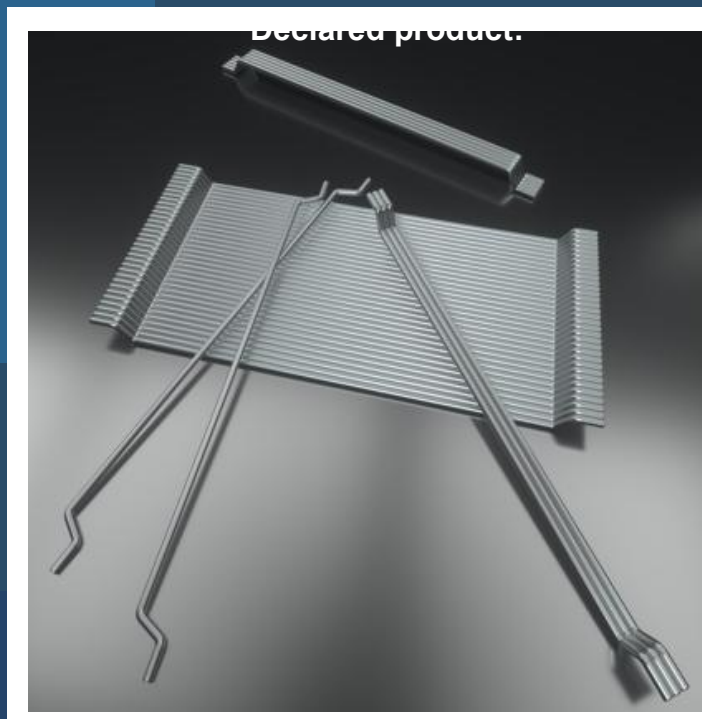
ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804 for:

Steel fiber for concrete reinforcement

From

Tianjin HengfengXuxiang New Material Co., LTD



| | |
|----------------------|--------------|
| Programme operator: | EPD China |
| Registration number: | EPD-CN-00008 |
| Issued date: | 2024-09-14 |
| Valid until: | 2029-09-13 |

Programme Information

| | |
|---|--|
| EPD Owner | Tianjin HengfengXuxiang New Material Co., LTD EPD@hffibers.com |
| Product Name | Steel fiber for concrete reinforcement |
| Production Site | Tianjin HengfengXuxiang New Material Co., LTD High-grade metal products industrial park, Shuangtang town, Jinghai district, Tianjin, P.R. China. Zip Code: 301600 |
| Identification of product | Group I: wire according to EN 14889-1:2016 |
| Field of Application | improve fatigue strength, shear strength, bending strength and impact resistance of concrete, increase crack resistance, durability and toughness of concrete |
| Programme Operator | EPD China Address of Headquarter: Tianping Road, Xuhui District, Shanghai Website: www.epdchina.cn Email: info@epdchina.cn secretary@epdchina.cn |
| LCA Practitioner | Wei Yang zhouyu@carbon-tc.com Carbon Trust Cornerstone Environmental Technology (Shanghai) Co.,Ltd |
| Responsibility | The EPD owner has the sole ownership, liability, and responsibility for the EPD |
| Comparability | EPDs within same category of product in different programme operator are not suggested to be compared. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible even applying the same PCR. |
| Liability | The EPD owner has the sole ownership, liability, and responsibility for the EPD. |
| Validity | The EPD is published on 2024-09-14 and valid to 2029-09-13 |
| LCA Software (version) | Simapro, Version 9.5 |
| LCI Dataset (version) | Ecoinvent Database, Version 3.9.1 |
| Year(s) of Primary Data | 07/2023-06/2024 |
| PCR | EPDCN-PCR-202204: PCR for construction Products and construction services to EN 15804 |
| Other Reference Document | / |
| Verification statement according EN15804 | |
| Independent verification of the declaration and data according to EN ISO 14025:2010 <input type="checkbox"/> internal <input checked="" type="checkbox"/> external Third-party institution verification: <Micheal Ge, SGS-CSTC Standards Technical Services Co., Ltd.> is an approved certification body accountable for third-party verification Approved by: EPD China | |
| Procedure for follow-up of data during EPD validity involves a third-party certification body: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | |

General Information

1.1 Company information

Owner of the EPD:

Tianjin HengfengXuxiang New Material Co., LTD

Contact: EPD@hffibers.com

Description of the organisation:

Tianjin HengfengXuxiang Company was established in 2004, with four branches and factories in Guangzhou and Tianjin. The total assets of the company are 300 million CNY, and the annual industrial output value is 1 billion CNY. The company has more than 190 employees, more than 20 senior professional staffs. Hengfeng also established a concrete laboratory jointly with Hebei University of Technology, a famous technical university in China, which is engaged in the performance research and application research of steel fiber concrete.

The company actively participates in the preparation and formulation of China's national standard "Steel fiber Concrete Structure Design", and actively participates in many exhibitions and academic conferences at domestic and abroad. Direct and continuous communication with customers enables Hengfeng to provide better products and services to customers around the world. The company has 10 steel fiber production lines, annual production capacity is 50,000 tons. We make steel fibers with tensile strength from 800 to 3600MPa, fiber type including macro steel fibers like normal steel fiber, galvanized steel fiber, special coated steel fiber, micro steel fiber with brass coating, and customized steel fiber according to customers' requirements

Name and location of production site(s):

Tianjin HengfengXuxiang New Material Co., LTD

High-grade metal products industrial park, Shuangtang town, Jinghai district, Tianjin, P.R. China.

Zip Code: 301600

1.2 Scope and type of EPD

Declared unit: Production of 1kg steel fibers (mass excluding packaging)

Reference service life: n/a

Time representativeness: 07/2023-06/2024 as reference year

Description of system boundaries:

Cradle-to-gate (A1-A3) with options: A4(Transport to customers), A5 (Installation), C1 (De-construction), C2(Transport to End of life), C3 (Waste processing), C4 (Disposal) and D (Reuse-Recycling-recovery-potential).

Excluded life cycle stages:

All phases of the use stage B (as there are no emissions during the use of the product). In this section, it is suggested to include but not limited to following information:

Table: Process stages and EPD modules.

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES |
|---------------------|-----------|------------|--------------------------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|---------------------------|-----------|------------------|----------|---|
| Raw material supply | Transport | Production | Transport from the gate to the | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction/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 | ND | ND | ND | ND | ND | ND | ND | x | x | x | x | x |

Further information:

All inputs and outputs of the production by Tianjin HengfengXuxiang New Material Co., LTD were considered in the calculation. Generic data from relevant EPD document was used for the considered raw materials from the supplier due to the fact that these materials are not produced by Tianjin HengfengXuxiang New Material Co., LTD

Assumptions were made for modules A2, A3, A5 and C2. Supplier-specific distances of raw materials to manufacturing site (A2) were provided by Tianjin HengfengXuxiang New Material Co., LTD, via truck with the assumption of the parameters: Euro 6, more than 32 t, for input packaging waste treatment in A3 100% are assumed to be incinerated. For C2 a distance of 50 km to waste treatment plant by truck (Euro 6, more than 32 t) were assumed.

According to the information from Tianjin HengfengXuxiang New Material Co., LTD after the use of steel fibres, 95% of the material is assumed to be recycled and 5% is assumed to be landfilled. The low impact from shredding in C3 is neglected.

Needed machines, plants and further infrastructure for the production at Tianjin HengfengXuxiang New Material Co., LTD not considered in the calculation.

All known and available primary data of the production processes were considered. Therefore, no cutoff rules were applied.

2 Detailed Product Description

Product name: Steel Fiber

Product identification: Group I: according to EN 14889-1:2016

Steel Fibers covered by this EPD:

| Type of fibre | Nominal Diameter mm | Nominal Length mm | Nominal Tensile Strength N/mm ² |
|--|------------------------|----------------------|---|
| Steel fiber for concrete reinforcement | 0.12-1.2 | 6-60 | 800-3600 |

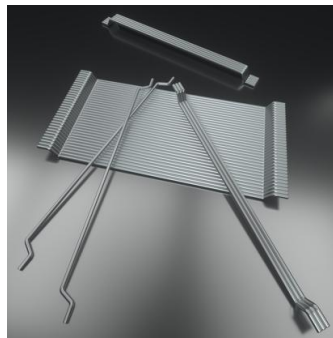


Figure: Picture of the declared product.

Product description:

Hengfeng steel fibers are made like this way: firstly make steel wire from wire rod by cold drawing, then glue wires into a steel band, at same time cut and shape wire band into steel fiber product with hooks on both ends, glued steel fiber can improve fibers distribution performance during mixing with concrete components, it will get better concrete property as better fibers distribution.

Hengfeng steel fibers can improve fatigue strength, shear strength, bending strength and impact resistance of concrete, increase crack resistance, durability and toughness of concrete

Application of Hengfeng steel fibers including: industry flooring, car parking garage, logistics warehouse, Pile bearing floor, Highway & bridge pavement, Tunnels and subways, Hydropower station, precast concrete products, tower of wind power generation, etc.

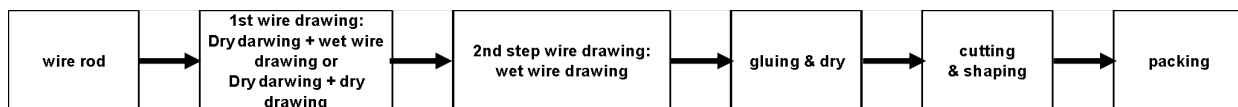


Figure: The production process in selected stages.

Hengfeng steel fiber production process including: The raw material is steel wire rod from steel maker, 1st wire drawing process: can be dry drawing + wet wire drawing or dry drawing + dry drawing, 2nd step wire drawing process is wet wire drawing, and then gluing (put glue onto wire band) & dry wire band, at same time cutting & shaping wire band into steel fiber pieces, afterwards packing products into paper bags of big bags on a wooden pallet

Table: Main product components and packaging materials per unit.

| Product components | Weight, kg | Weight-% (versus the product) |
|---------------------|------------|-------------------------------|
| Wire rod | 0.9926 | 99.26% |
| Scrap wire rod | 0.0156 | 1.56% |
| soap powder | 0.0022 | 0.22% |
| glue | 0.0083 | 0.83% |
| Sum | 1.0187 | 101.87% |
| Packaging materials | Weight, kg | Weight-% (versus the product) |
| Ton bag | 0.0009 | 0.09% |
| Paper bag | 0.0092 | 0.92% |
| Wood | 0.0080 | 0.80% |
| TOTAL | 0.0101 | 1.01% |

Included products do not contain the substances included in the "Candidate List of SVHC" document issued by the European Chemicals Agency (<http://echa.europa.eu/candidate-list-table>).

3 LCA results according to EN 15804

3.1 Environmental Impacts

The results of the underlying LCA is provided in this section as environmental impacts, resource use, output flows and additional information on biogenic carbon. All pre-set parameters of EN 15804 are required.

Table: Environmental impacts according to EN 15804.

| RESULTS OF THE LCA - ENVIRONMENTAL IMPACT per functional or declared unit | | | | | | | | | | | | | | | | |
|---|-----------------|-----------|-----------|----------|----|----|----|----|----|----|----|----------|----------|-----------|----------|-----------|
| Core indicator | Unit | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Global Warming Potential total (GWP-total) | [kg CO2 eq.] | 1.87E+00 | 2.65E-01 | 2.31E-02 | / | / | / | / | / | / | / | 0.00E+00 | 5.08E-03 | 3.06E-02 | 1.67E-04 | -1.34E+00 |
| Global Warming Potential fossil fuels (GWP-fossil) | [kg CO2 eq.] | 1.89E+00 | 2.65E-01 | 9.46E-03 | / | / | / | / | / | / | / | 0.00E+00 | 5.08E-03 | 3.10E-02 | 1.65E-04 | -1.33E+00 |
| Global Warming Potential biogenic (GWP-biogenic) | [kg CO2 eq.] | -2.06E-02 | -2.09E-05 | 2.06E-02 | / | / | / | / | / | / | / | 0.00E+00 | 1.93E-06 | -4.49E-04 | 2.08E-06 | -6.14E-03 |
| Global Warming Potential land use and land use change (GWP-luluc) | [kg CO2 eq.] | 1.66E-03 | 1.89E-04 | 3.74E-07 | / | / | / | / | / | / | / | 0.00E+00 | 2.61E-06 | 4.06E-05 | 2.16E-08 | -1.26E-03 |
| Depletion potential of the stratospheric ozone layer (ODP) | [kg CFC 11 eq.] | 1.63E-08 | 4.12E-09 | 2.22E-11 | / | / | / | / | / | / | / | 0.00E+00 | 8.64E-11 | 4.99E-10 | 2.26E-12 | -1.37E-08 |
| Acidification potential, Accumulated Exceedance (AP) | [mol H+ eq.] | 9.09E-03 | 6.33E-03 | 5.63E-06 | / | / | / | / | / | / | / | 0.00E+00 | 1.39E-05 | 3.04E-04 | 1.41E-06 | -6.12E-03 |
| Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | [kg P eq.] | 7.12E-04 | 1.18E-05 | 7.15E-07 | / | / | / | / | / | / | / | 0.00E+00 | 4.26E-07 | 1.57E-05 | 1.91E-08 | -5.81E-04 |
| Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | [kg N eq.] | 2.18E-03 | 1.58E-03 | 2.98E-06 | / | / | / | / | / | / | / | 0.00E+00 | 3.66E-06 | 7.15E-05 | 5.92E-07 | -1.53E-03 |
| Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | [mol N eq.] | 2.00E-02 | 1.75E-02 | 2.55E-05 | / | / | / | / | / | / | / | 0.00E+00 | 3.79E-05 | 7.94E-04 | 6.42E-06 | -1.32E-02 |
| Formation potential of tropospheric ozone (POCP) | [kg NMVOC eq.] | 7.15E-03 | 4.83E-03 | 6.67E-06 | / | / | / | / | / | / | / | 0.00E+00 | 2.00E-05 | 2.46E-04 | 2.01E-06 | -5.18E-03 |
| Abiotic depletion potential for non-fossil resources | [kg Sb eq.] | 5.36E-06 | 3.62E-07 | 1.30E-09 | / | / | / | / | / | / | / | 0.00E+00 | 1.42E-08 | 1.61E-06 | 6.81E-11 | -4.40E-06 |

| | | | | | | | | | | | | | | | | | | |
|--|-------------------------|-----------|----------|----------|---|---|---|---|---|---|---|---|----------|----------|----------|----------|-----------|--|
| (ADP-minerals&metals) | | | | | | | | | | | | | | | | | | |
| Abiotic depletion potential for fossil resources (ADP-fossil) | MJ, net calorific value | 2.04E+01 | 3.41E+00 | 5.61E-03 | / | / | / | / | / | / | / | / | 0.00E+00 | 7.67E-02 | 4.28E-01 | 2.05E-03 | -1.44E+01 | |
| Water (user) deprivation potential, deprivation-weighted water consumption (WDP) | [m3 world eq. Deprived] | -1.51E-02 | 3.43E-04 | 2.03E-05 | / | / | / | / | / | / | / | / | 0.00E+00 | 1.22E-05 | 1.87E-04 | 1.77E-07 | 1.62E-02 | |

3.2 Resource use and waste categories

Table: Resource use and waste categories according to EN 15804.

| RESULTS OF THE LCA - Resource use and waste categories per functional or declared unit | | | | | | | | | | | | | | | | |
|---|------|----------|----------|-----------|----|----|----|----|----|----|----|----------|----------|----------|-----------|----------|
| Core indicator | Unit | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE) | MJ | 1.62E-01 | 0.00E+00 | 3.44E-01 | / | / | / | / | / | / | / | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of renewable primary energy resources used as raw materials (PERM) | MJ | 1.93E+00 | 2.90E-02 | -3.44E-01 | / | / | / | / | / | / | / | 9.70E-04 | 5.55E-02 | 2.10E-05 | -1.01E+00 | 9.70E-04 |
| Total use of renewable primary energy resources (PERT) (primary energy and primary energy resources used as raw materials) | MJ | 2.09E+00 | 2.90E-02 | 1.90E-04 | / | / | / | / | / | / | / | 9.70E-04 | 5.55E-02 | 2.10E-05 | -1.01E+00 | 9.70E-04 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE) | MJ | 4.74E-02 | 0.00E+00 | 4.05E-02 | / | / | / | / | / | / | / | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of non-renewable primary energy resources used as raw materials (PENRM) | MJ | 2.03E+01 | 3.41E+00 | -3.49E-02 | / | / | / | / | / | / | / | 7.67E-02 | 4.28E-01 | 2.05E-03 | -1.44E+01 | 7.67E-02 |
| Total use of non-renewable primary energy resources (PENRT) (primary energy and primary energy resources used as raw materials) | MJ | 2.04E+01 | 3.41E+00 | 5.61E-03 | / | / | / | / | / | / | / | 7.67E-02 | 4.28E-01 | 2.05E-03 | -1.44E+01 | 7.67E-02 |
| Use of secondary material (SM) | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | / | / | / | / | / | / | / | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

| | | | | | | | | | | | | | | | | |
|---|----|---------------|--------------|--------------|---|---|---|---|---|---|---|--------------|--------------|--------------|---------------|--------------|
| Use of renewable secondary fuels (RSF) | MJ | 0.00E +00 | 0.00E +00 | 0.00E +00 | / | / | / | / | / | / | / | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 |
| Use of non-renewable secondary fuels (NRSF) | MJ | 0.00E +00 | 0.00E +00 | 0.00E +00 | / | / | / | / | / | / | / | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 |
| Net use of fresh water (FW) | m3 | -9.04 E-01 | 1.01E -02 | 7.21E -04 | / | / | / | / | / | / | / | 3.90E -04 | 4.65E -03 | 4.49E -06 | 9.37E -01 | 3.90E -04 |
| Hazardous waste disposed (HWD) | kg | 6.55E -05 | 1.81E -05 | 3.39E -08 | / | / | / | / | / | / | / | 4.84E -07 | 2.43E -06 | 1.22E -08 | -5.50 E-05 | 4.84E -07 |
| Non-hazardous waste disposed (NHWD) | kg | 6.28E -01 | 8.25E -02 | 1.00E -03 | / | / | / | / | / | / | / | 6.67E -03 | 1.73E -02 | 5.00E -02 | -5.40 E-01 | 6.67E -03 |
| Radioactive waste disposed (RWD) | kg | 1.67E -05 | 4.68E -07 | 2.43E -09 | / | / | / | / | / | / | / | 1.67E -08 | 7.28E -07 | 4.35E -10 | -1.43 E-05 | 1.67E -08 |
| Components for re-use (CRU) | kg | 0.00E +00 | 0.00E +00 | 0.00E +00 | / | / | / | / | / | / | / | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 |
| Materials for recycling (MR) | kg | 0.00E +00 | 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 (MER) | kg | 0.00E +00 | 0.00E +00 | 0.00E +00 | / | / | / | / | / | / | / | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 |
| Exported energy (EE) | MJ | 0.00E +00 | 0.00E +00 | 0.00E +00 | / | / | / | / | / | / | / | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 | 0.00E +00 |

3.3 Information on biogenic carbon content

Information on biogenic carbon content which shall be included in the EPD as follows:

| Biogenic carbon content | Unit (expressed per functional unit or per declared unit) |
|---|---|
| Biogenic carbon content in product | 0 kg C |
| Biogenic carbon content in accompanying packaging | 0.008 kg C |
| NOTE: 1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂ . | |

4 Supplementary information

4.1 Calculation rules

All inputs and outputs of the production by Tianjin HengfengXuxiang New Material Co., LTD were considered in the calculation. Generic data was used for the considered raw materials from the supplier due to the fact that these materials are not produced by Tianjin HengfengXuxiang New Material Co., LTD.

Supplier-specific distances of raw materials to the manufacturing site (A2) were provided by Tianjin HengfengXuxiang New Material Co., LTD via lorry > 32 metric ton, EURO5. For A5 and C2, distance of 50 km to waste treatment plant by lorry (EURO5, more than 32 metric ton) were assumed.

According to the information from Tianjin HengfengXuxiang New Material Co., LTD, after the use of steel fibers, 5% is assumed to be landfilled. The low impact from assembly in C1 and shredding in C3 is neglected. Needed machines, plants and further infrastructure for the production at Tianjin HengfengXuxiang New Material Co., LTD are not considered in the calculation. All known and available primary data of the production processes were considered. Therefore, no cut off rules were applied.

References

- General Programme Instructions of EPD China. Version 1.0.
- EPDCN-PCR-202204: PCR for construction Products and construction services to EN 15804
- ISO 14025:2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- ISO 14040:2006/Amd 1:2020 Environmental management — Life cycle assessment — Principles and framework — Amendment 1
- ISO 14044:2006/Amd 2:2020 Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 2
- EN 15804:2012+A2:2019, Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products
- Product Environmental Footprint Category Rules (PEFCRs) Annex II Part C
- Ecoinvent, 2023. Swiss Centre for Life Cycle Assessment, version 3.9.1 (www.ecoinvent.ch).
- PRé Consultants, 2021. Software SimaPro version 9.5.0.0 (www.pre.nl).
- Life Cycle Assessment (LCA) Report for Steel fiber for concrete reinforcement LCA Report from Tianjin HengfengXuxiang New Material Co., LTD 2024/09/02



Programme operator EPD China
Registration number EPD -CN - 00008



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