Environmental Product Declaration Type III ITB No. 128

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SBN RUNOWO Sp. z o.o.

Steel products for concrete reinforcement and prestressing

EPD Program Operator:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804:2012+A1 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804:2012+A1 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3, C1-C4 and D modules in accordance with EN 15804:2012+A1
(Cradle to Gate with options)

The year of preparing the EPD: 2020

Service Life: not declared by producer**,** calculation in accordance to EN 1990:2004

PCR: ITB-PCR A (PCR based on EN 15804+A1)

Declared unit: 1 kg of SBN steel product

Reasons for performing LCA: B2B

Representativeness: Polish production, year 2019

MANUFACTURER AND PRODUCTS DESCRIPTION

SBN RUNOWO Sp. z o.o. is the first producer in the north of Poland to offer a wide range of steel products to construction companies and concrete prefabrication companies:
- for concrete reinforcement (e.g. ribbed wire, welded steel mesh, spatial elements for reinforcement),
- for prestressing of concrete and building structures (e.g. steel wires for prestressing structures, prestressing steel strands).
SBN RUNOWO located at Runowo Krajeńskie (Poland) has its own test laboratory to assess the conformity of production, and the assessment of factory production control was carried out and supervised by the “SIMPTESTCERT” Katowice Testing and Certification Center and the "ZETOM" Research and Certification Departments, according to the national assessment system 1+ in accordance with the Regulation of the Ministry of Infrastructure and Construction from November 17, 2016 on how to declare the performance of construction products and how to mark them with a construction mark (Journal of Laws of 2016, item 1966, as amended). SBN RUNOWO offer the above range of products for the Polish, Danish, Swedish and Norwegian market. The production process diagram is shown in Figure 1.

Base materials (input to a product system including: reinforcing mesh, ribbed bars, bent elements made of mesh, PC strand and PC wire) is: smooth steel wire rod produced by RIVA Stahl and ArcelorMittal.

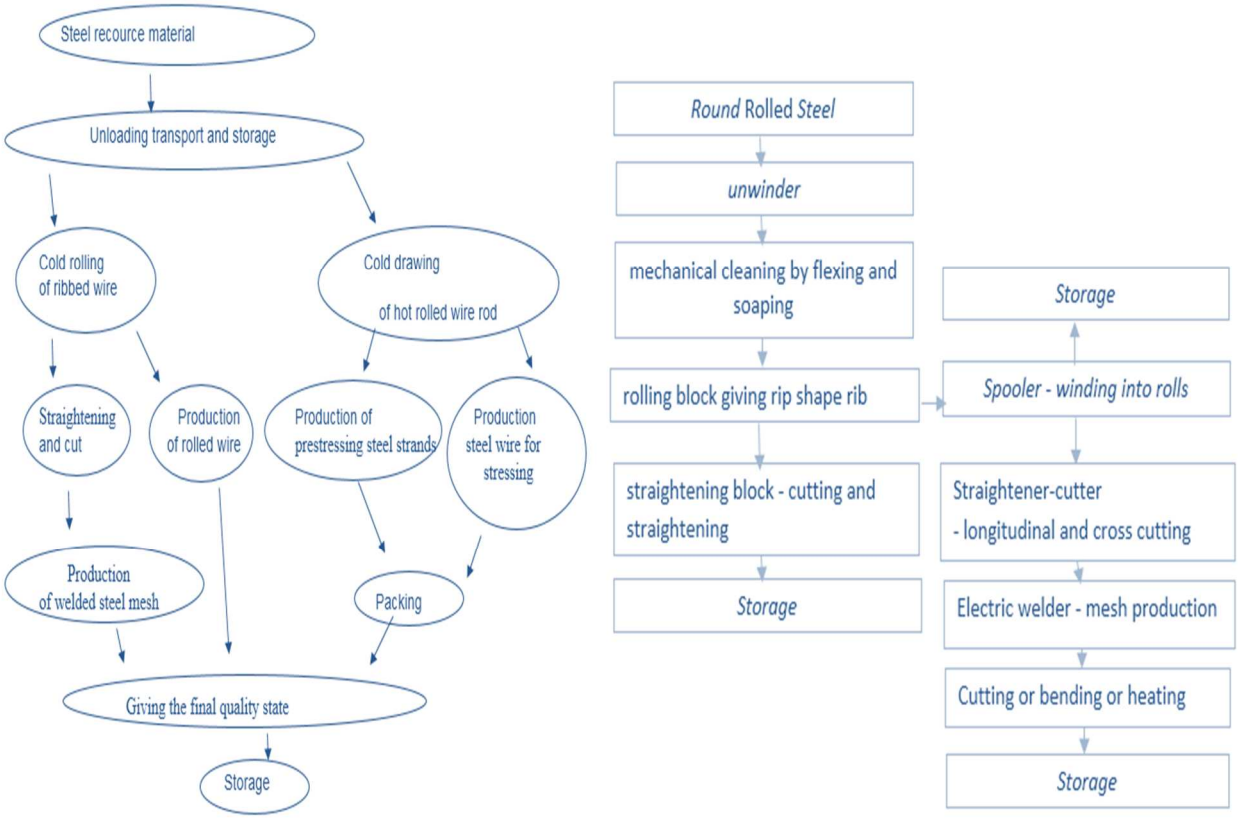
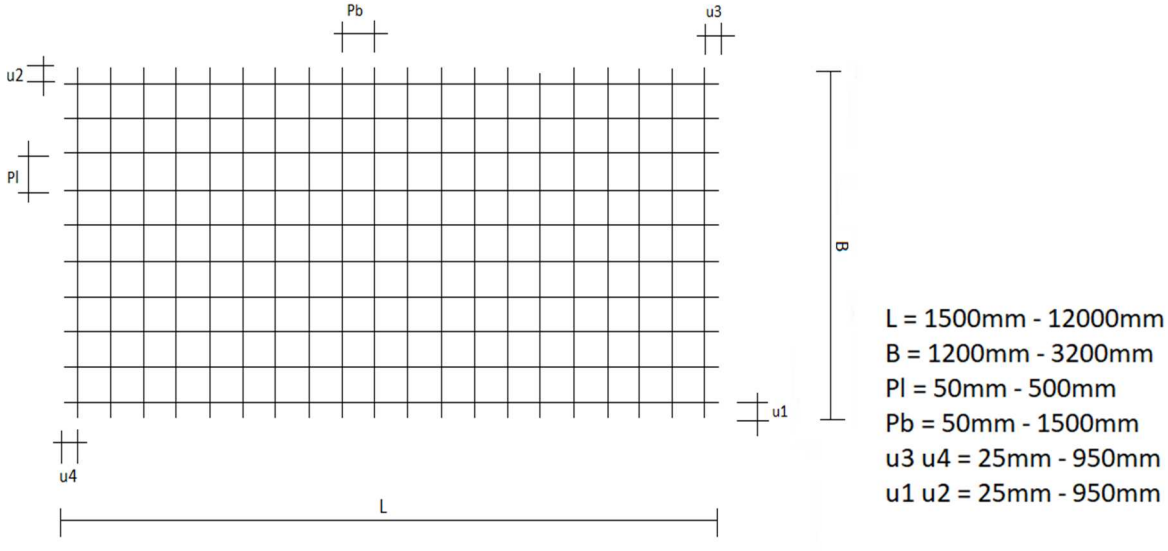


Figure 1. A scheme of manufacturing process of the SBN RUNOWO steel products

Technical data on SBN RUNOWO steel products can be found at https://www.sbnrunowo.pl/produkty/ .

Reinforcing mesh- welded steel mesh intended for concrete reinforcement

Meshes for the Polish market in the B500A grade according to PN-H-93247-2:2008, meshes for the Swedish market in NK500AB-W and NK500B grades according to SS-EN 10080:2005 + SS 212540:2014, meshes for the Norwegian market in B500NA and B500NB grades according to NS 3576-4:2005, meshes for the Danish market in grade B550B according to EN 10080:2005. The following drawing describes the scope of technical capabilities of the SBN RUNOWO produced meshes:



Ribbed bars - steel ribbed wire for concrete reinforcement manufactured according to PN-H-93247-1:2008

Grade: B500A
Length: 1200mm – 12000mm
Diameter range: 5mm – 12mm
Package weights: 100kg – 3000kg

Bent elements made of mesh - spatial elements for concrete reinforcement
Width range: 250mm – 1200mm
Length range: 350mm – 6000mm
Bending mandrel: 30mm
Diameter range: 5mm – 12mm

Prestressing steel strands (PC Strand) - for prestressing structures

Low relaxation, prestressing steel strands Y1860S7 made of smooth wires (7-wire strand) for prestressing structures. Nominal tensile strength (R_m) 1860 MPa. Strands are supplied in coils with an outer diameter of up to 1700mm, an inner diameter of 800mm or 900mm, a height of 500mm or 750mm (customer's choice) and a weight of 2.0 tons to 5.0 tons (exact weight to be agreed with the customer).

Prestressing steel wire (PC Wire) - for prestressing structures

Low relaxation, steel wires Y1670C and Y1570C for prestressing structures are wires with a circular cross-section and a smooth or indented surface produced by cold drawing of hot-rolled high-carbon wire rod. The wires are straightened using a roller wire straightening unit and cut automatically to a precise length in the range from 1500mm to 2700mm using a single knife cutting unit. Wires Y1670C and Y1570C are intended for prestressing construction structures and for use in traffic engineering in the field of road engineering facilities, railway engineering facilities, or urban metro construction structures. Construction prestressing wires are delivered in packages / bundles. Weight of a single package / bundle of wires: max. 2.5 tons (exact weight to be agreed with the customer).

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 kg of **SBN RUNOWO steel products for concrete reinforcement and prestressing.**

System boundary

The life cycle analysis of the declared SBN products covers “Product Stage” A1-A3, and End of Life stage C1, C2, C3, C4 and gains beyond system in D module (Cradle to Gate with options) accordance with EN 15804:2012+A1 and ITB PCR A.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the SBN RUNOWO products is a line process in one manufacturing plant located at Runowo Krajeńskie, Poland. Allocation of impact is done on product mass basis (100 % of whole production). All impacts from raw materials extraction are allocated in A1 module of the LCA (not included 0.5% of secondary production inputs). 99% of impacts from a line production were allocated to product covered by this declaration. Utilization of packaging material was not taken into consideration. Module A2 includes transport of raw materials such as steel from supplier to manufacturing plant. Municipal wastes of factory were allocated to module A3. Energy supply was inventoried for whole factory and 100% was allocated to the product assessed. Emissions in the factory are assessed using national KOBIZE 2019 emission factors for energy carriers were allocated to module A3.

System limits

99,5% materials and 100% energy consumption (electricity, oil) was inventoried in factory and were included in calculation. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation (99% of input is steel resource), utilized thermal energy, internal fuel and electric power consumption, direct production waste, and available emission measurements. Tires consumption for transport was not taken into account. Lubricants, precomponents, dyes, foils, labels, tapes with a percentage share of less than 0.1% were not included in the calculations. It is assumed that the total sum of omitted processes does not exceed 1% of all impact categories. In accordance with EN 15804 machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

A1 and A2 Modules: Raw materials supply and transport

Raw material (steel wire rod) come mainly from supplier providing environmental data on a steel production. Data on transport of the different input products to the manufacturing plants were inventoried in detail and modelled by assessor. For calculation purposes European fuel averages are applied.

A3: Production

The production process is presented in Figure 1.

End of life scenarios (C and D modules)

The end-of-life scenario for all products has been generalized. Steel reinforcement is infinitely recyclable, and typically is recycled by demolition contractors, who sell the recovered steel (Bars and reinforcement) as ferrous scrap (material recovery rate 98%). The steel is reclaimed by crushing the concrete and retrieving the wires with hammers, breakers, and grappling hooks mounted onto heavy equipment. According to the literature, 0.5 MJ of the energy is set to recover the bars from the material derived from the demolition was assumed. It is assumed that at the end of life the transport distance from the product deconstruction place to waste processing (C2) is 50 km on > 16 t loaded lorry with 75% capacity utilization and fuel consumption of 35 l per 100 km. Materials recovered from dismantled products are recycled and landfilled according to the Polish treatment practice of industrial waste what is presented in Table 1. The reuse, recovery and recycling potential for a new product system is considered beyond the system boundaries (module D) based on World Steel recommendations and national practice (see references).

Table 1. End of life scenarios for SBN RUNOWO products

Progress products	Material recovery	Recycling	Landfilling
Steel products	98%	98%	2%

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2019 – 31.12.2019 (1 year). The life cycle assessments were done for Poland as reference area.

Data quality - production

The values determined to calculate A3 originate from verified Progress LCI inventory data. A1 values were prepared considering several specific EPDs for the European made steel products. Allocation for steel production impacts is done in accordance with *LCI data for Steel products Report* compiled by Braian Hughes and William Hare (2012 for World Steel Association).

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average. Data regarding production per 1 kg of steel product were averaged for the analysed production. All production processes were assigned to different types of products in an equal way. Only one end-of-life scenario has been adopted.

Calculation rules

LCA was done in accordance with ITB PCR A document. Characterization factors are CML ver. 4.2 based. ITB-LCA algorithms were used for impact calculations. A1 was calculated based on data from the database and specific EPD for steel, A3 and A2 are calculated based on the LCI questionnaire provided by the manufacturer.

Databases

The background data for the processes come from the following databases: Ecoinvent v.3.5, specific EPD for a steel provider, KOBIZE and Tauron (Polish electricity mix and combustion factors for fuels). Specific (LCI) data quality analysis was a part of audit. The time related quality of the data used is valid (5 years).

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to the unit DU– 1 kg of the SBN RUNOWO steel product.

Table 2. System boundaries (life stage modules included) in a product environmental assessment

Environmental assessment information (MA – Module assessed, MNA – Module not assessed, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	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
MA	MA	MA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MA	MA	MA	MA	MA

Table 3. Environmental product characteristic – 1 kg of SBN RUNOWO steel product

Environmental impacts: (DU) 1 kg of steel product									
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential	kg CO_2 eq.	2.64E+00	3.72E-02	6.12E-04	1.31E-01	3.86E-03	5.98E-03	1.12E-03	-1.89E+00
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	5.09E-06	0.00E+00	1.20E-09	1.44E-09	0.00E+00	7.97E-09	2.28E-10	-5.93E-07
Acidification potential of soil and water	kg SO_2 eq.	4.60E-03	2.71E-04	1.94E-04	1.15E-04	2.82E-05	4.98E-04	1.04E-05	-3.40E-03
Formation potential of tropospheric ozone	kg Ethene eq.	1.36E-03	1.98E-05	2.12E-06	5.97E-04	2.06E-06	1.27E-06	2.28E-07	-1.18E-03
Eutrophication potential	kg $(PO_4)^{3-}$ eq.	4.69E-04	4.78E-05	8.96E-05	4.81E-06	4.97E-06	7.97E-04	1.66E-05	-3.22E-04
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	1.10E-03	0.00E+00	7.12E-07	9.72E-04	0.00E+00	6.09E-09	2.58E-09	-9.10E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	2.42E+01	9.15E-03	5.02E-01	1.50E+00	2.69E-02	7.97E-01	2.16E-02	-1.26E+01
Environmental aspects: (DU) 1 kg of steel product									
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.61E+00	6.40E-04	3.79E-02	2.25E-01	1.88E-03	9.97E-03	1.10E-04	-5.85E-01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	2.46E+01	9.61E-03	5.37E-01	1.26E+00	2.82E-02	8.47E-01	2.28E-02	-1.45E+01
Use of secondary material	kg	8.02E-02	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	MJ	2.05E-03	4.80E-04	0.00E+00	0.00E+00	1.41E-03	0.00E+00	0.00E+00	-1.26E+03
Use of non-renewable secondary fuels	MJ	9.73E-07	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	m^3	6.36E-06	1.00E-06	1.29E-04	4.74E-04	2.55E-04	0.00E+00	0.00E+00	-1.58E-05
Other environmental information describing waste categories: (DU) 1 kg of steel product									
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2.62E-06	4.60E-06	0.00E+00	2.00E-06	2.53E-08	1.49E-07	1.01E-08	-1.35E-06
Non-hazardous waste disposed	kg	2.93E-02	4.27E-03	4.19E-03	1.81E-02	2.35E-05	6.50E-05	2.08E-02	-6.75E-02
Radioactive waste disposed	kg	2.34E-04	0.00E+00	0.00E+00	2.00E-06	0.00E+00	3.81E-07	3.41E-08	-2.23E-06
Components for re-use	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	kg	0.00E+00	0.00E+00	3.91E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recover	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	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

RESULTS INTERPRETATION

Interpretation of the results has been carried out considering the methodology, data-related assumptions and limitations declared in the EPD.
The environmental impact of SBN steel product (cradle to gate with options) is largely dependent on the energy-intensive production of steel on which the manufacturer has only a little influence. The impact of the production line largely depends on the amount of electricity consumed by manufacturing plant. There are no significant emissions or environmental impacts in the A3 production processes alone. The production process itself does not have significant environmental impacts in the life cycle. Interrogation of the LCA results show that the cradle-to-gate A1-A3 GWP (Global Warming Potential) impact of 1 kg of screen products is 2.6 kgCO_2eq. For GWP, A1-A3 (production stage) accounts for 94% of the lifecycle impact. Manufacturing process for GWP (A3) in comparison to whole life is only 15%. The production of high-quality steel as meterial (module A1) therefore has the greatest impact on the environmental characteristic. The LCA results show that the cradle-to gate primary energy demand of fossil fuels by the declared unit is 25 MJ while A1 steel production alone consumes 24 MJ of fossil fuel energy. The transport of raw materials from considerable distances is optimized and not significant. The steel products, due to the high potential for reuse and the potential for significant reuse for steel production, has significant environmental gains - module D, which is its biggest benefit in the entire life cycle.

VERIFICATION

The process of verification of this EPD was in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804:2012+A1 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) [x] external [ ] internal
External verification of EPD: Ph.D. Eng. Halina Prejzner LCA, LCI audit and input data verification: Ph.D. Eng. Michał Piasecki, m.piasecki@itb.pl Verification of LCA: Ph.D. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A1 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- LCI DATA FOR STEEL PRODUCTS at https://www.worldsteel.org/en/dam/jcr:04f8a180-1406-4f5c-93ca-70f1ba7de5d4/LCI%2520study_2018%2520data%2520release.pdf
- FprEN 10138-1:2009 „Prestressing steels - Part 1: General requirements”
- FprEN 10138-2:2009 „Prestressing steels - Part 2: Wire”

- FprEN 10138-3:2009 „Prestressing steels - Part 3: Strand”
- prEN 10138-1:2006 „Prestressing steels - Part 1: General requirements”
- prEN 10138-2:2006 „Prestressing steels - Part 2: Wire”
- prEN 10138-3:2006 „Prestressing steels - Part 3: Strand”
- SS 212551:2013 „Prestressing steels - General requirements”
- SS 212552:2013 „Prestressing steels - Wire” [wersja oryginalna w języku angielskim]
- SS 212552:2013 „Prestressing steels - Wire” [tłumaczenie oryginału na język polski]
- SS 212553:2013 „Prestressing steels - Strand”
- PN-H-93247-1:2008 „Spajalna stal B500A do zbrojenia betonu - Część 1: Drut żebrowany”
- PN-H-93247-2:2008 „Spajalna stal B500A do zbrojenia betonu - Część 2: Zgrzewane siatki zbrojeniowe”
- PN-EN 10080:2007 „Stal do zbrojenia betonu - Spajalna stal zbrojeniowa - Postanowienia ogólne”
- PN-EN 1992-1-1:2008 „Eurokod 2 - Projektowanie konstrukcji z betonu - Część 1-1: Reguły ogólne i reguły dla budynków”
- SS 212540:2014 „Product specification for SS-EN 10080:2005 - Steel for the reinforcement of concrete - Waldable reinforcing steel - Technical delivery conditions for bars, coils, welded fabric and lattice girders”
- NS 3576-1:2005 „Steel for the reinforcement of concrete - Dimensions and properties - Part 1: Ribbed bars B500NA”
- NS 3576-2:2012 „Steel for the reinforcement of concrete - Dimensions and properties - Part 2: Ribbed steel B500NB”
- NS 3576-4:2005 „Steel for the reinforcement of concrete - Dimensions and properties - Part 4: Welded fabric”
- National Technical Assessemnt No. IBDiM-KOT-2019/0308 wydanie 1. „Liny SBN do sprężania konstrukcji”
- National Technical Assessemnt No. ITB-KOT-2019/0937 wydanie 1. „Stalowe sploty sprężające SBN Y1860S7 z drutów gładkich”
- National Technical Assessemnt No. IBDiM-KOT-2019/0372 wydanie 1. „Druty SBN do sprężania konstrukcji”
- Product Certificate No. 1103 - GlobeCert AB / Sweden
- Product Certificate No. 1902 - GlobeCert AB / Sweden
- Certificate No 009-UWB-052 - SimptestCert / Polska
- Certificate Nr 009-UWB-053 - SimptestCert / Polska
- Krajowy Certyfikat Stałości Właściwości Użytkowych Nr 005-UWB-085 - ZETOM / Polska
- Krajowy Certyfikat Stałości Właściwości Użytkowych Nr 005-UWB-086 - ZETOM / Polska
- Krajowy Certyfikat Stałości Właściwości Użytkowych Nr 005-UWB-119 - ZETOM / Polska
- PN-EN ISO 15630-1:2019-04 „Stal do zbrojenia i sprężania betonu - Metody badań - Część 1: Pręty, walcówka i drut do zbrojenia betonu”
- PN-EN ISO 15630-2:2019-04 „Stal do zbrojenia i sprężania betonu - Metody badań - Część 2: Zgrzewane siatki i dźwigary kratowe”
- PN-EN ISO 15630-3:2019-04 „Stal do zbrojenia i sprężania betonu - Metody badań - Część 3: Stal do sprężania”

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Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE № 128/2020
of TYPE III ENVIRONMENTAL DECLARATION

Product:

steel products for concrete reinforcement and prestressing

Manufacturer:

SBN RUNOWO Sp. z o.o.

Runowo Krajeńskie 3A, 89-410 Więcbork, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

PN-EN 15804+A1

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued for the first time on 30th September 2020 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Deputy Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, September 2020