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Seamless steel pipes and tubes



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Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 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 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3 modules in accordance with EN 15804 (Cradle to Gate)

The year of preparing the EPD: 2018

Product standard: listed in Table 2

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

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: Polish product

MANUFACTURER AND PRODUCT INFORMATION

Alchemia S.A. is a Capital Group operating in the sector of niche steel products: seamless pipes and tubes, forged products, forged-rolled and rolled products. The company debuted on the stock exchange 19 May, 1998. Alchemia SA was established in 2005 thanks to the takeover of Huta Batory's assets. In the following years, Alchemia SA grew thanks to the acquisition of Batory Research Laboratory and Batory Serwis in 2006. In 2007, they were joined by Huta Bankowa and Kuźnia Batory. In 2011, there were next milestones in the history of the Group, needed to become independent from the whims of the market - purchase of the Rurexpol pipe manufacturer in Częstochowa and Walcownia Rur Andrzej in Zawadzkie. In 2013, Huta Batory, Rurexpol and Walcownia Rur Andrzej entered the structures of Alchemia S.A as Plants and later as Branches. The name Huta Batory was changed to the Walcownia Rur Batory Branch in Chorzów.

Walcownia Rur Batory produces seamless steel pipes and tubes from a wide range of steel grades, including carbon steel, alloy steel and heat-resistant steel. The company provides a wide range of products such as line pipes, construction pipes, shipbuilding pipes, boiler tubes and construction pipes for machining which are commonly used in the power, petrochemical and drilling industry, and in building gas and oil pipelines.



Fig. 1. The view of Alchemia S.A. Oddział Walcownia Rur Batory in Chorzów

Product

Seamless steel pipes and tubes with diameters ranging from 219 mm to 508 mm are produced in hot pilger rolling process – Fig. 2. Characteristic of the products, including types of tubes and their dimensions is presented in Table 1. Information regarding materials used for the production process are listed in Table 1. The products possess declarations of performance issued by The Certification Body for Structural Metallic Products of TÜV Nord System GmbH & Co. KG: CPR/HBT/EN10210/03/10/2017, KD/HBT/ISO 3183/30/12/2016 (18/13 Appendix 1), KD/HBT/EN10216-1/30/12/2016 (20/16), KD/HBT/EN10216-2/30/12/2016 (21/16). Furthermore, the products possess voluntary safety mark according to PN-H-74248:1996 and WT/DKJ/46-2-05 (certifications no HBT-SIMPTEST-PN-H-74248) and BN 750648-60 (certification no HBT-SIMPTEST-BN-75 0648-60).

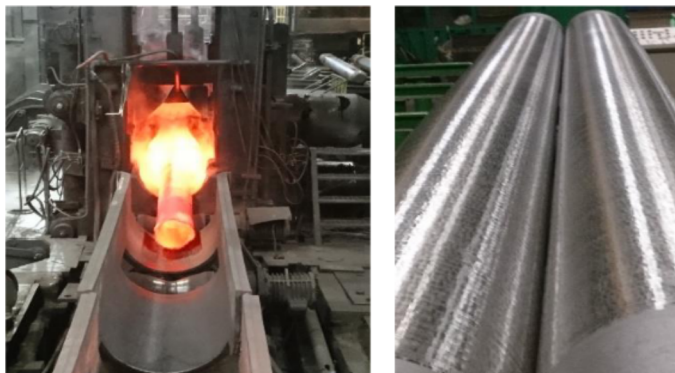


Fig. 2. The view of seamless steel tube produced by Alchemia S.A. Oddział Walcownia Rur Batory in Chorzów

Application

- line pipes for construction of gas, oil and fuel transmission grids (flammable media); water, steam, hot water, compressed air pipelines; industrial installations in steel mills, refineries, power plants, combined heat and power plants and large industrial plants;
- tubes for shipbuilding;

- structural tubes for light constructions; industrial, commercial and sports halls, airports, stadiums, wind farms, offshore structures; in construction of roads, bridges, footbridges, e.g. as load-bearing elements, culverts under roads, poles of tram traction, road lighting poles; thick-walled construction pipes are used for the manufacture of machine elements such as sleeves, rings, shafts and axles, e.g. in the railways, engineering industry and also for hardening and thermal improvement of servo (also telescopic), housings, cylinders for the mining industry;
- pipes for production of rolls, drums, e.g. in the paper (printing rolls) and automotive (drums for dynamometers) industries;
- boiler tubes (unalloyed and alloyed) for the use in the energy industry, e.g. for boiler elements (walls, collectors), superheaters and power pipelines;
- pipes for operation at elevated and reduced temperatures as elements of pipelines and operating devices;
- casing pipes for the oil and gas industry as well as water extraction (deep wells);
- pipes for transportation of filling and brine in coal and salt mines.

Table 1. Characteristic of tubes produced by Alchemia S.A. Oddział Walcowania Rur Batory

Outer diameter D [mm] ¹⁾	Thickness of tube [mm]			
	Line tubes, tubes for shipbuilding	Construction tubes, tubes for specific application	Tubes for chip forming ²⁾	Boiler tubes
219.1	7.1 ÷ 36	7.1 ÷ 36	10 ÷ 40	7.1 ÷ 40
244.5	7.1 ÷ 40	7.1 ÷ 40	10 ÷ 50	7.1 ÷ 40
273	7.1 ÷ 40	7.1 ÷ 40	10 ÷ 65	7.1 ÷ 40
298.5	7.1 ÷ 40	7.1 ÷ 40	10 ÷ 65	7.1 ÷ 40
323.9	7.1 ÷ 45	7.1 ÷ 45	10 ÷ 65	7.1 ÷ 45
355.6	8.0 ÷ 45	8.0 ÷ 45	10 ÷ 60	8.0 ÷ 45
406.4	8.8 ÷ 45	8.8 ÷ 45	11 ÷ 60	8.8 ÷ 45
457	9.5 ÷ 45	10 ÷ 45	12.5 ÷ 60	10.0 ÷ 45
508	9.5 ÷ 45	11 ÷ 45	14.2 ÷ 60	11.0 ÷ 45

¹⁾ intermediate diameter sizes available on request, ²⁾ higher thicknesses available on request

Table 2. Description of steel grades used for production of tubes

Type of pipe	Type of steel	Regulation
Structural tubes for chip forming	10, 20, 35, 45, 55 18G2A R35, R45, R55	BN-85/0648-83
Casing pipe with conical calyx and smooth end	R55, R65	BN-75/0648-60
Boiler tubes	K10, K18, 16M 19G2, 19G2FA 19G2MFA, 15HM, 10H2M, 13HMF St35.8, St45.8, 15Mo3	PN-H-74252 BN-84/0648-81 PN-H-74252 DIN 17175

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	13CrMo4-5 , 14MoV6-3 10CrMo9-10, 15NiCuMoNb5-6-4 X10CrMoVNb9-1 H9AMFNB P91, P1, P11, P22, P5, P12 P235GH, P265GH, 16Mo3 15128.5	PN-EN 10216-2 PN-EN 10216-2 ZN-HB-001 ASTM A335 PN-EN 10216-2 ČSN 415128
Structural tubes and line pipes	R, R35, R45, R55, R65 L245GA, L290GA, L360GA L245NB, L290NB, L360NB, L415NB 18G2A 10, 20, 35, 45, 10, 20A, 35, 45A 18G2A, 38HA 15H, 20H, 30H, 38HA, 40H 32HA St37.0, St44.0, St52.0 A106B, A106B sel, 1, 6 TUE 220A E235, E275, E275K2, E355, E355K2 C45E S235JRH, S355JOH, S355J2H S355K2H, S355NH, S460NH B(L245), X42(L290), X52(L360) X60(L415), X65(L450) BN(L245N), X42N(L290N) X52N(L360N), X60N(L415N) P235TR1, P265TR1 P235TR2, P265TR2 P275NL1-2, P355N, P355NH P355NL1-2, P460N, P460NH P265NL	PN-80/H-74219 PN-EN 10208-1 PN-EN 10208-2 BN-86/0648-77 PN-H-74248 DIN 1629 ASTM A106 ASTM A333 NFA49-112 - 87 EN10297-1 PN-EN 10210 API-5L PSL1 EN ISO 3183 PSL1 API-5L PSL2 EN ISO 3183 PSL2 PN-EN 10216-1 PN-EN 10216-3 PN-EN 10216-4
Plain-end coupling stock	H-40 , J55 K55 , N80, 20G2AV	ISO 11960 API - 5CT

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of seamless steel pipes and tubes is a line process in one factory of Alchemia S.A. Oddział Walcownia Rur Batory in Chorzów. Allocation was done on product mass basis. All impacts from raw materials extraction are allocated in A1 module of the EPD (including materials and energy consumption, transportation, emissions and wastes resulting from the production of steel ingots in Alchemia S.A. Stalownia Batory). 100% of impacts from line production of Alchemia S.A. Oddział Walcownia Rur Batory were inventoried and allocated to steel pipes and tubes production. Municipal waste and waste water of whole factory were allocated to module A3. Energy supply was inventoried for whole production process. Emissions in the factory are measured and were allocated to module A3.

System limits

The life cycle analysis of the declared products covers "Product Stage", A1-A3 modules (Cradle to Gate) in accordance with EN 15804+A1 and ITB PCR A. The details of systems limits are provided in product technical report. All materials and energy consumption inventoried in factory were included in calculation. Office impacts were also taken into consideration. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste, and all available emission measurements. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A1, 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 materials such as steel ingots used in the production process are made of 100% recycled scrap. 89% of utilized steel ingots came from Alchemia S.A. Stalownia Batory while the other 11% originated from Huta Stalowa Wola S.A. The chemical components such as lubricant, lacquer, paints and ancillary items come from local Polish suppliers. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Means of transport include trucks and Polish and European fuel averages are applied.

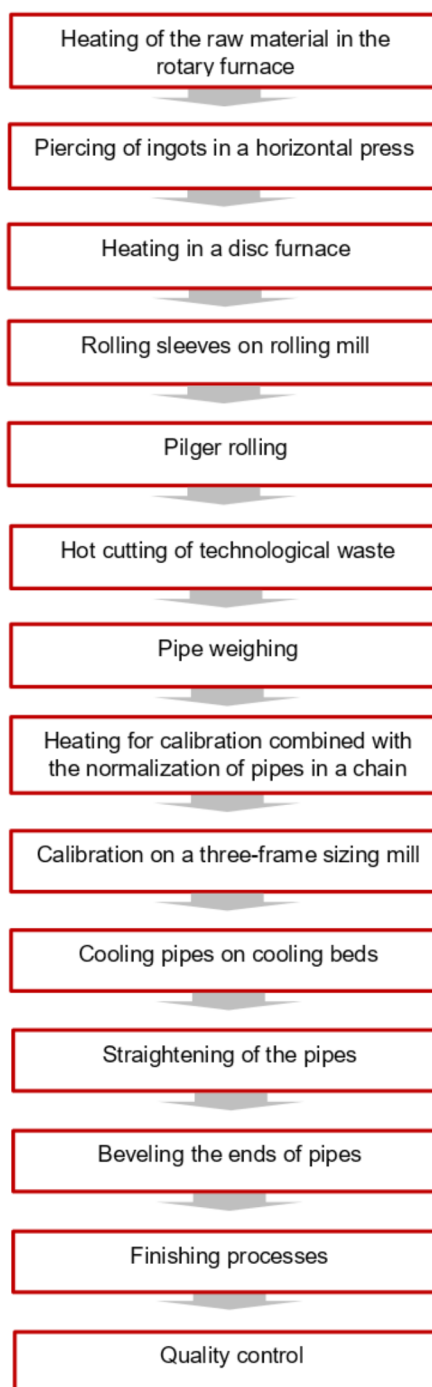


Fig. 3. A production scheme of seamless steel pipes and tubes in Alchemia S.A. Oddział Walcownia Rur Batory

A3: Production

Seamless steel pipes and tubes are produced in continuous process using hot pilger rolling method. In this method the raw material is heated in the rotary furnace and then subjected to piercing in a horizontal press (after earlier removal of scale). Such obtained rolling sleeve are placed on rolling mill followed by pilgrim mill in order to obtain a tube or a pipe with a desirable diameter. Afterwards the tube or the pipe undergoes shaping treatments such as heating for calibration combined with the normalization in a chain furnace, calibration on a three-frame sizing mill, cooling on cooling beds, straightening on a straightening machine, visual inspection and marking on the first inspection, waste cutting and finishing treatments such as hydro test, beveling the ends of pipes, control of dimensions and surface condition.

Data collection period

The data for manufacture of the declared products refer to period between 01.1.2016 – 31.12.2016 (1 year). The life cycle assessments were prepared for Poland as reference area.

Data quality

The values determined to calculate the LCA originate from verified Alchemia S.A. Oddział Walcowania Batory and Alchemia S.A. Stalownia Batory inventory data.

Assumptions and estimates

The impacts of the representative seamless steel pipes and tubes were aggregated using weighted average. Impacts were inventoried and calculated for all products of seamless steel pipes and tubes.

Calculation rules

LCA was done in accordance with ITB PCR A document.

Databases

The data for the processes come from the following databases: Ecoinvent, specific EPDs, ELCD, Ullmann's, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit. Characterization factors are CML ver. 4.2 based on EN 15804:2013+A1 version (PN-EN 15804+A1:2014-04).

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to functional unit (FU) – 1 ton of seamless steel pipes and tubes produced by Alchemia S.A. Oddział Walcowania Rur Batory

Table 2. System boundaries for environmental characteristic for seamless steel pipes and tubes

Environmental assessment information (MNA – Module not assessed, MD – Module Declared, 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
MD	MD	MD	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

Seamless steel pipes and tubes

Environmental impacts: (FU) 1 ton					
Indicator	Unit	A1	A2	A3	A1-A3
Global warming potential	[kg CO ₂ eq.]	1.45E+03	5.69E+00	6.48E+02	2.10E+03
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	9.86E-05	0.00E+00	0.00E+00	9.86E-05
Acidification potential of soil and water	[kg SO ₂ eq.]	2.54E+00	4.22E-02	8.37E-01	3.41E+00
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.38E-01	2.77E-03	1.74E-02	1.58E-01
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	2.68E-01	7.42E-03	1.54E-01	4.30E-01
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	2.95E+00	0.00E+00	2.40E-03	2.96E+00
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.24E+04	8.83E+01	7.50E+03	2.00E+04
Environmental aspects on resource use: (FU) 1 ton					
Indicator	Unit	A1	A2	A3	A1-A3
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	9.61E+02	6.18E+00	2.70E+02	1.24E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1.31E+04	9.27E+01	7.88E+03	2.11E+04
Use of secondary material	[kg]	2.37E+02	0.00E+00	2.27E+00	2.39E+02
Use of renewable secondary fuels	[MJ]	2.99E+01	0.00E+00	0.00E+00	2.99E+01
Use of non-renewable secondary fuels	[MJ]	7.64E-03	0.00E+00	0.00E+00	7.64E-03
Net use of fresh water	[m ³]	7.02E+00	1.61E-05	3.67E+00	1.07E+01
Other environmental information describing waste categories: (FU) 1 ton					
Indicator	Unit	A1	A2	A3	A1-A3
Hazardous waste disposed	[kg]	1.68E+01	7.80E-05	1.57E+00	1.84E+01
Non-hazardous waste disposed	[kg]	4.89E+01	7.20E-02	2.25E+00	5.12E+01
Radioactive waste disposed	[kg]	4.29E-03	0.00E+00	0.00E+00	4.29E-03
Components for re-use	[kg]	2.37E+02	0.00E+00	2.27E+00	2.39E+02
Materials for recycling	[kg]	1.06E+02	0.00E+00	3.70E+02	4.76E+02
Materials for energy recover	[kg]	1.12E-01	0.00E+00	0.00E+00	1.12E-01
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA

Verification

The process of verification of this EPD is 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 and ITB PCR A	
Independent verification corresponding to ISO 14025 (subclause 8.1.3.)	
☒ external	☐ internal
External verification of EPD: PhD. Eng. Halina Prejzner LCA, LCI audit and input data verification: PhD. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl Verification of LCA: PhD. Eng. Michał Piasecki, m.piasecki@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 procedure
- 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+A1:2013 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBIZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2017



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Thermal Physics, Acoustics and Environment Department

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CERTIFICATE No 068/2018 of TYPE III ENVIRONMENTAL DECLARATION

Product:

Seamless steel pipes and tubes

Manufacturer:

Alchemia S.A. Oddział Walcownia Rur Batory

Dyrekcja 6, 41-506 Chorzów, 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+A1:2014-04

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

This certificate, issued for the first time on 29th March 2018 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department

Michał Piasecki
Michał Piasecki, PhD



Deputy Director
for Research and Innovation

Krzysztof Kuczyński
Krzysztof Kuczyński, PhD

Warsaw, March 2018