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STAF & STAF-SG with variants

Owner of the EPD:

IMI International Sp. z o.o.
Address: Olewin 50A
32-300 Olkusz, Poland
Tel.: +48 32 758 82 00
Website: www.imi-hydronic.com

EPD Program Operator:

Instytut Techniki Budowlanej (ITB)
Address: Filtrowa 1,
00-611 Warsaw, Poland
Website: www.itb.pl
Contact: Michał Piasecki
m.piasecki@itb.pl
energia@itb.pl

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+A2 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 and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A3, A4-A5, C1-C4 and D modules in accordance with EN 15804+A2 (Cradle-to-Gate with options)

The year of preparing the EPD: 2024

Product standards: EN 12266-1

Service Life: >20 years

PCR: ITB-PCR A

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Poland, Europe, 2022

MANUFACTURER

As IMI Hydronic Engineering is a leading HVAC company with a valves montage plant located in Olkusz (Poland). Company is provider of technologies that deliver energy efficient water-based heating and cooling systems for the residential and commercial building sectors. Throughout the history, company have been at the forefront of HVAC industry innovation. The portfolio of brands has what is needed – a complete range of unique, industry-leading products and services. IMI Hydronic Engineering is a part of IMI PLC Group, listed on the London Stock Exchange on FTSE 100 list.

Figure 1 The view of IMI International Sp. z o.o. manufacturing plant located in Olkusz

PRODUCTS DESCRIPTION

A flanged, cast iron (STAF) and ductile iron (STAF-SG) balancing valve that delivers accurate hydronic performance in an impressive range of applications. The STAF is ideal for use mainly on the secondary side in heating and cooling systems. The STAF features IMI Hydronic Engineering's dezincification-resistant alloy, AMETAL, which minimizes the risk of leakage. Valves are made of components from ductile iron, cast iron, AMETAL, stainless steel, EPDM, EPS, HDPE, POM, PTFE and polyamide. Suitable for water or neutral fluids, including water-glycol mixtures (0-57%). Surface treated with epoxy painting for dimensions between DN20-200, duasolid painting for dimensions DN250-400. This document applies for CE and non-CE marked versions and different ranges of flange variants.

Main functions:

Balancing

Presetting

Measuring

Shut-off (The balancing cone for valves DN 100-400 is pressure released).

Dimensions: DN 65-200; DN 20-400 (for STAF-SG)

Pressure class: PN 16 and PN 25

Temperature range: -10 °C - 120 °C.

All additional technical information about the product is available on the manufacturer's website and catalogues.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 kg of STAF & STAF-SG with variants products. Declared unit refer to different numbers and types of valves; every valve typology contains valves with different dimensions and weights. However, the same manufacturing process and the similarities of valves allow a declared unit based on mass unit of products.

System boundary

The life cycle analysis of the declared products covers “Product Stage” A1-A3, A4-A5, C2-C4+D modules in accordance with EN 15804 and ITB PCR A (cradle to gate with options). Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculation. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Allocation

The allocation rules used for this EPD are based on general ITB ’s document PCR A. In the modules A1-A3, material losses in the assembly of the products in the factory are defined on the averaged specific values for the site. Input and output data from the production is inventoried and allocated to the production on the mass basis The declaration covers a wide range of products (averaged). Their production resources and processing stages are basically similar, so it is possible to average the production by product volume.

System limits

99.0% materials and 100% energy consumption were inventoried in a factory and were included in calculation. In the assessment, all significant parameters from gathered production data are considered, utilized energy, and electric power consumption, direct production waste, and available emission measurements. The total of neglected input flows per module A1-A3 does not exceed the permitted maximum of 1 % of energy usage and product mass. Tires consumption for transport was not taken into account. The components like: foils, papers, 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.

Modules A1 and A2: ***Raw materials supply and transport***

The modules A1 and A2 represent the extraction and processing of raw materials (mainly cast and ductile iron and plastic elements) and transport to the production site. The process starts with the manufacturing of raw brass and bronze pieces for valves obtained from casting and hot-moulding (activities carried out by IMI in Sweden); For A2 module (transport- inventoried) European averages for fuel data are applied. Production of metal and plastic elements (inputs to production in Olkusz) were inventoried and assessed.

Module A3: ***Production***

The product specific manufacturing process is presented in Figure 2.The production process is partially automated and is based on receiving metallurgical materials for production. Components previously made go to the factory in Olkusz where they are assembled into one final product. the pieces are mechanically worked and assembled with valves components (e.g. handles, gaskets, balls, fittings, etc.). Some pieces and valve components are coated with chrome and powder, according to the valve typologies in which they are used.

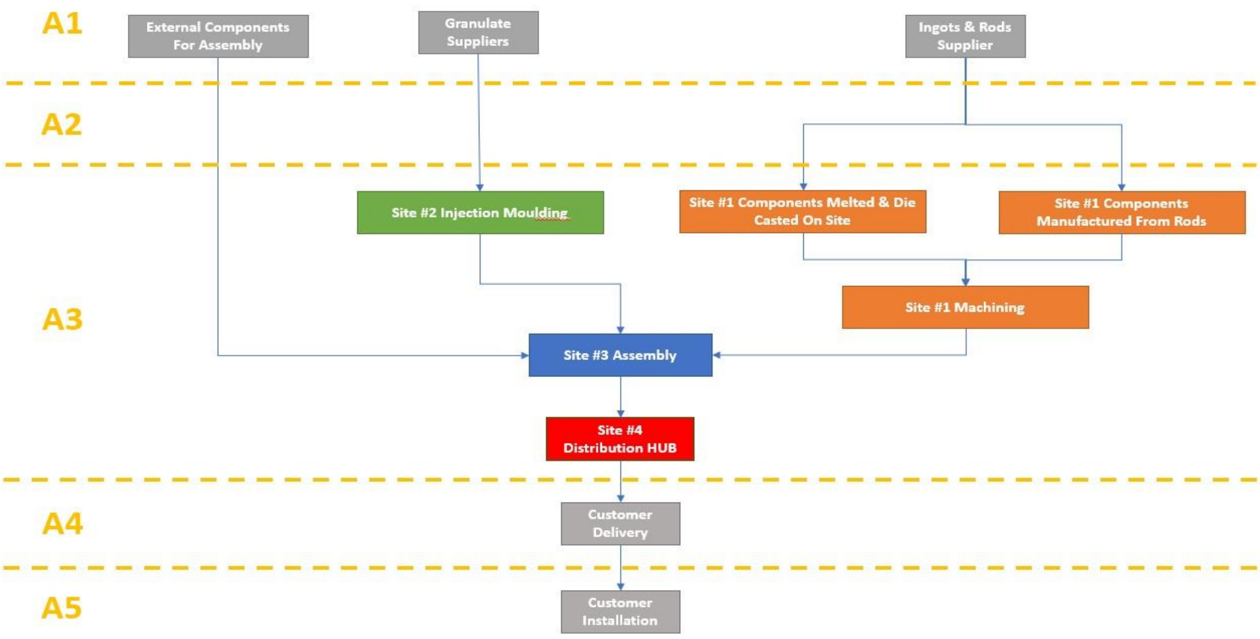

Figure 2 Manufacturing process scheme (A1-A3), with forming/assembly process in Olkusz (A3)

Module A4: transport to consumer

Vehicle transport at distance 500 km is considered (emission standard: Euro 5) with 100% load capacity.

Modules *C and D: End-of-life (EOL)*

Due to the fact that the declaration covers a wide range of products for various purposes and usage scenarios, it is not possible to directly specify the de-construction technology and the amount of energy for disassembly in C1 module (so this module is very generic based on literature). In the adapted end-of-life scenario, the de-constructed steel products are transported to a metal mill distant by 100 km on > 16t lorry EURO 5 where are used as scrap to produce a new metals. The recycling potential of C3 module is 98% and it is assumed that only 2% of the metal elements will end up in a landfill – C4 module (Table 1). Module D presents credits resulting from the recycling of the scrap (used for steel production), calculated in accordance with the approach developed by World Steel Association.

Table 1 End-of-life scenario for the STAF & STAF-SG with variants

Material	Material recovery	Recycling	Landfilling
metals	100%	98%	2%
polymers	100%	0%	100%

Electricity at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by IMI International Sp. z o. o. and verified during data audit (Sweden, Poland and Germany). No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as good. The background data for the processes come from the following resources database Ecoinvent v.3.10 (metal ores, copper recyclates, stainless steel, EPDM, PPS, PP TPE, EUR-flat pallet, paper, carton). Specific (LCI) data for Brass production was a part of the input data verification, some specific data comes from Erwitte located plant.

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100-year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method

Additional information

The manufacturer provided certificates of origin of electricity from renewable energy sources based on the biomass. Electricity (Ecoinvent v.3.10 data) emission factor (bio based electricity production for Poland) used is 0.056 kg CO_2/kWh. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary. The product may contain dangerous substances (lead), more than 0,1% by weight, given by the REACH Candidate List.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of STAF & STAF-SG with variants produced in Europe. The following life cycle modules (Table 2) were included in the analysis. The following tables 3-6 show the environmental impacts of the life cycle of selected modules (A1-A5+C1-C4+D).

Table 2 System boundaries for the environmental characteristic of the product.

Environmental assessment information (MD – Module Declared, MND – Module Not 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	MD	MD	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

Table 3 Life cycle assessment (LCA) results for specific product – environmental impacts of (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	1.65E+00	3.95E-01	1.51E-01	2.20E+00	8.34E-02	6.85E-04	6.85E-03	2.21E-02	6.39E-02	7.93E-04	-9.45E-01
Greenhouse potential - fossil	eq. kg CO_2	1.47E+00	3.94E-01	1.50E-01	2.01E+00	8.31E-02	6.85E-04	6.85E-03	2.20E-02	6.38E-02	7.90E-04	-9.19E-01
Greenhouse potential - biogenic	eq. kg CO_2	-4.91E-02	1.35E-03	3.08E-03	-4.47E-02	2.84E-04	1.85E-06	1.85E-05	7.52E-05	1.33E-05	2.01E-06	-1.40E-02
Global warming potential - land use and land use change	eq. kg CO_2	4.65E-03	1.55E-04	6.21E-05	4.87E-03	3.26E-05	1.07E-07	1.07E-06	8.64E-06	1.01E-05	7.46E-07	-2.38E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	1.07E-03	9.12E-08	1.49E-08	1.07E-03	1.92E-08	3.77E-12	3.77E-11	5.09E-09	7.80E-01	3.20E-10	-1.51E-08
Soil and water acidification potential	eq. mol H+	8.86E-03	1.60E-03	3.49E-03	1.40E-02	3.37E-04	7.25E-06	7.25E-05	8.93E-05	5.32E-04	7.43E-06	-4.37E-04
Eutrophication potential - freshwater	eq. kg P	2.19E-03	2.65E-05	4.87E-04	2.71E-03	5.59E-06	1.18E-06	1.18E-05	1.48E-06	4.32E-07	7.36E-08	-8.16E-05
Eutrophication potential - seawater	eq. kg N	2.14E-03	4.83E-04	8.26E-04	3.45E-03	1.02E-04	1.03E-06	1.03E-05	2.70E-05	1.81E-03	2.59E-06	-2.03E-04
Eutrophication potential - terrestrial	eq. mol N	1.20E-02	5.26E-03	6.04E-03	2.33E-02	1.11E-03	8.95E-06	8.95E-05	2.94E-04	3.42E-03	2.83E-05	-2.84E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	4.96E-03	1.61E-03	1.70E-03	8.27E-03	3.40E-04	2.57E-06	2.57E-05	9.01E-05	7.46E-04	8.23E-06	-1.59E-04
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.24E-03	1.40E-06	4.18E-07	1.24E-03	2.95E-07	2.58E-10	2.58E-09	7.80E-08	1.45E-08	1.81E-09	-2.67E-04
Abiotic depletion potential - fossil fuels	MJ	1.63E+01	5.85E+00	5.68E+00	2.78E+01	1.23E+00	1.08E-02	1.08E-01	3.27E-01	6.05E-02	2.17E-02	-5.65E+00
Water deprivation potential	eq. m^3	2.69E+00	2.70E-02	1.30E-01	2.84E+00	5.70E-03	2.07E-04	2.07E-03	1.51E-03	1.42E-03	6.87E-05	-3.72E+00

Table 4 Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 5 Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.63E+01	8.39E-02	3.63E-01	1.68E+01	1.77E-02	8.90E-04	8.90E-03	4.69E-03	1.11E-03	1.88E-04	3.25E+00
Consumption of renewable primary energy resources used as raw materials	MJ	2.31E+00	0.00E+00	0.00E+00	2.31E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	1.86E+01	8.39E-02	3.63E-01	1.91E+01	1.77E-02	8.90E-04	8.90E-03	4.69E-03	1.11E-03	1.88E-04	-3.25E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.62E+01	5.85E+00	4.39E+00	2.64E+01	1.23E+00	1.08E-02	1.08E-01	3.27E-01	-2.95E+00	2.17E-02	-8.05E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.82E-01	0.00E+00	0.00E+00	2.82E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E+00	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	1.65E+01	5.85E+00	5.81E+00	2.81E+01	1.23E+00	1.08E-02	1.08E-01	3.27E-01	6.06E-02	2.17E-02	-8.05E+00
Consumption of secondary materials	kg	3.84E-01	1.96E-03	6.60E-04	3.87E-01	4.14E-04	9.40E-07	9.40E-06	1.10E-04	2.74E-05	4.55E-06	-1.09E-02
Consumption of renew. secondary fuels	MJ	8.28E-03	2.16E-05	2.50E-06	8.30E-03	4.56E-06	4.75E-09	4.75E-08	1.21E-06	3.72E-07	1.19E-07	-7.46E-06
Consumption of non-renewable secondary fuels	MJ	1.04E-03	0.00E+00	0.00E+00	1.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater	m^3	1.18E-01	7.36E-04	2.39E-02	1.43E-01	1.55E-04	3.11E-05	3.11E-04	4.11E-05	5.36E-05	2.37E-05	-3.79E-02

Table 6 Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	1.44E-01	6.56E-03	3.67E-02	1.87E-01	1.38E-03	8.38E-05	8.38E-04	3.67E-04	4.35E-09	2.30E-05	-8.25E-02
Non-hazardous waste	kg	2.07E+00	1.16E-01	2.27E-01	2.42E+00	2.46E-02	5.65E-03	5.65E-02	6.51E-03	1.14E-02	3.24E-04	-1.23E+00
Radioactive waste	kg	1.64E-02	4.37E-07	4.03E-06	1.64E-02	9.21E-08	1.62E-09	1.62E-08	2.44E-08	3.23E-07	1.44E-07	-6.55E-01
Components for re-use	kg	1.04E-03	0.00E+00	0.00E+00	1.04E-03	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	8.05E-01	1.81E-05	9.00E-02	8.95E-01	3.82E-06	7.26E-08	7.26E-07	1.01E-06	4.04E-07	4.33E-08	0.00E+00
Materials for energy recovery	kg	1.06E-03	1.46E-07	1.00E-03	2.06E-03	3.09E-08	1.17E-10	1.17E-09	8.18E-09	5.04E-09	5.13E-10	0.00E+00
Exported Energy	MJ	1.92E-02	0.00E+00	1.65E-02	3.57E-02	0.00E+00	3.46E-05	3.46E-04	0.00E+00	6.17E-02	0.00E+00	0.00E+00

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 (sub clause 8.1.3.) [x] external [ ] internal
External verification of EPD: Halina Prejzner, PhD. Eng. LCI audit and verification: Michał Chwedaczuk, M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: Note: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (see ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products (v.1.6.,2023)
- PN-EN 12266-1:2012 - Badania armatury metalowej -- Część 1: Próby ciśnieniowe, procedury badawcze i kryteria odbioru -- Wymagania obowiązkowe
- 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
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- KOBiZE Wskaźniki emisyjności CO_2, SO_2, NO_x, CO i pyłu całkowitego dla energii elektrycznej. December 2021
- World Steel Association 2017 Life Cycle inventory methodology report for steel products

LCA,LCI, input data verification
Michał Piasecki, PhD. D.Sc.

Qualified electronic signature

Head of Thermal Physic, Acoustic and Environment Department
Agnieszka Winkler-Skalna, PhD.

Qualified electronic signature

Instytut Techniki Budowlanej

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

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

CERTIFICATE № 669/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

STAF & STAF-SG with variants

Manufacturer:

IMI International Sp. z o.o.
Olewin 50A, 32-300 Olkusz, Poland

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

EN 15804+A2

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

This certificate, issued on 13th September 2024 is valid for 5 years or until amendment of mentioned Environmental Declaration

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 2024