Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804+A2

VSH Shurjoint Fittings Painted

Registration number:	EPD-Kiwa-EE-000496-EN
Issue date:	26.05.2026
Valid until:	26.05.2031
Declaration owner:	Aalberts Integrated Piping Systems B.V.
Publisher:	Kiwa-Ecobility Experts
Program operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

VSH Shurjoint Fittings Painted

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-00496-EN

1.3 VALIDITY

Issue date: 26.05.2026

Valid until: 26.05.2031

1.4 PROGRAM OPERATOR

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1.5 OWNER OF THE DECLARATION

Declaration owner: Aalberts Integrated Piping Systems B.V.

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Production location: Taiwan

Production location: No. 295, Section 3, Wandan Road, Wandan, Pingtung, Taiwan.

1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

☐Internal ☒ External

Dr.-Ing. Morteza Nikravan

Third party verifier

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The program operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

Kiwa-EE GPI R.3.0 (2025): Kiwa-Ecobility Experts, General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025): Kiwa-Ecobility Experts, General Programme Instructions “Product Level” – Annex B1. Environmental Information Programme according to EN 15804 / ISO 21930 , SOP EE 1203_R.3.0 (03.06.2025)

1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPDs programs may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

1.10 CALCULATION BASIS

LCA method: EN15804+A2 (2019)

LCA software: Ecochain Helix version 4.3.1

Characterization method: EN15804+A2 (2019)

LCA database profiles: Ecoinvent version 3.9.1 & Nationale Milieudatabase v3.9

Database version: Ecoinvent 3.9.1 Cut-Off & Nationale Milieudatabase v3.9

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the following report: 'VSH Shurjoint Fittings Painted 260601'

2 Product

2.1 PRODUCT DESCRIPTION

"VSH Shurjoint Fittings Painted" are ductile iron, painted fittings with machined external grooves for use in mechanical piping systems; joints are made with gasketed couplings whose keys engage the groove and are tightened with bolts and nuts. The range covers numerous configurations (elbows, tees, reducers, adapters, caps and more) and sizes from ½" (DN32) up to 104" (DN2600); the declared reference article is a 90° elbow, model 7110, 1-1/4in approx., with a weight of 0.481 kg (≈ 0.475 kg ductile iron + 0.006 kg paint). Typical applications include heating, cooling, compressed air, sprinkler and dry extinguishing lines, with an expected service life of more than 50 years and no use-phase maintenance is expected or declared (modules B declared not relevant). Products are manufactured in Pingtung (Taiwan), shipped by container vessel and by trucks to the Aalberts IPS warehouse in Zeewolde (NL), and distributed to customers within Europe (average outbound distance ~561 km); packaging includes a plastic bag and wooden box.

PRODUCT SPECIFICATION

The reference article, VSH Shurjoint elbow 90°, model 7110 (2 x groove), 42.4 mm (DN32), (171100012002), painted orange, has the following composition:

The final composition of the product is described in the following table:

Materials	Weight [m-%]
Ductile Iron	98.75
Paint	1.25
Total	100

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

Shurjoint grooved fittings are mechanical pipe-joining components intended for use in pressurized or non-pressurized systems for water, HVAC, fire protection, gas and various industrial fluids. Shurjoint grooved-end fittings are manufactured and designed to meet ASTM F1548 and ANSI/AWWA C606 requirements for use with grooved mechanical couplings conforming to ASTM F1476.

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

A reference service life of at least 50 years has been declared by the manufacturer for VSH Shurjoint Fittings Painted. The reference service life depends on the conditions of use described in this EPD and on the specific characteristics of the product. Under normal application conditions, no planned maintenance, repair, replacement or refurbishment is required during the declared reference service life.

The declared reference service life applies only to this specific EPD. It does not provide information on the actual lifetime of an individual product and does not constitute a guarantee of product performance, durability or warranty conditions.

The product consists primarily of a painted ductile iron fitting body and is designed as a passive component for mechanical piping systems. No operational energy or water use is required by the fitting during its service life, and no in-use emissions are expected under normal use conditions.

USED RSL (YR) IN THIS CALCULATION:

50

2.4 TECHNICAL DATA

Ductile iron is an ideal material for VSH Shurjoint components because it provides the same or greater strength than forged or cast steel pipe materials, such as forged steel flanges – ASTM A105, steel valves – ASTM A216 WCB, forged steel pipe – ASTM A53 grade B, etc. Most VSH Shurjoint parts are made of ductile iron and comply with ASTM A536 grade 65-45-12. The range VSH Shurjoint Fittings Painted covers numerous configurations (elbows, tees, reducers, adapters, caps) and sizes from ½" (DN15) up to 104" (DN2600).

Technical data, including size ranges and specifications, can be found on the Aalberts IPS website under the product's Dimensions tab. A more detailed document is available under the product's Downloads tab in the Datasheet file. Link to the Datasheet file can be found in the Reference chapter.

2.5 SUBSTANCES OF VERY HIGH CONCERN

No substances included in the REACH 'Candidate List of Substances of Very High Concern (SVHC)' are present in this product at a concentration exceeding 0.1% (w/w).

2.6 DESCRIPTION PRODUCTION PROCESS

The process tree covers all processes that cause environmental impacts over the declared life cycle of the VSH Shurjoint Fittings Painted, including raw material procurement, transport of these resources to the production facility, manufacturing, distribution to the customer, installation packaging treatment, end-of-life treatment and potential benefits beyond the system boundary. The process tree for the reference product #7110 (42.2) 1-1/4 Red 171100012002 is visualized in Figure 1. The modules included in this EPD are defined by the system boundaries and are summarized below.

Raw material supply, transport and manufacturing (A1-A3) are included. A1 covers the extraction and processing of the incoming materials, primarily the ductile iron melting mix consisting of pig iron, externally sourced compressed iron scrap, internal scrap, graphite and noduliser. Paint, packaging materials and ancillary materials such as moulding sand, clay, water and lubricants are also included where relevant. A2 covers the transport of these raw and ancillary materials from suppliers to the Aalberts IPS APAC manufacturing facility in Pingtung, Taiwan, using supplier-specific transport distances where available.

A3 covers the production processes at the Pingtung facility. The ductile iron is melted, cast in moulds, cleaned and finished by blasting, grinding or machining where applicable, and painted. Internal scrap is recycled back into the melting process on site; the additional energy and process inputs required for this loop are included in A3. Production waste that leaves the site, such as used sand, slag, paint-related waste and small metal scrap streams, is modelled with transport and treatment in A3. Product packaging that leaves the factory is also assigned to the relevant modules.

Transport to the customer and the construction-installation process (A4-A5) are included. A4 covers road transport from the manufacturing facility to the export port in Taiwan, container vessel transport to Rotterdam, road transport from Rotterdam to the Aalberts IPS warehouse in Zeewolde, and distribution from Zeewolde to European customers.

A5 covers the construction-installation process. The fittings are installed with hand tools. The treatment of packaging waste reaching the construction site is included in A5, and related recovery benefits are reported in module D where applicable.

Modules B1-B7 are declared as modules not relevant (MNR). The product is a passive fitting with no in-use emissions, no planned maintenance, repair, replacement or refurbishment within the declared reference service life, and no operational energy or water use. Therefore, no activities occur during the stage that would lead to measurable impacts per EN 15804+A2. The declared reference service life is 50 years, based on the default value used for buildings in LCA studies by the European Commission Joint Research Centre and on Aalberts IPS internal expectations for comparable products and materials.

De-construction, transport, waste processing and disposal (C1-C4) are included. C1 is declared without product-specific inputs because the fittings are small components removed manually during refurbishment or as part of mixed demolition waste, and no dedicated machinery or ancillary materials can reasonably be attributed to the declared unit. C2 covers transport from the demolition site to waste processing using the European default end-of-life transport scenario. C3 includes sorting and pressing of the ductile iron fraction and treatment of paint residues. C4 covers final disposal of residual material fractions that are not recycled or recovered.

Reuse, recovery and recycling potential (D) is included. Module D reports the potential benefits and loads beyond the system boundary from recycling and energy recovery. Recycling benefits for the ductile iron fraction are adjusted to avoid double counting the high secondary material share already present in the A1 melting mix. Benefits related to recovered packaging material and energy recovery from packaging waste are also reported in module D in accordance with the modularity and polluter-pays principles of EN 15804+A2.

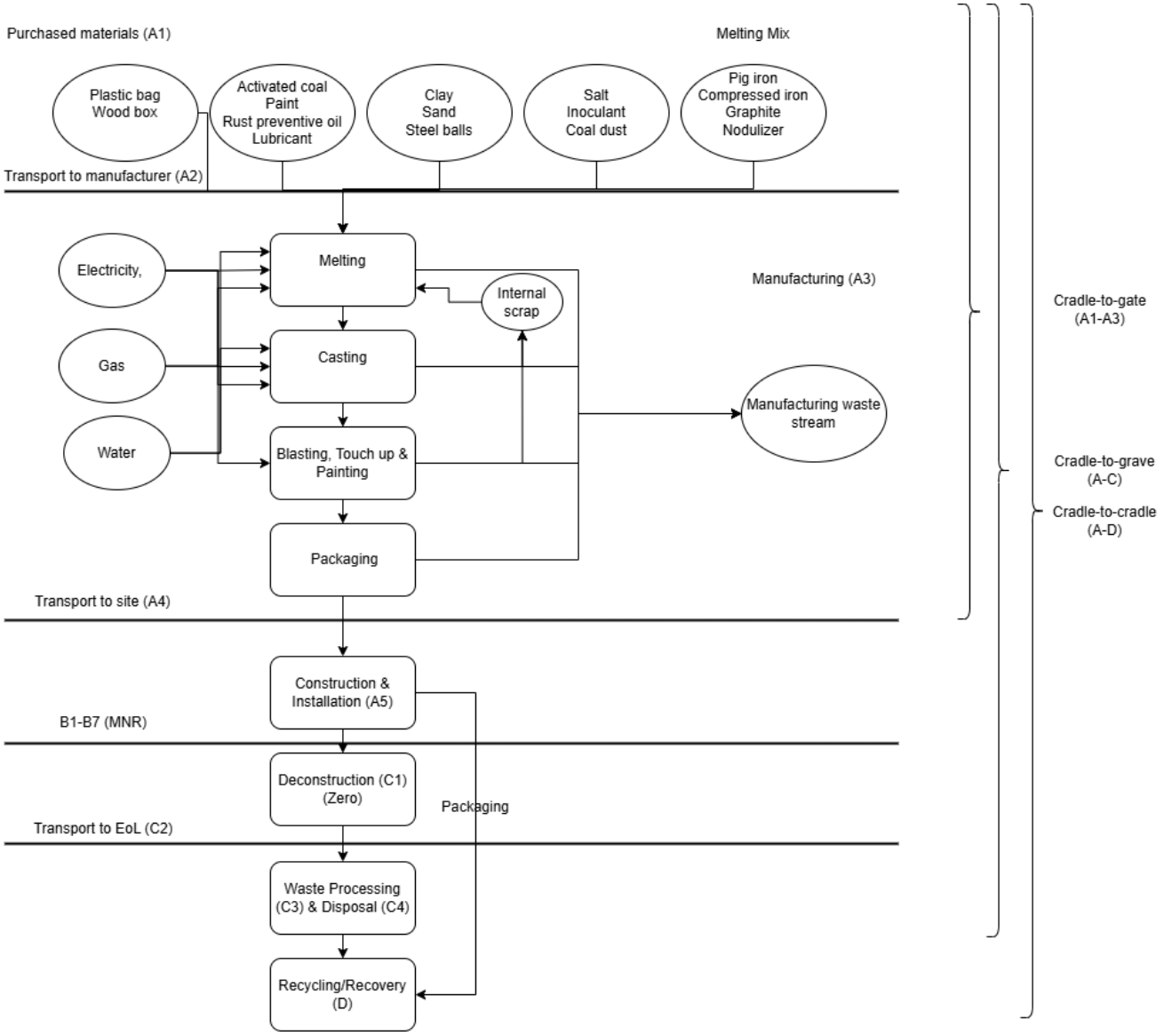

Figure 1: Process tree of #7110 (42.2) 1-1/4 Red 171100012002

2.7 CONSTRUCTION DESCRIPTION

During the installation process, no relevant environmental impacts are considered as installation is completed by hand tools.

3 Calculation rules

3.1 DECLARED UNIT

This is the worst-case EPD. The declared unit for this EPD is 1 kg of VSH Shurjoint painted ductile iron grooved fitting. The product group is represented by the VSH Shurjoint 90° elbow, model 7110 (2 x groove), 42.2 mm (DN32), painted orange, article number 171100012002, with a weight of 0.481 kg per piece. This product was chosen because this product has the highest environmental impact per kilogram of product within the assessed product range.

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	kg
Weight of article used for LCA result tables	0.481	kg/piece
Conversion factor to 1 kg	2.079	Piece/kg

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This EPD can be regarded as a cradle-to-gate with options, A4-A5, C1-C4 and D. The following phases are considered not relevant for this product range: B1-B7.

The life cycle stages included are as shown below:

(X = module declared, ND = module not declared)

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

The modules of EN15804+A2 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

This EPD is representative for VSH Shurjoint painted ductile iron grooved fittings, a

product group of Aalberts Integrated Piping Systems B.V.

This is a product group EPD covering similar painted ductile iron fittings in multiple sizes. The products are manufactured from the same core materials and follow the same main production processes, including casting, finishing and painting, at the Aalberts IPS APAC production facility in Pingtung, Taiwan. The main differences between the products are size, geometry and resulting mass.

The 1-1/4" article, #7110 (42.2) 1-1/4 Red, article number 171100012002, is used as the representative product of the product group because it is a typical representation of the range in terms of materials and manufacturing technology and is a high-volume product.

For the environmental results tables, a conservative worst-case approach is applied. The results are declared per 1 kg and are based on the smallest assessed article, #7110 (42.2) 1-1/4 Red, article number 171100012002, because this article has the highest environmental impact per kilogram within the assessed product range. Results for the remaining covered products can be derived by weight-based scaling, as their environmental impacts are considered directly proportional to product mass. The results of this EPD are representative for European Union.

Environmental results for other sizes covered by this EPD are available upon request or on the Aalberts-ips.eu website under the Sustainability tab of the VSH Shurjoint fittings product line. These results are calculated by applying the product weight to the LCA result table based on the declared unit of this EPD.

Main Input material representativeness

Item	Dataset geography	Actual input geography
Melting mix - Ferrosilicon	GLO	TW
Melting mix - Graphite	GLO	TW
Melting mix - Pig iron	RoW	TW
Melting mix - Iron scrap (processing)	RoW	TW
Paint (alkyd, 60% solution)	RoW	TW
Paint (solvent, 40%)	GLO	TW
Wood box	RoW	TW

Fehler! Keine gültige Verknüpfung.

3.5 CUT-OFF CRITERIA

All relevant inputs and outputs, including materials, energy use, emissions, transport and waste flows, have been considered in this LCA. Any excluded flows are limited to minor inputs that fall below the cut-off criteria of EN 15804+A2. Per unit process, excluded flows do not exceed 1% of total primary energy use and 1% of total mass input. Per information module, the sum of excluded flows does not exceed 5% of total primary energy use and 5% of total mass input.

Excluded flows mainly concern minor packaging-related materials used at the manufacturing site and the product plastic film, which have a very small mass and environmental relevance compared with the total production volume. No relevant fixed components of the product system have been omitted. Relevant inputs and outputs such as emissions, energy and materials have been considered in this LCA. In accordance with EN15804, the total neglected input flows per module does not exceed 5% of energy usage and mass.

3.6 ALLOCATION

Allocation was applied in accordance with EN 15804+A2 where inputs and outputs could not be directly assigned to the assessed product group. Product-specific material inputs were modelled directly where available. Shared production inputs and outputs, such as energy, ancillary materials, water use and production waste, were allocated using representative production-based methods, including production quantities and product mass where applicable.

Background datasets were selected from recognised LCA databases, including ecoinvent v3.9.1 and Nationale Milieudatabase v3.9. For ecoinvent datasets, the system model “allocation, cut-off by classification” was applied. End-of-life loads and benefits were assigned according to the modularity and polluter-pays principles of EN 15804+A2, with benefits from recycling and energy recovery reported separately in module D.

3.7 DATA COLLECTION & REFERENCE TIME PERIOD

Primary data, including raw materials, packaging materials, energy consumption and ancillary materials, were collected for the reference period from 2023-01-01 to 2023-12-31.

3.8 ESTIMATES AND ASSUMPTIONS

Generic background data from ecoinvent v3.9.1 and Nationale Milieudatabase v3.9 (based on ecoinvent 3.6/3.9.1) were used where supplier-specific environmental data or EPDs were not available. Background datasets were selected to represent the relevant material, energy, transport and waste treatment processes as closely as possible. Where no exact dataset was available, a representative or conservative proxy dataset was applied. Minor flows have been excluded only where they fall below the cut-off criteria of EN 15804+A2 and are not expected to materially influence the results.

Raw Material Supply (A1):

Material inputs were modelled based on available product and production data. Representative datasets from ecoinvent or NMD were applied. Secondary metallic input is included in the manufacturing mix and is modelled in accordance with EN 15804+A2, with related recycling benefits accounted for only where double counting in module D is avoided.

Transport To Manufacturer (A2):

Transport of raw and ancillary materials from suppliers to the production facility in Pingtung, Taiwan, was modelled using the actual transport distances available for the supplying site. A representative road transport dataset was applied for these inbound flows.

Manufacturing (A3):

Production processes at the Pingtung facility, including melting, casting, finishing and painting, are based on primary site data for the reference year 2023. Electricity is modelled using the Taiwanese electricity mix, applied as a location-based approach since no market-based renewable electricity instruments were retired during the inventory year. Internal recycling of production scrap is modelled within the manufacturing stage exclusively through the additional energy usage. Production waste leaving the site is modelled using available treatment information or conservative treatment assumptions. Wood box packaging that accompanies the product is included in this stage.

Transport To Construction Site (A4):

Transport to customers was modelled using representative logistics routes from the production site in Pingtung, Taiwan, to the European market. The scenario includes road transport to the export port in Taiwan, container vessel transport to Rotterdam, road transport to the Aalberts IPS warehouse in Zeewolde, and onward distribution by road to European customers. The customer transport distance is based on the 2023 sales-country distribution and is calculated as a single weighted-average European distance. Conservative truck datasets were applied.

Construction Installation Process (A5):

Module A5 impacts mainly represent treatment of packaging waste and biogenic carbon balancing of the wooden box packaging. The declared fittings are installed using hand tools, installation energy is considered negligible and therefore set to zero. Product installation losses are also set to zero, as no cutting or processing losses occur during normal installation and reported damage or rejection rates are negligible compared with total sales volumes. Packaging waste generated at the construction site is included in module A5, with related recovery benefits reported in module D where applicable.

Use Stage (B1-B7):

Modules B1-B7 are declared as modules not relevant. The fittings have no in-use emissions, no planned maintenance, repair, replacement or refurbishment, and no operational energy or water use during the declared reference service life of 50 years.

End Of Life (C1-C4):

End-of-life scenarios are based on representative European waste treatment assumptions. Module C1 is declared with a value of zero, as no product-specific deconstruction energy or machinery can reasonably be attributed to the declared unit; the fittings are typically removed manually during refurbishment or fall out with mixed demolition waste. Module C2 covers transport from the demolition site to waste processing using a representative European default distance. Module C3 includes sorting and pressing of the ductile iron fraction and treatment of paint. Module C4 covers final disposal of residual fractions that are not recycled or recovered.

Reuse, Recovery and Recycling Potential (D):

Module D includes potential benefits and loads beyond the system boundary from material recycling and energy recovery. Recycling benefits for the ductile iron fraction are adjusted to avoid double counting the secondary material already present in the product system. Benefits from recovered packaging material and energy recovery from packaging waste are reported separately in this module.

Biogenic Carbon:

The product itself contains no biogenic carbon. Biogenic carbon is present only in wooden packaging and is balanced over the life cycle in accordance with EN 15804+A2.

3.9 DATA QUALITY

The data quality of this LCA can be rated as good. Foreground (manufacturing) data are based on primary 2023 production records from the Aalberts IPS APAC manufacturing site in Pingtung, Taiwan, including material inputs, energy consumption, waste streams and transport distances. The processes and input at the manufacturing plant have not changed since the data collection point.

Background data were sourced from recognised LCA databases (ecoinvent v3.9.1, system model "allocation, cut-off by classification"; Nationale Milieudatabase v3.9; and World Steel) and are considered representative of the technologies used. Where no exact dataset was available, a representative or conservative proxy dataset was applied. Datasets were selected with geographical priority Taiwan > Asia > Rest-of-World > Global for manufacturing, and Europe > Switzerland > Rest-of-World > Global for end-of-life and downstream modules.

The data quality of all foreground and background datasets has been assessed in accordance with EN 15804+A2:2019, §6.3.8, on three dimensions: geographical, technological and time representativeness. Foreground data are assessed as very good across all three dimensions. Background data are assessed as good to fair, depending on the availability of region- and technology-specific datasets.

The LCA was conducted in accordance with EN 15804:2012+A2:2019, using JRC characterization factors from the EN 15804 reference package based on EF 3.1. Global Warming Potential is assessed on a 100-year time horizon. Biogenic carbon is present only in wooden packaging and is fully balanced over the life cycle in accordance with EN 15804+A2.

The study is reproducible based on the documented process descriptions, datasets and references. A summary of the data quality assessment per dimension is shown in the table below.

Quality requirement	Specific requirement	Data quality level	Notes
Time-related coverage	Age of data and minimum time period for data collection.	Good	Primary data from 2023;
Geographical coverage	Upstream: Unit process for raw material should be collected for respective geographic region	Fair	Region-specific datasets used where available; otherwise, RoW/GLO proxies applied
	Core: Unit process for production should represent the real site.	Fair	Foreground data from the Pingtung site; Taiwan electricity mix used for manufacturing
	Downstream: End-of-life disposal should represent the region of disposal.	Fair	European average end-of-life scenarios applied (NMD/ecoinvent)
Technical representativeness	Qualitative assessment of the degree to which the data set reflects the true population of interest (technology)	Good	Datasets selected to closely match the actual production and treatment technologies

3.10 POWER MIX

The Aalberts IPS APAC manufacturing site in Pingtung, Taiwan, did not procure or retire any contractual instruments during the inventory year 2023. No market-based renewable electricity claim is therefore applied in this LCA.

Electricity consumption in module A3 is modelled using a location-based approach, based on the Taiwanese grid electricity mix. The GWP intensity of this electricity mix is approximately 0.78 kg CO_2-eq/kWh.

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

Transport from the factory in Pingtung, Taiwan, to the warehouse in Zeewolde, Netherlands, is carried out by Aalberts integrated piping systems and logistical partners. The main means of transport is by average {GLO} trucks and per container ship {GLO}. Transportation to customers within Europe from the warehouse in Zeewolde is carried out by logistical partners. The main means of transport in Europe is by Class Euro5 trucks. The average transportation distance is calculated at 561km.

4.2 TRANSPORT END-OF-LIFE (C2)

The transport of waste from the demolition site to the respective end-of-life treatment facilities was modelled in accordance with the default waste scenarios prescribed by the NMD Bepalingsmethode. The following transport distances were used based on the type of end-of-life processing that the materials undergo. The transport dataset used is “t*km 0363-tra&Transport, vrachtwagen, waterstof (o.b.v. Transport, freight, lorry >32 metric ton, EURO5 {RER}| transport, freight, lorry >32 metric ton, EURO5”.

End-of-Life Scenario	Prescribed Distance [km]
Recycling	50
Landfill	100
Incineration	150

4.3 END OF LIFE (C3, C4)

Module C3 - Waste processing

The ductile iron product body is sorted and pressed for recycling, reaching end-of-waste status as ferrous scrap suitable for reuse in steelmaking or iron foundry operations. Paint is treated by municipal incineration with energy recovery; the resulting energy benefit is reported in module D.

Module C4 - Disposal

A conservative landfill share is assumed for the residual fractions that are not recycled or recovered. For the ductile iron body, 10 % of the mass is assumed to go to inert waste landfill. This is considered a conservative assumption, as in practice metal recycling rates in the European construction sector are generally higher; selecting a 10 % landfill share therefore avoids overestimating module D credits and overstating recycling performance.

4.4 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

Module D reports the potential net benefits and loads beyond the system boundary resulting from material recycling and energy recovery of end-of-life and packaging waste. The scenario follows the modularity and "polluter-pays principles” of EN 15804+A2 and uses the recycling and energy recovery rates defined for module C and module A5.

Material Recycling

The recycling credit for the ductile iron product body is modelled using the NMD module D steel substitution dataset (0282-reD), based on the World Steel methodology. The credit is calculated as the net difference between secondary, scrap-based electric arc furnace steel production and primary, ore-based converter steel production. This dataset is used as the closest available module D substitution profile for the recovered ferrous fraction.

The credit is adjusted to avoid double counting of the secondary material already present in the production input: only the primary fraction of the recovered metal qualifies for a module D credit. With an end-of-life recycling rate of 90 % for construction-sector iron and steel and a high secondary material share in the production input, the resulting net recycling output flow used for module D is approximately 12.9 % of the product body mass (≈-0.129 kg per 1 kg of declared product).

The wood box packaging is partially recycled (46 % of mass), with the recycling benefit modelled as substitution of virgin sawn wood beam production using the corresponding NMD module D wood substitution dataset.

Energy Recovery

For materials sent to incineration, module D credits the avoided external energy production based on the lower heating value of the incinerated material and the efficiencies of the applicable waste-to-energy datasets (18 % electric and 31 % thermal).

The paint fraction (100 % incinerated in module C3) is credited using the avoided fossil energy production dataset. The incinerated share of the wood box (54 %) is credited using the avoided renewable energy production dataset, since wood is a biogenic fuel.

Component	End-of-life share	Module D substitution / recovery
Ductile iron body	90 % recycling, 10 % landfill	Net steel recycling credit (NMD 0282-reD, World Steel methodology), SM-adjusted to net ~12.9 % of product mass
Paint	100 % incineration	Avoided fossil energy production from waste-to-energy
Wood box packaging	46 % recycling, 54 % incineration	Substitution of virgin sawn wood beam + avoided renewable energy production from waste-to-energy

5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about endpoints of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

These LCA results are based on one kilogram of the smallest, highest-emitting assessed size (1-1/4). For all other products covered by this worst-case EPD, the results are calculated from this baseline using a weight-based conversion. The data is available upon request or on the official Aalberts IPS website inside the covered product's sustainability tab.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER KILOGRAM OF PRODUCT #7110 (42.2) 1-1/4 RED.

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbreviation	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
AP	mol H^+ eqv.	3.82E-03	3.05E-04	7.70E-03	1.18E-02	6.08E-03	1.15E-05	0.00E+00	1.37E-05	2.89E-04	4.94E-06	-1.31E-03
GWP-total	kg CO_2 eqv.	7.80E-01	5.26E-02	1.93E+00	2.76E+00	3.11E-01	1.36E-01	0.00E+00	3.13E-03	5.62E-02	5.21E-04	-2.17E-01
GWP-b	kg CO_2 eqv.	1.40E-03	2.43E-05	-9.00E-02	-8.86E-02	-3.34E-06	1.35E-01	0.00E+00	1.30E-05	8.89E-05	1.03E-06	5.80E-05
GWP-f	kg CO_2 eqv.	7.62E-01	5.26E-02	2.02E+00	2.83E+00	3.11E-01	7.19E-04	0.00E+00	3.11E-03	5.61E-02	5.20E-04	-2.17E-01
GWP-luluc	kg CO_2 eqv.	1.68E-02	1.93E-05	1.76E-03	1.86E-02	1.85E-04	6.63E-07	0.00E+00	1.88E-06	3.79E-05	1.45E-07	-9.83E-05
EP-m	kg N eqv.	7.97E-04	1.07E-04	1.29E-03	2.19E-03	1.54E-03	4.97E-06	0.00E+00	3.13E-06	6.65E-05	1.70E-06	-3.09E-04
EP-fw	kg P eqv.	4.08E-05	5.31E-07	1.49E-04	1.90E-04	1.79E-06	2.59E-08	0.00E+00	6.70E-08	1.17E-06	5.83E-09	-8.53E-06
EP-T	mol N eqv.	8.55E-03	1.18E-03	1.42E-02	2.40E-02	1.70E-02	5.67E-05	0.00E+00	3.47E-05	7.60E-04	1.87E-05	-4.40E-03
ODP	kg CFC 11 eqv.	1.38E-08	1.16E-08	2.71E-08	5.25E-08	3.85E-08	4.26E-11	0.00E+00	6.12E-10	4.34E-10	2.14E-10	-1.18E-08
POCP	kg NMVOC eqv	3.61E-03	3.38E-04	4.70E-03	8.64E-03	4.65E-03	1.54E-05	0.00E+00	1.48E-05	2.27E-04	5.44E-06	-1.55E-03
ADP-f	MJ	1.00E+01	7.93E-01	2.71E+01	3.80E+01	4.12E+00	1.06E-02	0.00E+00	8.95E-02	3.50E-01	1.45E-02	-1.77E+00
ADP-mm	kg Sb-eqv.	3.31E-06	1.33E-06	1.86E-06	6.50E-06	1.81E-06	2.85E-09	0.00E+00	1.11E-07	1.58E-06	4.76E-09	-5.79E-07
WDP	m^3 world eqv.	8.65E-02	2.84E-03	3.34E-01	4.23E-01	1.10E-02	1.03E-04	0.00E+00	1.87E-03	4.13E-03	6.52E-04	-3.80E-02

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbreviation	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
ETP-fw	CTUe	2.62E+01	7.07E-01	1.72E+01	4.41E+01	3.27E+00	1.30E-02	0.00E+00	4.34E-02	1.34E+00	9.43E-03	-1.17E+01
PM	Disease incidence	2.83E-02	4.72E-05	2.58E-04	3.14E-03	1.60E-04	1.04E-06	0.00E+00	4.33E-06	3.95E-05	9.58E-07	-1.99E-04
HTP-c	CTUh	2.43E-03	2.29E-07	5.30E-06	2.48E-04	1.59E-07	9.21E-08	0.00E+00	1.61E-08	7.74E-07	2.18E-13	-9.15E-08
HTP-nc	CTUh	1.71E-03	7.74E-06	1.53E-04	3.32E-04	2.91E-06	3.41E-08	0.00E+00	7.64E-08	2.00E-05	6.70E-08	3.26E-04
IRP	kBq U-235 eqv.	1.17E-02	3.32E-03	1.67E-01	1.82E-01	1.07E-02	4.6646E-05	0.00E+00	1.41E-04	9.28E-04	5.9639E-05	1.89E-03
SQP	Pt	3.95E+00	6.88E-01	1.36E+01	1.83E+01	1.46E+00	4.54E-03	0.00E+00	8.42E-02	6.21E-01	3.05E-02	-2.76E+01

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None

	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – 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.

Disclaimer 2 – 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 experience with the indicator.

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbreviation	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	7.09E-01	1.17E-02	1.34E+00	2.06E+00	4.57E-02	1.00E-03	0.00E+00	2.01E-03	5.39E-02	1.27E-04	-3.53E+00
PERM	MJ	0.00E+00	0.00E+00	7.34E-01	7.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.09E-01	1.17E-02	2.08E+00	2.80E+00	4.57E-02	1.00E-03	0.00E+00	2.01E-03	5.39E-02	1.27E-04	-3.53E+00
PENRE	MJ	1.06E+01	8.30E-01	2.91E+01	4.06E+01	4.31E+00	1.11E-02	0.00E+00	8.97E-02	3.71E-01	1.50E-02	-1.36E+00
PENRM	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	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.06E+01	8.30E-01	2.91E+01	4.06E+01	4.31E+00	1.11E-02	0.00E+00	8.97E-02	3.71E-01	1.50E-02	-1.36E+00
SM	kg	7.62E-01	0.00E+00	0.00E+00	7.62E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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	0.00E+00	0.00E+00	0.00E+00
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	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.77E-03	2.13E-04	7.10E-03	1.01E-02	4.76E-04	1.83E-05	0.00E+00	4.90E-05	1.65E-04	1.61E-05	8.26E-04

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbreviation	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	4.45E-05	5.28E-06	5.29E-05	1.03E-04	2.35E-05	4.40E-08	0.00E+00	1.40E-07	1.97E-06	7.92E-08	-2.20E-05
NHWD	kg	3.61E-01	5.48E-02	4.84E-01	9.00E-01	1.00E-01	4.49E-04	0.00E+00	7.34E-03	1.10E-02	9.87E-02	1.74E-02
RWD	kg	7.59E-06	1.90E-07	7.60E-05	8.38E-05	8.65E-07	3.35E-08	0.00E+00	5.24E-08	7.04E-07	2.21E-09	9.31E-07

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbreviation	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
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	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-02	0.00E+00	0.00E+00	8.89E-01	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-02	0.00E+00	0.00E+00	1.25E-02	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	0.00E+00	3.92E-02	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.55E-02	0.00E+00	0.00E+00	2.28E-02	0.00E+00	0.00E+00

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER KILOGRAM

BIOGENIC CARBON CONTENT

The following information describes the biogenic carbon content in (the main parts of) the product at the factory gate per kilogram of product:

Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.024948	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake biogenic carbon dioxide	Amount	Unit
Product	0	kg CO_2 (biogenic)
Packaging	0.091476	kg CO_2 (biogenic)

6 Interpretation of results

6.1 CONTRIBUTION ANALYSIS

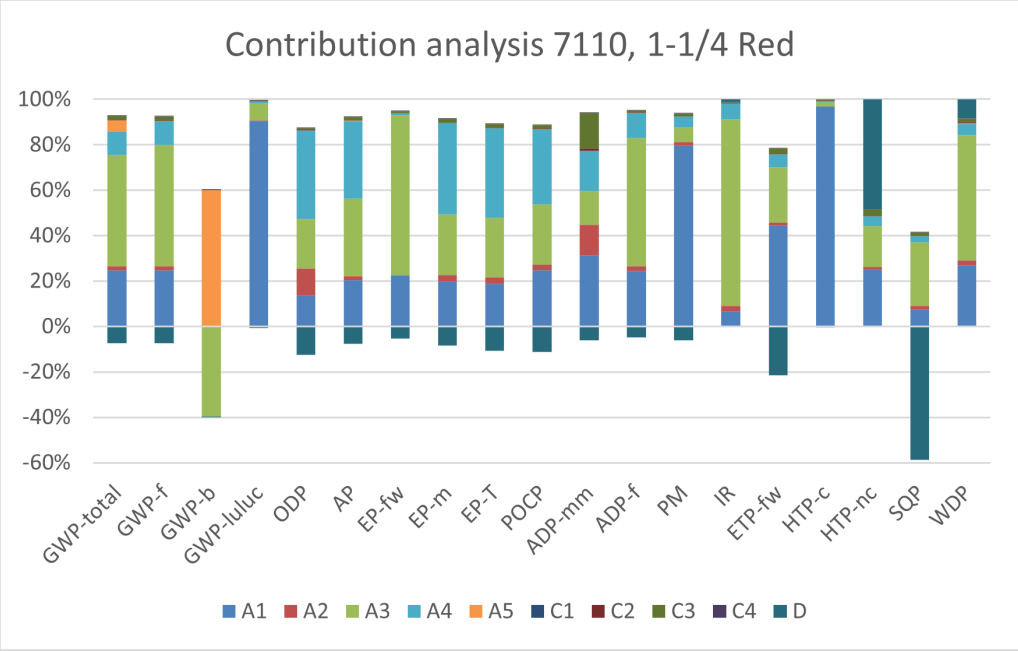

Figure 2: Contribution Analysis #7110 environmental impact. Product #7110 (42.2) 1-1/4 Red.

Figure 2 shows the contribution of the different life cycle stages to the environmental indicators. Most environmental impacts are associated with raw material processing in module A1 and the production process in module A3.

The main impacts in A1 are driven by the melting mix input materials. Within this module, the highest contributions are observed for GWP-total, GWP-fossil, ADP and PM, indicating that raw material extraction and processing are the main drivers of these impact categories. In A3, the main emissions driver is the electricity consumption associated with the melting process. For A4, sea freight is the main emissions driver, followed closely by truck transport within the EU.

For GWP-biogenic specifically, the main contribution in module A5 is related to the biogenic carbon balance of the packaging material. The benefits reported in module D are relatively limited for this metal product. This is due to the high share of secondary input material, in the form of scrap, which is excluded from the final module D benefit calculation.

7 References

ISO 14040

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044

ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14044:2006

ISO 14025

ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2

EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

Kiwa-EE GPI R.3.0 (2025)

Kiwa-Ecobility Experts, General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025)

Kiwa-Ecobility Experts, General Programme Instructions “Product Level” – Annex B1

Environmental Information Programme

Background database

ecoinvent version 3.9.1

NMD Determination Method V3.9

Woodbox packaging

Ikenze, N., Rizos, V., & Nipius, L. (2024, November 12). Improving waste wood circularity in the EU: Classification frameworks and policy options. CEPS.

Shurjoint Painted Fittings Datasheet

https://aalberts.compano.com/Data/Environments/000001/Attachment/Bijlage/PRD/ProductGroup/Shurjoint/Datasheet/Grooved%20End%20Fittings.pdf

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