Declaration Owner
Sancal Diseño, S.L.
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Product:
Link 138X100

Functional Unit
The functional unit is one (1) unit of seating to seat Single or Multiple Occupants, maintained for a 15-year period.

EPD Number and Period of Validity
SCS-EPD-10408
EPD Valid: May 23, 2025 through May 22, 2030

Product Category Rule
EPD-NORGE, NPCR PART A: Construction products and services, Version: 2.0, Issue date: 24.03.2021.

EPD-NORGE, NPCR 026 Part B for Furniture and components of furniture (references to EN 15804+A2) version 3.0,
Issue date: 08.10.2024.

Program Operator
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Declaration owner:	Sancal Diseño, S.L.
Address:	Calle Príncipe de Asturias, 18, Yecla, Spain
For Additional Explanatory Material:	Email empresa@sancal.com
Declaration Number:	SCS-EPD-10408
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Program Operator:	SCS Global Services, 2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
General Program Instructions:	SCS Type III Environmental Declaration Program: Program Operator Manual. Version 12-0 (December 2023) | SCS Global Services
Product(s):	Furniture
Functional Unit:	The functional unit is one (1) unit of seating to seat Single or Multiple Occupants, maintained for a 15-year period.
Product RSL:	15 years
Product ESL:	15 years
Product Subcategory:	Indoor Seating
Markets of Applicability:	Global
Year(s) of Reported Manufacturer Primary Data:	2023
LCA Software & Version Number:	OpenLCA 2.3.0
LCA Practitioner:	Connor Mikre, SCS Global Services
Part A Product Category Rule:	EPD-NORGE, NPCR PART A: Construction products and services, Version: 2.0, Issue date: 24.03.2021.
Part B Product Category Rule:	EPD-NORGE, NPCR 026 Part B for Furniture and components of furniture (references to EN 15804+A2) version 3.0, Issue date: 08.10.2024.
Independent critical review of the LCA and data, according to ISO 14044 and the PCR:	☐ internal ☒ external
LCA Reviewer:	Lindita Bushi, Ph.D.,Athena Sustainable Materials Institute
Independent verification of the declaration and data, according to ISO 14025 and the PCR:	☐ internal ☒ external
EPD Verifier:	Lindita Bushi, Ph.D.,Athena Sustainable Materials Institute
Declaration Contents:	

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and EN 15804.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

In accordance with EN 15804+A2 2019, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.

1. SANCAL DISEÑO, S.L.

Sancal Diseño, S.L. (Sancal) was founded in Spain over fifty years ago, where they remain there to this day. The firm designs balanced products with a strong identity, but which can be personalized at the same time, because the diversity of humanity is the measure of everything. Sancal has a contemporary style, timeless and eclectic. Its premise is to design products which go forward with us, which bring value and allow to create personal, singular spaces.

For Sancal design should be a source of innovation, to develop new concepts and improve existing products. Simplicity, to make our lives easier. Closeness, to make the new familiar. Creativity, to thrill us.

2. PRODUCT

2.1 PRODUCT DESCRIPTION

A few months ago, Raw Color challenged the concept of rest with their design, Link. They asked themselves why a seat can't be a "piece of art" when we are not using it? Now, why can't a "piece of art" be as practical as a seat? The answer is that it can. Meet the new Wrinkled Link, featuring a cover that allows you to dress and undress each link without much effort, making it easy to maintain. A quilted filling provides extra softness and allows you to choose from a wide variety of fabrics. Its ruffled construction creates a characteristic crinkled effect. In any of their versions, the sculptural Link poufs are based on the search for alternative furnishing solutions. By breaking down all formal barriers, their approach is undoubtedly freer, and this triggers rebellious, even anarchic sitting. In any case, fun is guaranteed.

Product variants, which are limited to fabric type and color, are accounted for through the dataset selection for fabric, which is based on the weighted average fabric by mass used across the product suite. The manufacturing of Sancal seating products - including cutting, sowing, quilting, upholstering, foam and elastic webbing application, staining, lacquering, assembly, and packaging - occurs in Sancal Diseño S.L. facility in Yecla Spain.

The reference service life (RSL) used for this product is assumed to be 15 years of use with no maintenance or replacement, per the PCR. The estimated service life (ESL) for this product is 15 years, per the PCR. The product image included in this Environmental Product Declaration is for illustrative purposes only and the actual configuration of the furniture product may vary. This product is not meant for reuse. This is not an electrically operated furniture product.

2.2 PRODUCT SPECIFICATION

Table 1. *Product weight for Sancal's Link 138X100.*

Product	Declared Unit	kg
Link 138X100	1 Product	19.5

2.3 APPLICATION

Sancal seating products are used in indoor public spaces, offices, as well as domestic environments.

2.4 FLOW DIAGRAM

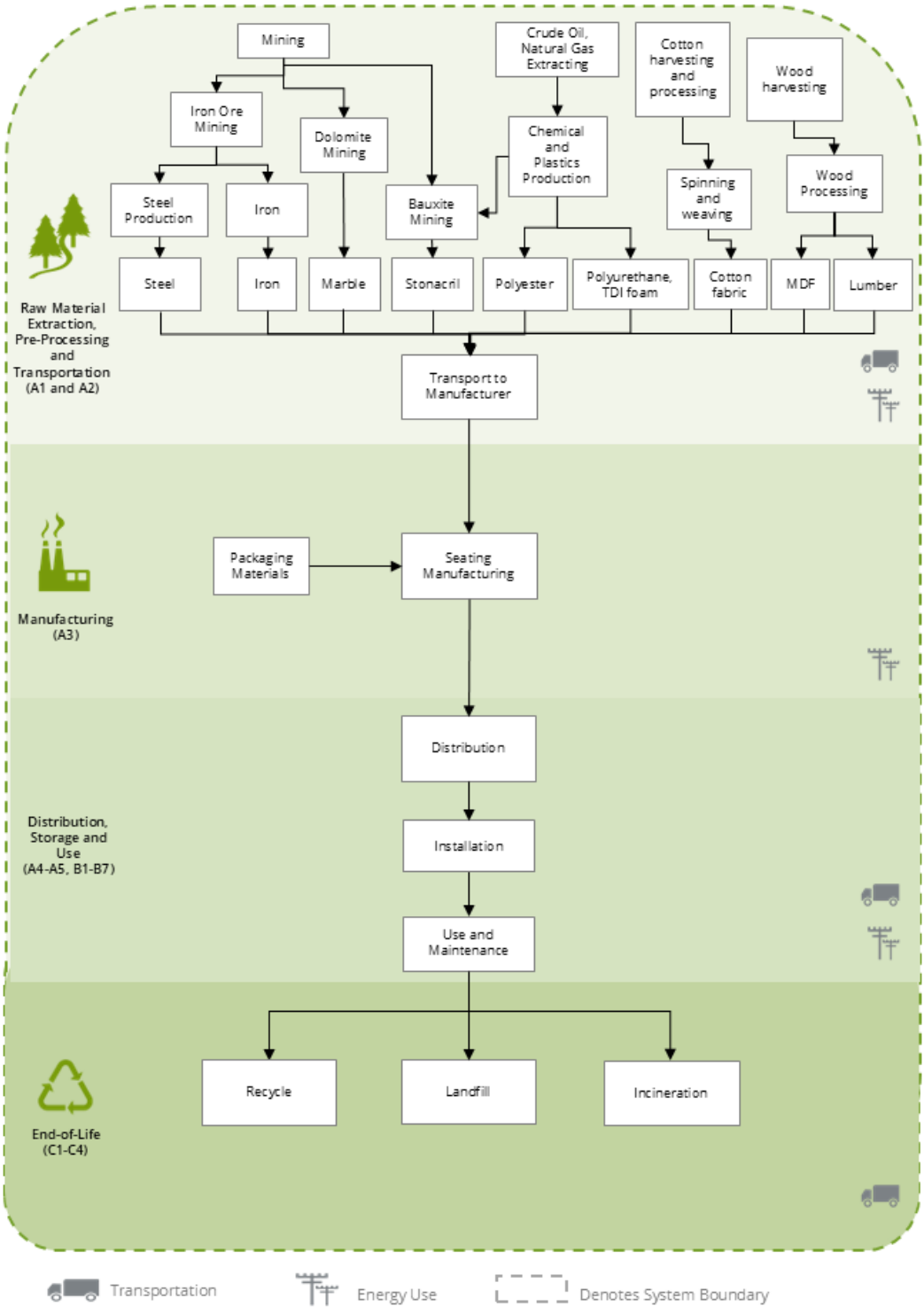

Figure 1. *Flow Diagram for the life cycle of the Sancal Link 138X100.*

3. Methodological Framework

3.1 FUNCTIONAL UNIT

The functional unit is one (1) unit of seating to seat Single or Multiple Occupants, maintained for a 15-year period.

3.2 SYSTEM BOUNDARY

The system boundary is cradle-to-grave and includes resource extraction and processing, product manufacture and assembly, distribution/transport, use and maintenance, and end-of-life. The diagram below illustrates the life cycle stages included in this EPD. Modules B1, B2, B3, B4, B5, B6, B7, C1 and C3 are assumed null.

Table 2. *Life cycle phases included in the Sancal seating product system boundary.*

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Benefits and loads beyond the system boundary
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

X = Module Included | MND = Module Not Declared

3.3 ALLOCATION

Resource use at the Sancal Diseño S.L. facility (e.g. water and energy) was allocated to the product based on the product mass as a fraction of the total facility production volume. Production wastage is modelled based on the material sent to landfill, recycling, and incineration. Waste in A3 is accounted for in modules A1 and A2 of the model. The co-product method is used, which is an allocation method in which scrap generated during manufacturing is treated not as waste, but as a separate co-product to which burden can be attributed to.

The seating product includes recycled materials, which are allocated using the recycled content allocation method (also known as the 100-0 cut-off method). Using the recycled content allocation approach, system inputs with recycled content do not receive any burden from the previous life cycle other than reprocessing of the waste material. At the end of life, materials which are recycled leave the system boundaries with no additional burden.

Impacts from transportation were allocated based on the mass of material and distance transported.

3.4 CUT-OFF RULES

According to the PCR, cumulative omitted mass or energy flows within the product boundary shall not exceed 5%. In the present study, except as noted, all known materials and processes were included in the life cycle inventory.

Production of surface treatments, such as paint, wood coatings, water-based, oil-based, and solvent-based paint, is covered in life cycle module A1. Surface treatments are declared even in instances where they account for less than 1% of the product mass.

3.5 DATA SOURCES

Primary data were provided by Sancal for the Diseño S.L. facility in Yecla, Spain. The principal source of secondary LCI data is the Ecoinvent 3.10 database.

Table 3. *Data sources used for the LCA study*

Component	Dataset	Data Source	Publication Date
PRODUCT			
Fabrics			
Polyester Fill	market for fibre, polyester | fibre, polyester | EN15804GD, U - GLO	EI v3.10	2023
New Wool	market for sheep fleece in the grease | sheep fleece in the grease | EN15804GD, U - GLO market for weaving, synthetic fibre | weaving, synthetic fibre | EN15804GD, U - GLO	EI v3.10	2023
Nylon	nylon 6 production | nylon 6 | EN15804GD, U - RoW market for weaving, synthetic fibre | weaving, synthetic fibre | EN15804GD, U - GLO	EI v3.10	2023
Polyester	polyester fibre production, finished | fibre, polyester | EN15804GD, U - RoW weaving of synthetic fibre, for industrial use | weaving, synthetic fibre | EN15804GD, U - GLO	EI v3.10	2023
Trevire CS	polyester fibre production, finished | fibre, polyester | EN15804GD, U - RoW weaving of synthetic fibre, for industrial use | weaving, synthetic fibre | EN15804GD, U - GLO	EI v3.10	2023
Recycled Polyester	polyester fibre production, finished | fibre, polyester | Cutoff, U (Modified - Recycled) - RoW weaving of synthetic fibre, for industrial use | weaving, synthetic fibre | EN15804GD, U - GLO	EI v3.10	2023
Viscose	market for fibre, viscose | fibre, viscose | EN15804GD, U - GLO	EI v3.10	2023

	weaving of synthetic fibre, for industrial use | weaving, synthetic fibre | EN15804GD, U - GLO		
Silicone	market for silicone product | silicone product | EN15804GD, U - RoW	EI v3.10	2023
Cotton	market for finishing, textile, woven cotton | finishing, textile, woven cotton | EN15804GD, U - GLO market for textile, woven cotton | textile, woven cotton | EN15804GD, U - GLO	EI v3.10	2023
Polypropylene	textile production, nonwoven polypropylene, spunbond | textile, nonwoven polypropylene | EN15804GD, U - RoW	EI v3.10	2023
Polyester Fiber Filling	market for fibre, polyester | fibre, polyester | EN15804GD, U - GLO	EI v3.10	2023
Steel	market for steel, chromium steel 18/8, hot rolled | steel, chromium steel 18/8, hot rolled | EN15804GD, U – GLO metal working, average for steel product manufacturing | metal working, average for steel product manufacturing | EN15804GD, U - RoW	EI v3.10	2023
Medium Density Fiberboard (recycled)	market for waste wood, post-consumer | waste wood, post-consumer | EN15804GD, U - RoW medium density fibreboard production, uncoated | medium density fibreboard | EN15804GD, U (Modified - 100% Recycled) - RoW	EI v3.10	2023
Foam	market for polyurethane, flexible foam | polyurethane, flexible foam | EN15804GD, U - RoW market for injection moulding | injection moulding | EN15804GD, U - GLO	EI v3.10	2023
PACKAGING			
Plastic wrap (recycled)	market for packaging film, low density polyethylene | packaging film, low density polyethylene | Cutoff, U (100% Post-Consumer Recycled)	EI v3.10	2023
Cardboard (recycled)	waste paperboard, sorted, Recycled Content cut-off | waste paperboard, sorted | EN15804GD, U - GLO	EI v3.10	2023
Medium density fiberboard packaging (recycled)	waste wood, post-consumer, Recycled Content cut-off | waste wood, post-consumer | EN15804GD, U - GLO	EI v3.10	2023
Pine wood packaging (recycled)	waste wood, post-consumer, Recycled Content cut-off | waste wood, post-consumer | EN15804GD, U - GLO	EI v3.10	2023

Plastic packaging (recycled)	market for packaging film, low density polyethylene | packaging film, low density polyethylene | Cutoff, U (100% Post-Consumer Recycled)	EI v3.10	2023
Polyethylene (recycled)	market for polyethylene, low density, granulate | polyethylene, low density, granulate | Cutoff, U (100% Post-Consumer Recycled)	EI v3.10	2023
Glue	polyurethane adhesive production | polyurethane adhesive | EN15804GD, U - GLO	EI v3.10	2023
TRANSPORT			
Road transport	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | EN15804GD, U - RoW	EI v3.10	2023
Ship transport	market for transport, freight, sea, container ship | transport, freight, sea, container ship | EN15804GD, U - GLO	EI v3.10	2023
RESOURCES			
Grid electricity	market for electricity, medium voltage | electricity, medium voltage | EN15804GD, U - ES	EI v3.10	2023
Propane	market for propane | propane | EN15804GD, U - GLO	EI v3.10	2023
WASTES			
Hazardous waste incineration	market for hazardous waste, for incineration | hazardous waste, for incineration | EN15804GD, U - Europe without Switzerland	EI v3.10	2023
Inert waste	market for inert waste, for final disposal | inert waste, for final disposal | EN15804GD, U - RoW	EI v3.10	2023
Municipal solid waste	treatment of municipal solid waste, municipal incineration | municipal solid waste | EN15804GD, U - RoW	EI v3.10	2023

3.6. DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 4. *Data Quality Assessment*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage Age of data and the minimum length of time over which data should be collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data have been updated within the last 5 years (2023 for Ecoinvent). All of the secondary data used represents an average of at least one year's worth of data collection.
Geographical Coverage Geographical area from which data for unit processes should be collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Actual processes for upstream operations are primarily global. Surrogate data used in the assessment for European operations are representative of European operations. Data representative of European operations are considered sufficiently similar to actual processes. Electricity grids for secondary datasets are based on the country or sub-national grids, as available in Ecoinvent.
Technology Coverage Specific technology or technology mix	Data are generally representative of the actual technologies used for energy generation, processing, transportation, and manufacturing operations.
Precision Measure of the variability of the data values for each data expressed (e.g. variance)	Precision of results are not quantified due to a lack of data on data variance. Precision on the allocating manufacturing resources is moderate, as subdividing electricity and fuel use by each manufacturing process was not possible. Data collected for most operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results. Precision of the individual component materials could be improved with more primary data.
Completeness Percentage of flow that is measured or estimated	The LCA model includes all known mass and energy flows for production of the furniture products. In some instances, surrogate data are used to represent unit processes. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness Qualitative assessment of the degree to which the data set reflects the true population of interest (i.e. geographical coverage, time period, and technology coverage)	Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of the outdoor furniture products.
Consistency Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent data for secondary data.
Reproducibility Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, the major contributing components and life cycle stages of the assessment would be reproducible by other practitioners with access to the primary data used in the study and the assumptions built into Ecoinvent datasets. These major assumptions, models, and data sources are documented.
Sources of the Data Description of all primary and secondary data sources	Data sources used are documented and described in this report. For secondary LCI datasets, Ecoinvent database are used. Ecoinvent datasets are also used to underlie some assumptions on welding and coating processes.
Uncertainty of the Information Uncertainty related to data, models, and assumptions	Uncertainty related to the manufacturing processes are low. Primary data for key unit operations are included. Uncertainty related to the IPCC 2021 metrics are high, given that these metrics assume impacts from climate change will not occur for 100 years and do not include short-lived climate forcers.

3.7 PERIOD UNDER REVIEW

The period of review is calendar year 2023.

3.8 COMPARABILITY AND BENCHMARKING

The PCR this EPD was based on was written to determine the potential environmental impacts of a furniture seating product from cradle-to-grave. It was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

3.9 ESTIMATES AND ASSUMPTIONS

- Impact indicators rely on the use of generic models and potential impacts and therefore are not able to measure actual environmental impacts. Additionally, the indicators prescribed by the PCR do not represent all categories of potential environmental and human health impacts associated with the life cycle of Sancal products, and this represents a general limitation of the LCA study.
- Energy use and emissions were allocated to the product based on the mass of the product as a fraction of the total production at the Sancal Diseño S.L. facility. Total annual electricity and fuel (propane) consumption data were provided by the manufacturer.
- Fabric production in module A1 was assumed to be a weighted average fabric by mass used across the product suite.
- Lacking detailed supplier information, much of the upstream raw materials extraction and processing could not be modeled with actual process information. Representative data from the ecoinvent database was utilized as appropriate.
- No specific data were available to estimate the final disposition of the product and packaging at end-of-life. For end-of-life treatment, only metal components of furniture were assumed to be recycled. Disposal statistics, including recycling rates for the remaining durable goods and packaging were based on disposal rates from UL Part A v4.0 and UL Part A v3.2 assuming even product distribution across the United States, China, India, and Europe.
- No specific data were available to estimate the distribution of the product to the global market for module A4. For products distributed overseas, distance for distribution is assumed to include the distance from the manufacturing facility to the nearest major port (Port of Valencia), an average global shipping distance, and the distance from port to the site of installation, which was assumed to be 500 km. For products distributed within Europe, transportation from the manufacturing gate to the site of installation was assumed to be 500 km.
- Assumed all hazardous waste generated during manufacturing is disposed of through incineration.
- As a representative dataset for animal fiber weaving was not available in ecoinvent, a synthetic fiber weaving process was used to model the weaving of wool.
- This EPD only assumes fabrication loss for Fabric Material. Null fabrication loss is assumed for other input materials/components. A1 and A2 modules account for the fabrication loss of fabric materials.

3.10 UNITS

All data and results are presented using SI units. In addition to the requirements of the PCR, EN15804+A2, which this EPD conforms to, requires disclaimers from environmental indicators, which are shown in Table 5 below.

Table 5. *Disclaimers for environmental indicators as required by the PCR*

Classification	Indicator	Disclaimer
ILCD Type 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 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 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 uncertainties on these results are high or as there is limited experience with the indicator.*

4. Technical Information and Scenarios

4.1 MATERIAL COMPOSITION

Table *6.* *Material components for the Link 138X100 (kg/product).*

Product	Fabric	Wood	Polyu-rethane	Metal	Polyester	Total
Link 138X100	3.40	0.740	13.8	0.870	0.688	19.5
	17.45%	3.79%	70.77%	4.46%	3.53%	100.00%

Table 7. *Material components for the product packaging (kg/product).*

Product	Cardboard	Plastic	Total
Link 138X100	3.50	0.200	3.70
	94.59%	5.41%	100.00%

4.2 MANUFACTURE

Link 138X100 pieces are manufactured from steel and molten polyurethane injection molded into precise components to form the core of the product. Metal components are shaped through cutting and bending into various forms required for framing of the seating product and are combined with polyurethane components that comprise the seat of the piece. Prior to assembly, each piece is upholstered and filled with stuffing materials to enhance the usability of the product. All units are assembled onsite.

4.3 PRODUCT TRANSPORT

Transportation of raw materials to the Sancal facility is based on primary data supplied by Sancal. Data for transportation upstream of the 1st tier suppliers is included based on assumptions on supply chains embedded in the Ecoinvent datasets.

Transportation impacts will vary based on how far the final customer is from the Sancal facility. For module A4, distance for distribution is assumed to include the distance from the manufacturing facility to the nearest major port (Port of Valencia), an average global shipping distance, and the distance from port to the site of installation, which was assumed to be 500 km.

Transportation for end-of-life scenarios was modeled using the assumption of 100 km from the point of product use to a landfill or material recovery center.

4.4 INSTALLATION

Impacts from the production, transport and disposal of waste material associated with installation are included in this stage in addition to impacts from packaging disposal. The packaging disposal rates are taken from the UL Part A v4.0 and v3.2 packaging statistics by material and are averaged across the geographic regions to which the product is distributed. Transportation for end-of-life scenarios was modeled using the assumption of 100 km from the point of product use to a landfill, material recovery center, or waste incinerator.

Table 8. Disposal pathways by material for packaging materials at end-of-life.

Material	Packaging		
	Recycling	Landfill	Incineration
Plastics	22.6%	60.7%	16.7%
Metals	41%	57%	2%
Pulp (Cardboard, paper)	56%	40%	4%
Wood	25%	62%	13%

4.5 PRODUCT USE

No specific maintenance of the product is identified by the manufacturer. It is assumed any impacts associated with routine cleaning and maintenance are minimal and are not included in the LCA model for the product life cycle. Impacts related to indoor air quality during the product use stage are also excluded.

4.6 END-OF-LIFE

No specific data are available regarding the recycling rate of materials of the Sancal products at end-of-life. Disposal pathways are modeled in line with UL Part A v4.0. Only metal furniture components were assumed to be recycled, with global average recycling rates based on UL Part A v4.0. For all non-metal materials, the recycling portion of disposal was excluded and the remaining disposal was divided between landfill and incineration in proportion to their relative share of the total non-recycled fraction as reported in UL Part A v4.0.

Table 9. *Disposal pathways by material for products at end-of-life.*

Material	Product		
	Recycling	Landfill	Incineration
Steel	38%	62%	0%
All other materials	0%	93.5%	6.5%

4.7 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (Module D)

Information Module D aims at transparency for the environmental loads and benefits resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system.

The Link 138X100 includes steel components, containing some recycled content, which can be recycled at end-of-life. While the benefits of using recycled (secondary) materials in the product are accounted for in Module A1 for the product system, the benefits of recycling this material can be assumed to offset some production of virgin steel beyond the product system boundary.

The net burden or credit for steel components of the product is estimated using the end-of-life formulae in Annex D of EN 15804. No specific data are available regarding the recycling rate of materials of the Sancal products at end-of-life. End-of-life disposal pathways necessary for Module D calculation are modeled by material according to global average recycling rates based on UL Part A v4.0. The benefits of recycling steel components can be assumed to offset some production of materials beyond the product system boundary. Resource use and emissions associated with the processing of the recycled materials are included and modeled using Ecoinvent data. Energy recovery from incineration of the waste material is assumed negligible.

The specific recycled content, EOL recycling rates, and the relevant ecoinvent process datasets used for each material are summarized below. Datasets representing secondary steel material are modified to contain 100% scrap material input upstream.

Table 10. *Modeling parameters for Module D*

Material	Recycled Content	EOL Recycling Rate	Secondary Material	Primary Material
Steel	27%	38%	market for steel, chromium steel 18/8, hot rolled | steel, chromium steel 18/8, hot rolled | EN15804GD, U (Modified - 100% Recycled) - GLO metal working, average for steel product manufacturing | metal working, average for steel product manufacturing | EN15804GD, U - RoW	steel production, converter, low-alloyed | steel, low-alloyed | EN15804GD, U – RoW metal working, average for steel product manufacturing | metal working, average for steel product manufacturing | EN15804GD, U - RoW

5. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The following environmental impact category indicators are reported using characterization factors based on the OpenLCA v2.3.0 model utilizing the associated EN 15804+A2 method pack. Results representing energy flows are calculated using lower heating (i.e., net calorific) values. This EPD presents the estimated environmental impacts of the selected furniture product with all variations in product design and composition resulting in less than a 10% difference in the GWP_{total} indicator for A1-A3, and no significant variation among other LCIA indicators reported, in accordance with the PCR requirements for average EPDs.

The following inventory parameters, specified by the PCR, are also reported.

Table 11. *Impact categories indicators from the LCIA of the Link 138X100.*

Core Impact Category Indicators	
Global Warming Potential - Total	Eutrophication Potential, marine
Global Warming Potential – Fossil Fuels	Eutrophication potential, terrestrial
Global Warming Potential - Biogenic	Photochemical ozone formation
Global Warming Potential – Land use and land use change	Depletion of abiotic resources - minerals and metals
Ozone Depletion	Depletion of abiotic resources - fossil fuels
Acidification potential	Water use
Eutrophication Potential, freshwater	-

The following inventory parameters, specified by the PCR, are also reported.

Table 12. *Inventory parameters reported for the Link 138X100.*

Resources	Unit	Waste and Outflows	Unit
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, LHV	FW: Use of net freshwater resources	m3
RPRE: Renewable primary resources used as energy carrier (fuel)	MJ, LHV	HWD: Hazardous waste disposed	kg
RPRM: Renewable primary resources with energy content used as material	MJ, LHV	NHWD: Non-hazardous waste disposed	kg
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, LHV	RW: Radioactive waste, conditioned, to final repository	kg
NRPRE: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	CRU: Components for re-use	kg
NRPRM: Non-renewable primary resources with energy content used as material	MJ, LHV	MR: Materials for recycling	kg
SM: Secondary materials	kg	MER: Materials for energy recovery	kg
RSF: Renewable secondary fuels	MJ, LHV	EE: Recovered energy exported from the product system	MJ, LHV
NRSF: Non-renewable secondary fuels	MJ, LHV	-	-

Table 13. *Life Cycle Impact Assessment results for the Link 138X100 over a 15-yr product lifetime.*

Impact Category	Material extraction (A1)	Upstream transport (A2)	Production (A3)	Distribution (A4)	Installation (A5)	Transport to disposal (C2)	End of Life (C4)	Recovery (D)
Climate change - Total (kg CO2 eq)	203	1.37	2.00	3.97	0.327	0.378	1.83	-0.187
	95%	0.64%	0.94%	1.9%	0.15%	0.18%	0.86%	-
Climate change - Fossil (kg CO2 eq)	169	1.36	1.86	3.97	0.194	0.378	0.950	-0.190
	95%	0.77%	1%	2.2%	0.11%	0.21%	0.53%	-
Climate change - Biogenic (kg CO2 eq)	25.5	$1.44x10^{-3}$	0.135	$-5.18x10^{-4}$	0.133	$1.12x10^{-5}$	0.881	$3.57x10^{-3}$
	96%	0.0054%	0.51%	-0.0019%	0.5%	0.000042%	3.3%	-
Climate change - Land use and LU change (kg CO2 eq)	8.07	$6.19x10^{-4}$	$6.72x10^{-4}$	$1.82x10^{-3}$	$1.13x10^{-4}$	$1.52x10^{-4}$	$9.21x10^{-4}$	$1.25x10^{-4}$
	100%	0.0077%	0.0083%	0.023%	0.0014%	0.0019%	0.011%	-
Ozone depletion (kg CFC11 eq)	$4.69x10^{-5}$	$3.97x10^{-8}$	$2.02x10^{-8}$	$5.81x10^{-8}$	$1.72x10^{-9}$	$5.63x10^{-9}$	$7.30x10^{-9}$	$6.19x10^{-10}$
	100%	0.084%	0.043%	0.12%	0.0037%	0.012%	0.016%	-
Acidification (molc H+ eq)	2.56	$7.21x10^{-3}$	$4.28x10^{-3}$	$6.29x10^{-2}$	$5.03x10^{-4}$	$1.58x10^{-3}$	$2.12x10^{-3}$	$-6.50x10^{-4}$
	97%	0.27%	0.16%	2.4%	0.019%	0.06%	0.08%	-
Eutrophication, freshwater (kg P eq)	$6.27x10^{-2}$	$1.46x10^{-4}$	$4.10x10^{-4}$	$2.26x10^{-4}$	$1.63x10^{-5}$	$2.97x10^{-5}$	$8.22x10^{-5}$	$-7.53x10^{-5}$
	99%	0.23%	0.64%	0.36%	0.026%	0.047%	0.13%	-
Eutrophication, marine (kg N eq)	0.470	$2.18x10^{-3}$	$1.35x10^{-3}$	$1.67x10^{-2}$	$1.96x10^{-4}$	$5.76x10^{-4}$	$8.66x10^{-4}$	$-1.16x10^{-4}$
	96%	0.44%	0.27%	3.4%	0.04%	0.12%	0.18%	-
Eutrophication, terrestrial (molc N eq)	9.72	$2.37x10^{-2}$	$1.41x10^{-2}$	0.185	$2.06x10^{-3}$	$6.28x10^{-3}$	$8.93x10^{-3}$	$-1.38x10^{-3}$
	98%	0.24%	0.14%	1.9%	0.021%	0.063%	0.09%	-
Photochemical ozone formation (kg NMVOC eq)	0.624	$9.25x10^{-3}$	$5.04x10^{-3}$	$5.28x10^{-2}$	$6.96x10^{-4}$	$2.19x10^{-3}$	$2.98x10^{-3}$	$-4.07x10^{-4}$
	90%	1.3%	0.72%	7.6%	0.1%	0.31%	0.43%	-
Abiotic Depletion Potential, minerals and metals (kg Sb-Eq)	$1.71x10^{-3}$	$6.13x10^{-6}$	$5.22x10^{-6}$	$8.87x10^{-6}$	$3.29x10^{-7}$	$1.25x10^{-6}$	$9.84x10^{-7}$	$-2.98x10^{-6}$
	99%	0.35%	0.3%	0.51%	0.019%	0.072%	0.057%	-
Fossil fuel depletion (MJ, LHV)	2,430	33.3	14.8	52.6	1.56	5.34	6.13	-1.13
	96%	1.3%	0.58%	2.1%	0.061%	0.21%	0.24%	-
Water use (m3 world eq. deprived)	115	0.101	0.294	0.197	$1.90x10^{-2}$	$2.40x10^{-2}$	0.105	$5.52x10^{-2}$
	99%	0.088%	0.25%	0.17%	0.016%	0.021%	0.091%	-

Table 14. *Additional Life Cycle Impact Assessment Results by life cycle stage for the Link 138X100. Results are shown for one pouf maintained for 15 years.*

Impact Category	Material extraction (A1)	Upstream transport (A2)	Production (A3)	Distribution (A4)	Installation (A5)	Transport to disposal (C2)	End of Life (C4)	Recovery (D)
Additional Indicators								
Freshwater ecotoxicity (CTUe)	5,480	5.44	19.1	11.8	0.790	1.42	4.26	-12.4
	99%	0.099%	0.35%	0.21%	0.014%	0.026%	0.077%	-
Human toxicity, cancer (CTUh)	$9.56x10^{-7}$	$7.39x10^{-9}$	$5.52x10^{-9}$	$1.89x10^{-8}$	$6.17x10^{-10}$	$1.97x10^{-9}$	$2.32x10^{-9}$	$-3.74x10^{-8}$
	100%	0.77%	0.58%	2%	0.065%	0.21%	0.24%	-
Human toxicity, non-cancer (CTUh)	$1.79x10^{-6}$	$1.21x10^{-8}$	$1.05x10^{-8}$	$2.51x10^{-8}$	$1.94x10^{-9}$	$3.42x10^{-9}$	$9.70x10^{-9}$	$-2.90x10^{-9}$
	97%	0.65%	0.57%	1.4%	0.1%	0.18%	0.52%	-
Land use (Dimensionless)	9,400	8.91	7.64	19.7	1.30	3.19	8.05	-0.505
	99%	0.094%	0.081%	0.21%	0.014%	0.034%	0.085%	-
Particulate Matter emissions (Disease inc.)	$2.03x10^{-5}$	$9.30x10^{-8}$	$6.78x10^{-8}$	$2.29x10^{-7}$	$9.67x10^{-9}$	$3.09x10^{-8}$	$4.23x10^{-8}$	$-2.61x10^{-8}$
	98%	0.45%	0.33%	1.1%	0.047%	0.15%	0.2%	-
Ionizing Radiation, human health (kBq U-235 eq)	12.1	$2.42x10^{-2}$	$5.05x10^{-2}$	$3.50x10^{-2}$	$1.29x10^{-3}$	$4.38x10^{-3}$	$4.99x10^{-3}$	$1.55x10^{-2}$
	99%	0.2%	0.41%	0.29%	0.011%	0.036%	0.041%	-

Table 15. *Inventory parameters results for the Link 138X100 over a 15-yr product lifetime.*

Impact Category	Material extraction (A1)	Upstream transport (A2)	Production (A3)	Distribution (A4)	Installation (A5)	Transport to disposal (C2)	End of Life (C4)	Recovery (D)
Resources								
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ, LHV)	411	0.410	0.830	0.563	$2.10x10^{-2}$	$7.01x10^{-2}$	$8.12x10^{-2}$	-0.136
	100%	0.099%	0.2%	0.14%	0.0051%	0.017%	0.02%	-
Use of renewable primary energy resources used as raw materials (MJ, LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	100%	0%	0%	0%	0%	-
Total use of renewable primary energy resources (RPRE) (MJ, LHV)	411	0.410	0.830	0.563	$2.10x10^{-2}$	$7.01x10^{-2}$	$8.12x10^{-2}$	-0.136
	100%	0.099%	0.2%	0.14%	0.0051%	0.017%	0.02%	-
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ, LHV)	2,320	30.8	13.6	47.6	1.41	4.85	5.58	-1.17
	96%	1.3%	0.56%	2%	0.058%	0.2%	0.23%	-
Use of non-renewable primary energy resources used as raw materials (MJ, LHV)	132	2.51	1.20	5.00	0.143	0.493	0.564	$3.54x10^{-2}$
	93%	1.8%	0.84%	3.5%	0.1%	0.35%	0.4%	-
Total use of non-renewable primary energy resources (NRPRE) (MJ, LHV)	2,450	33.3	14.8	52.6	1.56	5.34	6.14	-1.13
	96%	1.3%	0.58%	2.1%	0.061%	0.21%	0.24%	-
Use of secondary material (kg)	7.97	$1.73x10^{-2}$	$5.03x10^{-2}$	$3.71x10^{-2}$	$1.24x10^{-3}$	$3.96x10^{-3}$	$4.82x10^{-3}$	0.210
	99%	0.21%	0.62%	0.46%	0.015%	0.049%	0.06%	-
Use of renewable secondary fuels (MJ, LHV)	1.42	$3.10x10^{-3}$	$2.16x10^{-2}$	$4.33x10^{-3}$	$1.55x10^{-4}$	$5.04x10^{-4}$	$6.42x10^{-4}$	$2.59x10^{-3}$
	98%	0.21%	1.5%	0.3%	0.011%	0.035%	0.044%	-
Use of non renewable secondary fuels (MJ, LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	-
Net use of fresh water (m3)	2.80	$2.90x10^{-3}$	$7.56x10^{-3}$	$5.48x10^{-3}$	$6.11x10^{-4}$	$7.06x10^{-4}$	$4.62x10^{-3}$	$1.90x10^{-3}$
	99%	0.1%	0.27%	0.19%	0.022%	0.025%	0.16%	-
Waste								
Components for re-use (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	-
Exported energy (MJ, LHV)	0.936	$2.19x10^{-3}$	$1.12x10^{-2}$	$3.17x10^{-3}$	$1.13x10^{-4}$	$3.80x10^{-4}$	$4.47x10^{-4}$	$2.10x10^{-3}$
	98%	0.23%	1.2%	0.33%	0.012%	0.04%	0.047%	-
Materials for energy recovery (kg)	$6.36x10^{-4}$	$1.39x10^{-6}$	$9.72x10^{-6}$	$1.94x10^{-6}$	$6.94x10^{-8}$	$2.26x10^{-7}$	$2.89x10^{-7}$	$1.17x10^{-6}$
	98%	0.21%	1.5%	0.3%	0.011%	0.035%	0.044%	-
Materials for recycling (kg)	3.28	$1.53x10^{-2}$	$4.36x10^{-2}$	$3.44x10^{-2}$	$3.08x10^{-3}$	$3.49x10^{-3}$	$1.74x10^{-2}$	$-4.99x10^{-2}$
	97%	0.45%	1.3%	1%	0.091%	0.1%	0.51%	-
Hazardous waste (kg)	12.6	$3.01x10^{-2}$	0.116	$5.95x10^{-2}$	$9.02x10^{-3}$	$6.38x10^{-3}$	$5.43x10^{-2}$	$-7.34x10^{-2}$
	98%	0.23%	0.9%	0.46%	0.07%	0.05%	0.42%	-
Nonhazardous waste (kg)	191	0.192	0.617	0.454	0.244	$5.03x10^{-2}$	1.58	-0.201
	98%	0.099%	0.32%	0.23%	0.13%	0.026%	0.81%	-
Radioactive waste (kg)	$3.01x10^{-3}$	$5.91x10^{-6}$	$1.31x10^{-5}$	$8.55x10^{-6}$	$3.16x10^{-7}$	$1.07x10^{-6}$	$1.22x10^{-6}$	$3.83x10^{-6}$
	99%	0.19%	0.43%	0.28%	0.01%	0.035%	0.04%	-

Table 16. *Information describing the biogenic carbon content of the Link 138X100 at the factory gate*

Biogenic Carbon Content	Unit	Value
Biogenic carbon content in product	kg C	4.13
Biogenic carbon content in packaging	kg C	6.42

Table 17. *National production mix from import, medium voltage (production of transmission lines, in addition to direct emissions) of applied electricity for the manufacturing process per functional unit.*

National electricity grid	Data source	Amount	Unit
Electricity, market mix (kWh) - Spain	EI v3.10	0.203	g CO2-eq/kWh

6. LCA: Interpretation

The A1 life cycle phase is the largest contributor to the impact indicators evaluated. Impacts from modules downstream of the manufacturing facility are minimal while the manufacturing (A3) stage impacts are generally less than 5% of the overall life cycle of the product. Extraction and processing of fabric, polyurethane, and steel components are the main contributors to the product's life cycle impacts.

Product distribution dominates the downstream stage impacts and reflects the geographic variability of the product distribution. Variation of disposal rates across geographic regions are not expected to affect the overall life cycle impacts of the assessed product. A review of the modeling results for the Global Warming Potential indicators shows the upstream impacts are dominated by the fabric, polyurethane, and steel material components contributing over 90% to total life cycle impacts. Other indicators exhibit similar trends in impact contributions.

7. Additional Environmental Information

This product is certified under SCS Indoor Advantage™ Gold, demonstrating compliance with the most rigorous indoor air quality emissions standards in North America for volatile organic compounds (VOC).

Table 18. *Presentation of key environmental indicators for Link 138X100 based on the functional unit of one (1) unit of seating to seat Single or Multiple Occupants, maintained for a 15-year period.*

Key environmental performance indicators	Unit	Product stage	Construction stage		Use stage	End-of-life		Net benefits and loads from reuse, recovery, and/or recycling
		A1-A3	A4	A5	B4	C2	C4	D
GWP-total	kg CO2 eq.	206	3.97	0.327	0.00	0.378	1.83	-0.187
Total energy consumption	MJ	2,770	48.2	1.44	0.00	4.92	5.66	-1.30
Share of recycled materials	%	100.00%	0%	0%	0%	0%	0%	-

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Table 19. *Presentation of key environmental indicators for Link 138X100 based on the functional unit of one (1) unit of seating to seat Single or Multiple Occupants, maintained for a 15-year period.*

Impact Category	Material extraction (A1)	Upstream transport (A2)	Production (A3)	Distribution (A4)	Installation (A5)	Transport to disposal (C2)	End of Life (C4)	Recovery (D)
GWP-GHG / GWP-IOBC (kg CO2)	222	1.37	1.86	3.98	0.194	0.378	0.951	-0.188
	96%	0.59%	0.81%	1.7%	0.084%	0.16%	0.41%	-

8. References

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6. EPD-NORGE, NPCR PART A: Construction products and services, Version: 2.0, Issue date: 24.03.2021.
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9. SCS Type III Environmental Declaration Program: Program Operator Manual. Version 12-0 (December 2023) | SCS Global Services.
10. Product Category Rules for Building Related Products and Services, Part A: Life Cycle Assessment Calculation Rules and Report Requirements V4.0. March 2022. UL Environment Standard.
11. Product Category Rules for Building Related Products and Services, Part A: Life Cycle Assessment Calculation Rules and Report Requirements V3.2. July 2018. UL Environment Standard.

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