

ZEITRAUM

NONOTO

Design by Läufer & Keichel, 2015



Furniture Footprint

NONOTO

Design by Läufer & Keichel, 2015

First of all, NONOTO is a sculpture. It's emblematic from all angles and engages the viewer emotionally. At the same time, NONOTO is a real chair. It cries out to be sat on with its perfectly balanced strength, weight and ultimate seating comfort. And finally, NONOTO is a state-of-the-art product concept. The chair boasts a flexible design, meaning it lends itself to creating a comprehensive range of products. NONOTO has an unplugged design that is brought to life using cutting-edge CNC milling technology.

ZEITRAUM furniture meets the highest quality and environmental standards and is primarily made of solid wood. All the materials we use come from responsible manufacturing and are for the most part sourced directly from Germany. The following describes the product: NONOTO. Due to the proportion of renewable raw materials, among other things, ZEITRAUM products can contribute to a good rating in certification programmes for sustainable buildings, such as LEED. For more information, please do not hesitate to contact us at any time.

Product details

Product category	Chairs			
Weight	ca. 4,7 kg			
Certification	CATAS Test EN 1728:2012 Level 2 – extreme			

Environmental details (wooden seat)

Recycled content/ renewable raw materials	ca. 0,25 % recycled material (steel, share: 0,5 %, ø 50 % recycled content) ca. 98,5 % renewable materials			
Recyclability	ca. 99,3 % wood (waste wood category 2) ca. 0,5 % steel			
Repairability	Due to the modular construction and the use of solid wood, the furniture can be repaired and refurbished almost indefinitely. We will be happy to assist with spare parts and service where necessary and possible.			

Removeable cover

Leather	No			
Fabric	No			

Manufacturing details

Furniture element	Production site	Production partner since	Visited by ZEITRAUM	Code of Conduct signed
Frame	Bavaria, Germany	2012	Yes	Yes
Seat	Bavaria, Germany	2012	Yes	Yes
Upholstery	Bavaria, Germany	—	Yes	Yes

Packaging

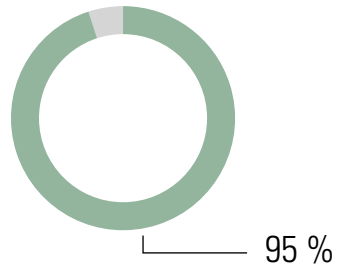
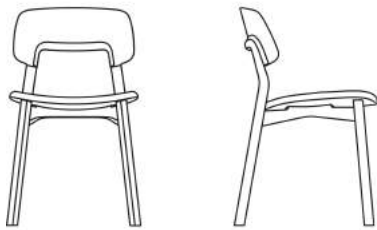
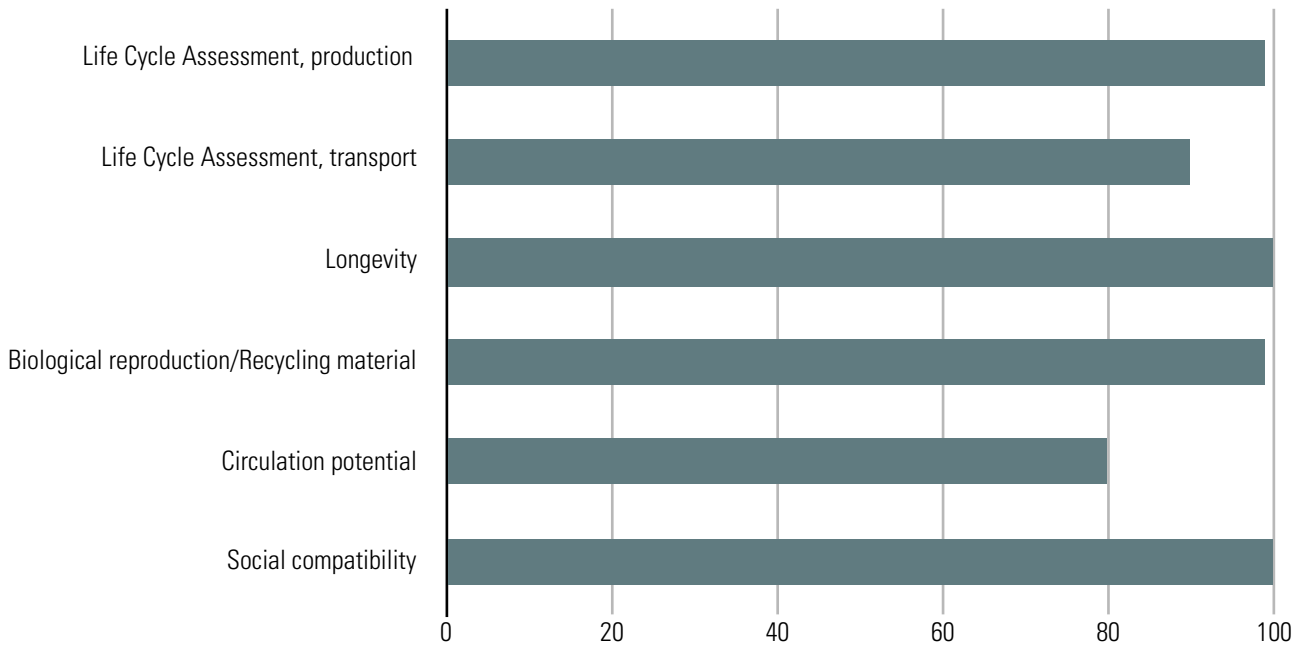
Flatpack	No			
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Two pieces of furniture can be packed in one box

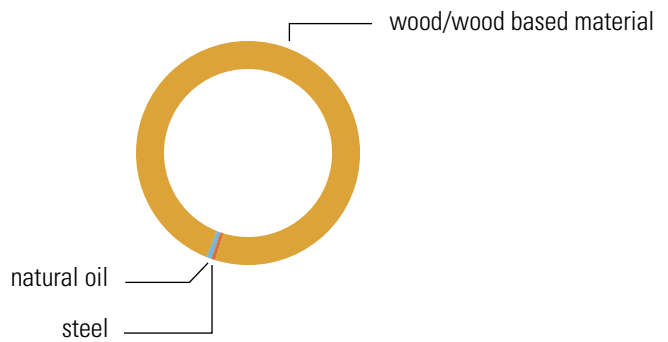
Warehouse

Country	Federal state			
Germany	Bavaria			

NONOTO, wooden seat; oak



- wood/wood based material
- steel
- PA
- natural oil
- PVAC adhesive

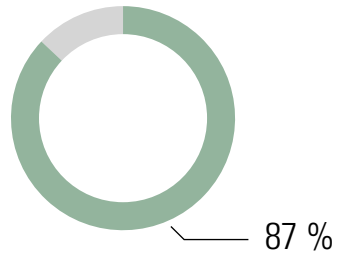
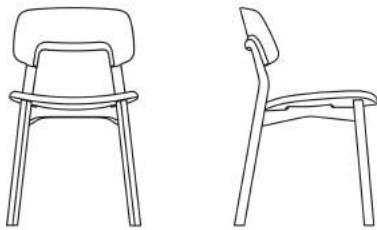
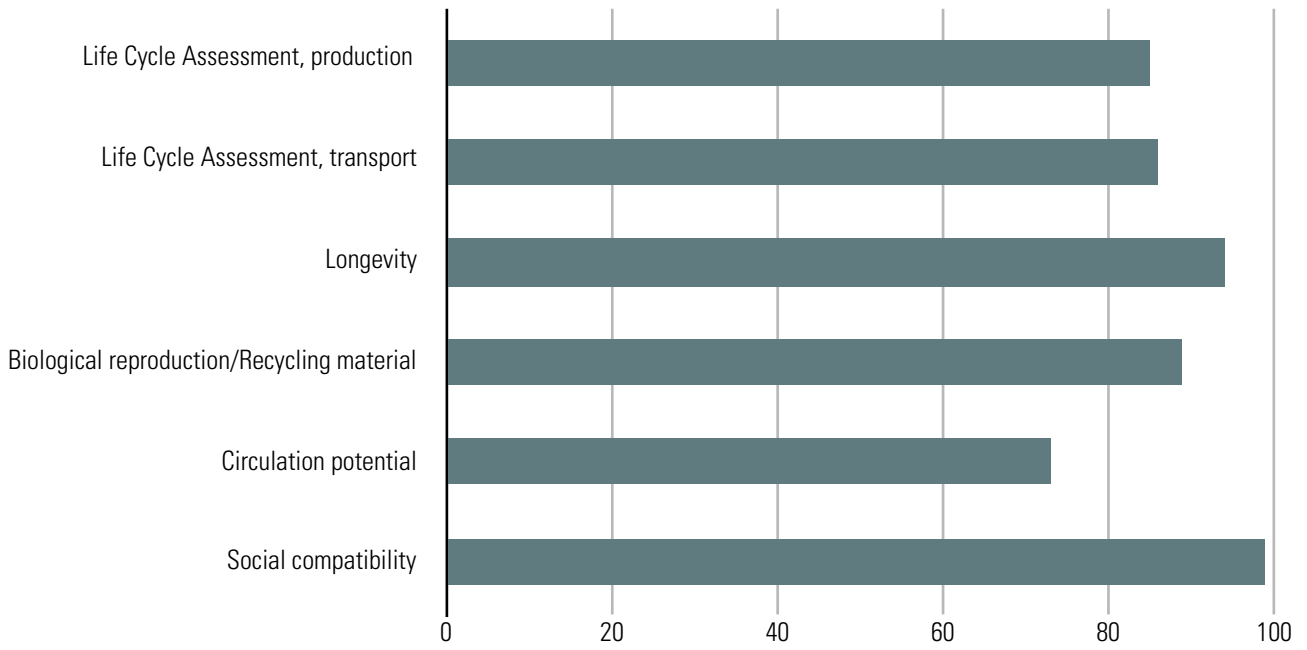


■ 2x Two chairs packable in one box

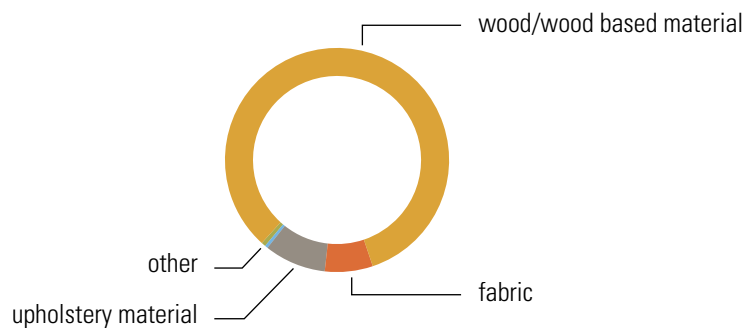
NONOTO, wooden seat; oak	Material/Product rating					
	Oak	Steel	Plastic, PA	Natural oil, Osmo	PVAC	Weighted rating, %
Life Cycle Assessment, production	10	5,33	3	5	10	99,36183 %
Life Cycle Assessment, transport	9	4	6,5	9	6,5	89,642 %
Longevity	10	10	8	10	9	99,931 %
Biological reproduction/ Recycling material	10	6	0	6	0	99,216 %
Circulation potential	8	10	10	10	4	80,15 %
Social compatibility	10	8	9	10	9	99,844 %
Average rating, $\bar{\sigma}$	9,5	7,221	6,083	8,333	6,416	Total weight
Share in kg	5	0,026	0,008	0,028	0,01	5,072
Share in %	98,58 %	0,51 %	0,15 %	0,55 %	0,19 %	
Weighted rating	9,365	0,036	0,009	0,045	0,012	
Product rating in %	94,67					

Packaging (two chairs packable in one box)	Material/Product rating	
	Cardboard	Weighted rating, %
Life Cycle Assessment, production	10	100 %
Life Cycle Assessment, transport	9	90 %
Longevity	4	40 %
Biological reproduction/Recycling material	9	90 %
Circulation potential	10	100 %
Social compatibility	10	100 %
Average rating, $\bar{\sigma}$	8,666	Total weight
Share in kg	3,8	3,8
Share in %	100 %	
Weighted rating	8,666	
Product rating in %	86,66	

NONOTO, close upholstery, fabric; oak



- wood/wood based material
- fabric
- upholstery material
- steel
- other

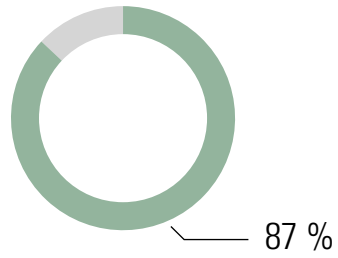
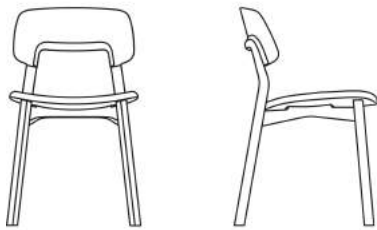
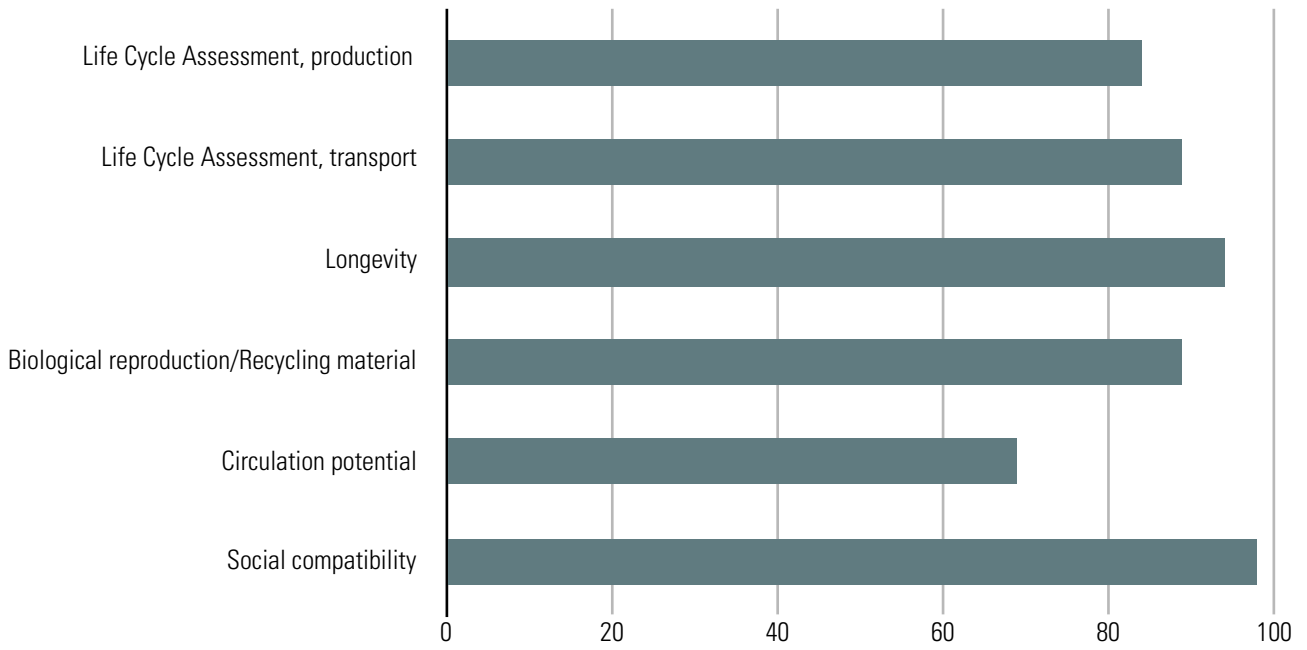


■ 2x Two chairs packable in one box

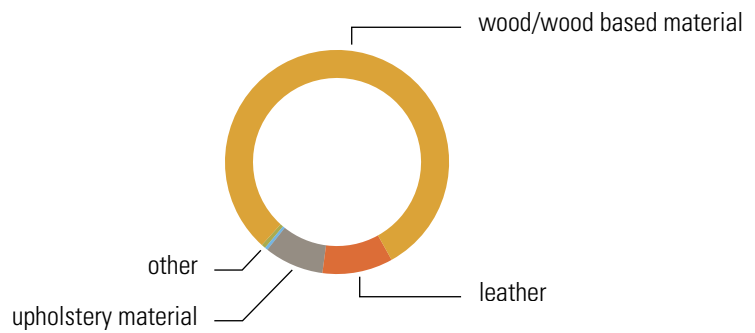
NONOTO, close upholstery, fabric; oak	Material/Product rating									
	Oak	Plywood (moulded)	Fabric, Rohi, Opera	PUR, Upholstery	Poly-ester fiber	Steel	PA	Natural oil, Osmo	PVAC	Weighted rating, %
Life Cycle Assessment, production	10	6,33	5,33	3	9	5,33	3	5	10	85,25287 %
Life Cycle Assessment, transport	9	9,5	5	6,5	6,5	4	6,5	9	6,5	85,626 %
Longevity	10	9	9	5	8	10	8	10	9	93,977 %
Biological reproduction/ Recycling material	10	9	10	0	0	6	0	6	0	88,557 %
Circulation potential	8	4	8	7	10	10	10	10	4	72,707 %
Social compatibility	10	10	10	9	9	8	9	10	9	98,945 %
Average rating, $\bar{\mu}$	9,5	7,971	7,888	5,083	7,083	7,221	6,083	8,333	6,416	Total weight
Share in kg	3,7	1,1	0,4	0,3	0,215	0,026	0,008	0,021	0,008	5,778
Share in %	64,03 %	19,03 %	6,92 %	5,19 %	3,72 %	0,44 %	0,13 %	0,36 %	0,13 %	
Weighted rating	6,082	1,516	0,545	0,263	0,263	0,031	0,007	0,029	0,008	
Product rating in %	87,44									

Packaging (two chairs packable in one box)	Material/Product rating	
	Cardboard	Weighted rating, %
Life Cycle Assessment, production	10	100 %
Life Cycle Assessment, transport	9	90 %
Longevity	4	40 %
Biological reproduction/Recycling material	9	90 %
Circulation potential	10	100 %
Social compatibility	10	100 %
Average rating, $\bar{\mu}$	8,666	Total weight
Share in kg	3,8	3,8
Share in %	100 %	
Weighted rating	8,666	
Product rating in %	86,66	

NONOTO, close upholstery, leather; oak



- wood/wood based material
- leather
- upholstery material
- steel
- other



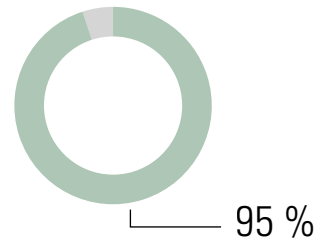
■ 2x Two chairs packable in one box

NONOTO, close upholstery, leather; oak	Material/Product rating									
	Oak	Plywood (moulded)	Leather, Reinhardt, Jopard	PUR, Upholstery	Poly-ester fiber	Steel	PA	Natural oil, Osmo	PVAC	Weighted rating, %
Life Cycle Assessment, production	10	6,33	5	3	9	5,33	3	5	10	83,8154 %
Life Cycle Assessment, transport	9	9,5	10	6,5	6,5	4	6,5	9	6,5	89,4885 %
Longevity	10	9	9	5	8	10	8	10	9	93,863 %
Biological reproduction/ Recycling material	10	9	10	0	0	6	0	6	0	88,971 %
Circulation potential	8	4	4	7	10	10	10	10	4	68,911 %
Social compatibility	10	10	9	9	9	8	9	10	9	97,99 %
Average rating, $\bar{\sigma}$	9,5	7,971	7,833	5,083	7,083	7,221	6,083	8,333	6,416	Total weight
Share in kg	3,7	1,1	0,61	0,3	0,215	0,026	0,008	0,021	0,008	5,988
Share in %	61,79 %	18,37 %	10,18 %	5,01 %	3,59 %	0,43 %	0,13 %	0,35 %	0,13 %	
Weighted rating	5,87	1,464	0,797	0,254	0,254	0,031	0,007	0,029	0,008	
Product rating in %	87,14									

Packaging (two chairs packable in one box)	Material/Product rating	
	Cardboard	Weighted rating, %
Life Cycle Assessment, production	10	100 %
Life Cycle Assessment, transport	9	90 %
Longevity	4	40 %
Biological reproduction/Recycling material	9	90 %
Circulation potential	10	100 %
Social compatibility	10	100 %
Average rating, $\bar{\sigma}$	8,666	Total weight
Share in kg	3,8	3,8
Share in %	100 %	
Weighted rating	8,666	
Product rating in %	86,66	



1 Oak



Tab. 1 A: Material data sheet, oak, general¹²

Material group	Natural material; wood; hardwood
Botanical name	<i>Quercus robur L./Q. patrea Liebl. (Fagaceae)</i>
Name	European Oak (GB, US); Eiche (D), Sommereiche (D); Chêne (F)
Material Norm. Ref.	DIN EN 13556: QCXE
Origin	Germany, (Central Europe)
Occurrence	Europe to Asia Minor; North America; most common European occurrence in France
Use	Solid and veneer, mainly sliced veneer; furniture and interior fittings; paneling and parquet; structural timber, etc.

¹ WAGENFUEHR, R. (2007) - Wood Atlas. (6) Leipzig: Hanser Wirtschaft, Fachbuchverlag Leipzig, pp. 255-277

² LOHMANN, U. (2010) - Wood encyclopedia. The standard work for wood and forestry. (4) Hamburg: Nikol-Verlag, pp. 284-285

Tab. 1 B: Material data sheet, oak, specific³**General description**

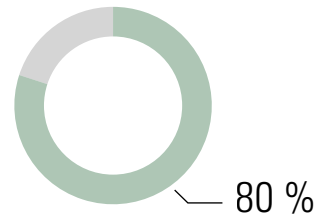
Certifications/Information	FSC and PEFC on request	
Life cycle assessment data hardwood, average (GER)		10
Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	2,18 MJ	10
Use of freshwater resources (FW)	0,00048 m ³	10
Environmental impact per m³		
Global Warming Potential (GWP)	-1,74 Kg CO ₂ -eqv.	10
Environmental impact Transport, per 1000 kgkm (690 kg/m³)		9
Production site: Germany/ZEITRAUM		
Truck - ca. 300 km	A4	10
Total non-renewable primary energy (PENRT)	362,4 MJ	
Use of freshwater resources (FW)	0,019164 m ³	
Global Warming Potential (GWP)	26,907 Kg CO ₂ -eqv.	
Main raw material origin: Germany, Central Europe/Production site		
Truck - ca. 1500 km	A4	8
Total non-renewable primary energy (PENRT)	1812 MJ	
Use of freshwater resources (FW)	0,09582 m ³	
Global Warming Potential (GWP)	134,535 Kg CO ₂ -eqv.	
Sustainability Assessment		
Longevity	Very durable/repairable (> 20 years)	10
Biological reproduction/ recycled material	100 %	10
Circulation potential	70 % - 99 % (technological/recycling)	8
Socially compatible	Yes	10
Total average rating		9,5
Processing		
Mechanical	Good; can be cut and peeled, suitable for turning and carving; pre-drill thin wood for nailing	
Drying	Moderately good; slow; tendency to tear and warp; predrying outdoors favorable; good durability	

³ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

Adhesion	Good; alkalis can cause stains	
Surface finishing	Good; can be stained and varnished, if necessary use pore filler when varnishing; tinting of wood color by smoking	
Natural durability DIN EN 350-2	durable; sapwood low; heartwood durable; also in water; durability class 2	
Physical properties		
Kiln density (0 % wood moisture content)	390... 650... 930 kg/m ³	
Bulk density (12 - 15 % wood moisture)	430... 690... 960 kg/m ³	
Pore ratio	ca. 57 %	
Shrinkage rate at 1 % moisture reduction	radial - 0,20 %; tangential - 0,32 %; volume - 0,45 %	
Mechanical properties		
Compressive strength (σ_{dB})	Q. robur: 54... 61... 67 N/mm ² Q. petraea: 48... 65... 70 N/mm ²	
Flexural strength (σ_{bB})	Q. robur: 74... 88... 105 N/mm ² Q. petraea: 78... 110... 117 N/mm ²	
Tensile strength ($\sigma_{zB} $)	50... 90... 180 N/mm ²	
Tensile strength ($\sigma_{zB} \perp$)	2,6... 4,0... 9,6 N/mm ²	
Shear strength (τ_{aB})	6,0... 11,0... 13,0 N/mm ²	
Hardness (HB)	50... 66 N/mm ²	
Hardness (HB \perp)	25... 34 N/mm ²	
E-modulus ($E_b $)	Q. robur: 10000... 11700... 13200 N/mm ² Q. petraea: 9200... 13000... 13500 N/mm ²	



**2 Plywood, veneer panel
(moulded wood)**



Tab. 2 A: Material data sheet, plywood, veneer panel, general⁴

Material group	Natural-synthetic material; wood-based materials; plywood; veneer panels
Name	Plywood (GB, US); Furnierplatten; Schichtholz; Kunstharzpressholz; Brettsperrholz; etc. (D)
Short name	FU
Manufactured in	Germany
Origin of the wood	Germany (top veneer outside Germany if necessary)
Version	Moulded wood
Use	Mainly for industrial furniture making and interior design; plywood moldings; boat and aircraft building; special parts: bulletproof elements impregnated in resin; model and tool making

⁴ KALWEIT, A., a.o. (2012) - Handbook of Technical Product Design, Materials and Manufacturing - Decision Bases for Designers and Engineers (2) Berlin: Springer-Verlag Berlin Heidelberg GmbH

Tab. 2 B: Material data sheet, plywood, veneer panel, specific⁵⁶**General description** (manufacturer spec.)

Certifications/Information	FSC, PEFC, E1 (EU), ISO 50001, REACH	
Emission class	E1 (CARB not relevant)	
Fire resistance	Fire behavior: The tested product fulfills the requirements of building material class B1 for flame-retardant building materials according to DIN 4102, Part 1 (May 1998) when freely suspended or at a distance greater than 40 mm from the same or other flat building materials	

General description (general)

Length	1220 - 3050 mm	
Wide	1220 - 3050 mm	
Thickness	4 - 80 mm	
Color	mostly light white yellowish (birch, spruce, pine, maple and poplar), to reddish (beech) rotary cut veneer, birch, beech or poplar; figured, plain	
Texture	plain, figured, smooth (top view), structure of several layers of veneer, smooth (cross section)	

Basic materials/auxiliary materials

Veneer layers	From at least three layers; 0.8 - 2.5 mm thick veneer layers	
Binder	Synthetic binders; UMF adhesive (melamine-formaldehyde resin), urea-formaldehyde resin (UF adhesive); approx. 5%	

Life cycle assessment data plywood, average (GER) 6,33

Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	6,8 MJ	8
Use of freshwater resources (FW)	0,004 m ³	1

Environmental impact per m³	A1-A3	
Global Warming Potential (GWP)	-1,5 Kg CO ₂ -eqv.	10

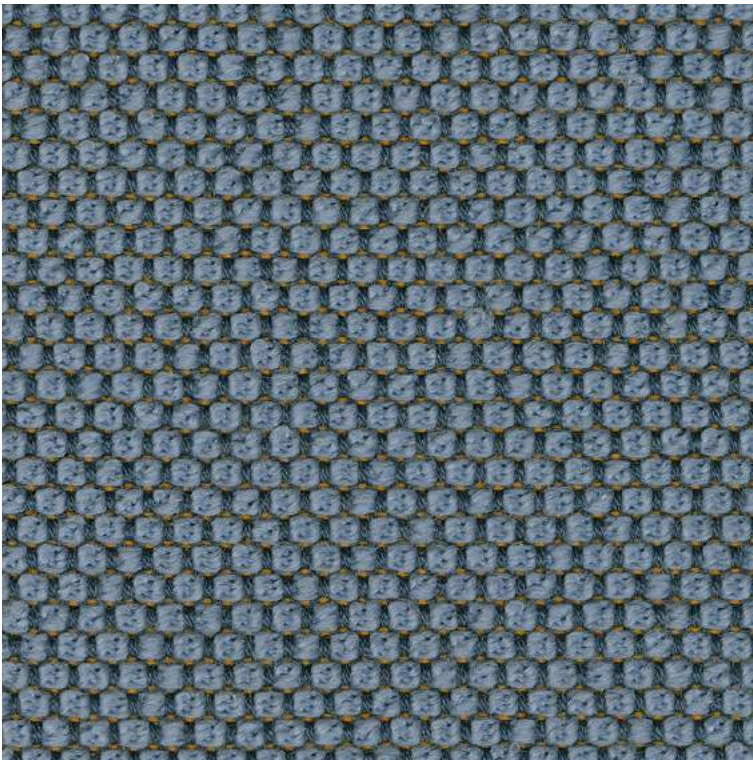
Environmental impact Transport, per 1000 kgkm (1200 kg/m³) 9,5**Production site: Germany/ZEITRAUM**

Truck - ca. 1000 km	A4	9
Total non-renewable primary energy (PENRT)	1208 MJ	
Use of freshwater resources (FW)	0,064 m ³	

⁵ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

⁶ WEZEL, O. (2019) - Strength properties of wood-based materials according to DIN EN 622 <<http://www.tischler-ole-welzel.de/Holzwerkstoffe/Faserplatten%20nach%20DIN%20EN%2013986.pdf>> Accessed, on 09/03/2019

Global Warming Potential (GWP)	89,69 Kg CO ₂ -eqv.	
Main raw material origin: Germany/Production site		
Truck - ca. < 100 km	A4	10
Total non-renewable primary energy (PENRT)	120,8 MJ	
Use of freshwater resources (FW)	0,006388 m ³	
Global Warming Potential (GWP)	8,969 CO ₂ -eqv.	
Sustainability Assessment		
Longevity	Very durable/moderately repairable (> 20 years)	9
Biological reproduction/ recycled material	90 %	9
Circulation potential	Only thermally recyclable	4
Socially compatible	Yes	10
Total average rating		7,97
Processing		
Mechanical	Very good; can be sawed, drilled and milled with common machines	
Adhesion	Very good	
Surface finishing	Good; varnishable; coating possible	
Durability	By changing the synthetic binder or adding further additives, an increase in fire resistance, resistance to fungi and insects and moisture resistance can be achieved (see manufacturer's instructions)	
Physical properties		
Bulk density according to EN 323	400... 1000 kg/m ³	
Basis weight (18 mm)	n.a.	
Material moisture at delivery	8 %	
Mechanical properties		
Compressive strength (σ_{dB})	n.a.	
Flexural strength (σ_{bB})	5... 120 N/mm ²	
Tensile strength ($\sigma_{zB} $)	n.a.	
Shear strength (τ_{aB})	n.a.	
E-modulus ($E_b $)	500... 14000 N/mm ²	



3 Rohi, Opera

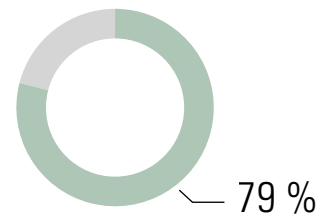


Fig. 3: www.rohi.com

Tab. 3 A: Material data sheet, Opera, general⁷

Material group	Natural synthetic material; textiles; upholstery fabric; virgin wool, polyamide
Name	Opera
Material abbreviation	WV (virgin wool); PA (polyamide)
Manufacturer	Rohi, Germany (GER)
Manufactured in	Germany (GER)
Designer	Rohi
Version	29 different colors
Use	Object areas and private living spaces with very high stresses

⁷ ROHI (2021) - Rohi; Products <<https://www.rohi.com/en/products/living/>> Accessed, on 11/12/2021

Tab. 3 B: Material data sheet, Opera, specific⁸⁹

General description (manufacturer spec.)

Certifications/Information	RAL-UZ 117 2+3, IWTO Guidelines for Sheep Welfare, FR-free, AB2998 (US Export Norm), ISO 9001, REACH, CP65 (on request)	
Fire resistance	<p>Fire tests (without additional flame retardant finish): CAL TB 117 - 2013 • DIN EN 1021-1/-2 • BS 5852 Part 1: 1979 • UNI 9175 1 IM • ÖNORM B1/Q1 • IMO 2014/90/EU</p> <p>Fire tests (with optional flame retardant finish): BS 5852: 2006 Crib5 • DIN 4102-1 B2 • DIN EN 13501-1 E • FAR 25.853 12 sec. vertical • NF P92-507 M2</p>	

Environmental benefits

AZO dyes	Not contained	
Heavy metals	Not contained	
Formaldehyde	Not contained	
Brominated flame retardants	Not contained	
Spinning oil used	n.a.	

Appearance

Pattern	Solid	
Length	n.a.	
Width	140 cm	
Thickness	n.a.	
Color	www.rohi.com; Differences may occur	
Textile surface	n.a.	

Basic materials

Virgin wool	96 %	
Polyamide (Nylon)	4 %	

LCA data comparator for Opera, Rohi (no data available) - Hero (96 % WV, 4 % PA), Kvadrat		5,33
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Resource use per m²	A1-A3	
Total non-renewable primary energy (PENRT)	89 MJ	7
Use of freshwater resources (FW)	0,34 m ³	4
Environmental impact per m²	A1-A3	
Global Warming Potential (GWP)	7,3 Kg CO ₂ -eqv.	5
Environmental impact Transport, per 1000 kgkm (0.870 kg/m)		5

⁸ ROHI (2021) - Rohi; Products <<https://www.rohi.com/en/products/living/>> Accessed, on 11/12/2021

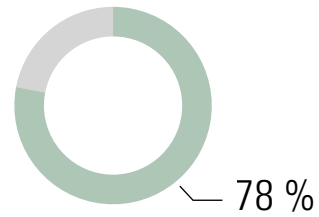
⁹ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

Production site: Germany/ZEITRAUM		
Truck - < 100 km	A4	10
Total non-renewable primary energy (PENRT)	120,8 MJ	
Use of freshwater resources (FW)	0,006388 m ³	
Global Warming Potential (GWP)	8,969 Kg CO ₂ -eqv.	
Main raw material origin: Australia/production site		0
Truck - ca. 2000 km	A4	
Total non-renewable primary energy (PENRT)	2416 MJ	
Use of freshwater resources (FW)	0,12776 m ³	
Global Warming Potential (GWP)	179,38 Kg CO ₂ -eqv.	
Container ship - ca. 10000 km	A4	
Total non-renewable primary energy (PENRT)	1094 MJ	
Use of freshwater resources (FW)	0,005636 m ³	
Global Warming Potential (GWP)	90,11 Kg CO ₂ -eqv.	
Sustainability Assessment		
Longevity	Very durable/moderately repairable (> 20 years)	9
Biological reproduction/ recycled material	96 %	10
Circulation potential	70 - 99 % technological/recycling	8
Socially compatible	Yes	10
Total average rating		7,88
Resistance to dirt	Not sensitive to dirt	
Physical properties		
Weight	ca. 1010 g/m	
Mechanical properties		
Resilience	90.000 Martindale	
Pilling (ISO1-5)	min. 4 - 5	
Light fastness (ISO 1-5)	min. 5 - 8	
Seam slippage	n.a.	
Care		
Washing	Professional cleaning recommended	
Chlorine	Do not bleach	
Drying drum	Do not dry	

Ironing	Moderate hot ironing	
Dry cleaning	Professional cleaning recommended	



4 Reinhardt Leather, Jepard



Tab. 4 A: Material data sheet, Jepard, general¹⁰

Material group	Natural materials; animal products; mammalian leather, cowhide (mineral tanning)
Name	Jepard
Manufacturer	Leder Reinhardt GmbH
Manufactured in	Germany (GER)
Cattle origin	Italy
Version	13 different colors
Use	Clothing: jackets, pants, bags, backpacks, belts, etc.; jewelry; hats; caps; shoe soles, straps Furniture making: upholstery materials, seat shells, etc.; saddlery; automotive industry; book covers; art objects; etc.

¹⁰ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Tab. 4 B: Material data sheet, Jepard, specific¹¹¹²**General description** (manufacturer spec.)

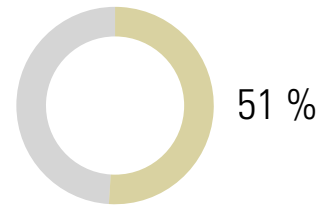
Certifications/Information	n.a.	
Fire resistance	Fire tests: CA TB 117-2013	
Appearance		
Size	4,2... 5,2 m ²	
Thickness	1,1... 1,3 mm	
Color	13 color versions	
Texture	Pappillary layer - smooth, scarred Reticular layer: fibrous (also called flesh side)	
Life cycle assessment data leather		5
Resource use per m²	A1-A3	
Total non-renewable primary energy (PENRT)	n.a.	
Use of freshwater resources (FW)	n.a.	
Environmental impact per m²	A1-A3	
Global Warming Potential (GWP)	n.a.	
Environmental impact Transport, per 1000 kgkm (approx. 0,9 kg/m²)		10
Production site: Germany/ZEITRAUM		
Truck - ca. 200 km	A4	10
Total non-renewable primary energy (PENRT)	241,6 MJ	
Use of freshwater resources (FW)	0,012776 m ³	
Global Warming Potential (GWP)	17,938 Kg CO ₂ -eqv.	
Main raw material origin: Italy/production site		
Truck - ca. 1000 km	A4	10
Total non-renewable primary energy (PENRT)	1208 MJ	
Use of freshwater resources (FW)	0,06388 m ³	
Global Warming Potential (GWP)	89,69 Kg CO ₂ -eqv.	
Sustainability Assessment		
Longevity	Very durable/moderately repairable (> 20 years)	9
Biological reproduction/ recycled material	> 95 % (chrome tanning)	10

¹¹ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019¹² BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

Circulation potential	40 - 70 % technological/downcycling	4
Socially compatible	Yes	9
Total average rating		7,83
Resistance to dirt	Not sensitive to dirt	
Processing		
Mechanically	Mechanical processing of the material with tools designed for this purpose; cutting possible; offcut (upholstered furniture) approx. 30-45 %	
Storage	Relative humidity: 50-70 %; Temperature: 5-15 %	
Adhesion	good; possible with suitable adhesives	
Surface processing	good; can be dyed; smooth leather can and should be greased, oiled or waxed to protect the der from drying out; too much grease can also cause the leather to dry out; leather can be cleaned with lukewarm water; avoid using solvents	
Other	Untreated leather is porous and permeable to water and air; direct sunlight can cause drying and color change	
Natural durability	With regular care, the service life of leather can be increased many times over	
Properties	Very tear-resistant; elastic; water-permeable; breathable	
Physical properties		
Density	400... 900 kg/m ³	
Mechanical properties		
Continuous folding behavior (EN ISO 5402)	30.000	
Light fastness (ISO 105-B02)	3	
Wet abrasion (ISO 11640)	20	
Dry abrasion (ISO 11640)	50	
Elongation at break (unwashed underleather)	n.a.	
Notes	The most important leather is cowhide; leather is largely a by-product of the meat industry; some animals are bred only for their leather, e.g. snakes, crocodiles or lizards	



5 PUR flexible foam, (MDI)



Tab. 5 A: Material data sheet, PUR flexible foam, general¹³

Material group	Synthetic Material; Synthetic Upholstery Material
Name	Polyurethane Foam (GB); Polyurethan Weichschaum (D);
Material abbreviation	PUR foam
Manufactured in	Germany (GER)
Use	Automotive industry (upholstery, fittings); furniture upholstery; shoe soles; etc.

¹³ KALWEIT A. (2012) - Handbook of technical product design - materials and manufacturing. Berlin: Springer Verlag

Tab. 5 B: Material data sheet, PUR flexible foam, specific¹⁴¹⁵

General description (manufacturer spec.)

Certifications/Information	REACH, OEKOTEX® 100 STANDARD on request	
Fire resistance	DIN 4102 B1, BS 5852 Part 2 Crib 5, DIN EN 10211 EUFAC, DIN EN 10212 EUFAC, CAL117 on request	
Delivery form	Bales, flakes, mats, etc.	
Texture	soft, porous	
Color	Available in all colors	
Life cycle assessment data Comparative material for PUR flexible foam (no data available) - PU slabstock foam insulation panels (GER)		3
Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	98,5 MJ	0
Use of freshwater resources (FW)	0,028696 m ³	9
Environmental impact per kg	A1-A3	
Global Warming Potential (GWP)	4,48 Kg CO ₂ -eqv.	0
Environmental impact Transport, per 1000 kgkm (approx. 75 kg/m³)		6,5
Production site: Germany/ZEITRAUM		
Truck - ca. 500 km	A4	10
Total non-renewable primary energy (PENRT)	430,3 MJ	
Use of freshwater resources (FW)	0,030265 m ³	
Global Warming Potential (GWP)	32,055 Kg CO ₂ -eqv.	
Main raw material origin: n.a./production site		3
n.a. - ø > 7000 km	A4	
Total non-renewable primary energy (PENRT)	8456 MJ	
Use of freshwater resources (FW)	0,44716 m ³	
Global Warming Potential (GWP)	627,83 Kg CO ₂ -eqv.	
Sustainability Assessment		
Longevity	Durable (10 - 20 years)	5
Biological reproduction/ recycled material	0 %	0

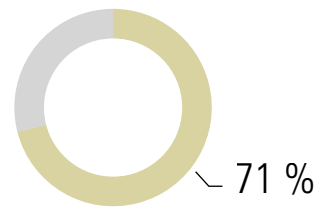
¹⁴ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021.

¹⁵ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Circulation potential	70 - 99 % technological/downcycling	7
Socially compatible	Yes	9
Total average rating		5,08
Resistance to dirt	Not sensitive to dirt	
Notes	MDI: methylene diphenyl isocyanate; chemical compounds from the group of aromatic isocyanates	



6 Polyester fibers



Tab. 6 A: Material data sheet, polyester fibers, general¹⁶

Material group	Synthetic Material; Synthetic Upholstery Material
Name	Polyester Fibers (GB); Polyesterfaser (D)
Material abbreviation	PES
Manufactured in	Germany (GER)
Use	Furniture upholstery

¹⁶ KALWEIT A. (2012) - Handbook of technical product design - materials and manufacturing. Berlin: Springer Verlag

Tab. 6 B: Material data sheet, polyester fibers, specific¹⁷¹⁸

General description

Certifications/Information	OEKO-TEX® STANDARD 100	
Fire resistance	BS 5852 Part 1, CAL117	
Delivery form	Mats, wadding, etc.	
Texture	soft, fibrous	
Color	Available in all colors	

Life cycle assessment data Comparative material for PE wadding (no data available) - PE nonwoven (GER)		9
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Resource input per kg	A1-A3	
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Total non-renewable primary energy (PENRT)	22 MJ	8
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Use of freshwater resources (FW)	0,00252 m ³	10
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Environmental impact per kg	A1-A3	
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Global Warming Potential (GWP)	0,73 Kg CO ₂ -eqv.	8
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Environmental impact Transport, per 1000 kgkm (approx. 0.5 kg/m²)		6,5
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Production site: Germany/ZEITRAUM		
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Truck - ca. 500 km	A4	10
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Total non-renewable primary energy (PENRT)	430,3 MJ	
--------------------------------------------	----------	--

Use of freshwater resources (FW)	0,030265 m ³	
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Global Warming Potential (GWP)	32,055 Kg CO ₂ -eqv.	
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Main raw material origin: n.a./production site		3
-------------------------------------------------------	--	---

n.a. - ø > 7000 km	A4	
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Total non-renewable primary energy (PENRT)	8456 MJ	
--------------------------------------------	---------	--

Use of freshwater resources (FW)	0,44716 m ³	
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Global Warming Potential (GWP)	627,83 Kg CO ₂ -eqv.	
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Sustainability Assessment

Longevity	Very durable (> 20 years)	8
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Biological reproduction/ recycled material	0 %	0
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Circulation potential	100 % (technological)	10
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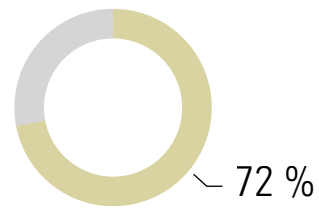
¹⁷ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

¹⁸ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Socially compatible	Yes	9
Total average rating		7,08
Resistance to dirt	Not sensitive to dirt	
Properties		
Density	1380 kg/m ³	
Acid resistance	Conditionally resistant to organic and mineral acids	
Moisture absorption	0,2 to 0,5 %	
Thermal properties		
Softening temperature Vicat	ca. 230 °C to 240 °C	
Melting point/range	250 °C	



7 Steel



Tab. 7 A: Material data sheet, steel, general¹⁹

Material group	Natural material; metals; transition metals
Parts origin	n.a.
Occurrence	Worldwide; South America, Western Australia, China and Eastern Europe, Canada
Use	According to application: building structural and tool steel, structural steel for machinery, vehicle and shipbuilding or mechanical engineering; line pipe, pressure vessel, etc.; handicraft and design; furniture making

¹⁹ KALWEIT, A., a.o. (2012) - Handbook of Technical Product Design, Materials and Manufacturing - Decision Bases for Designers and Engineers (2) Berlin: Springer-Verlag Berlin Heidelberg GmbH

Tab. 7 B: Material data sheet, steel,
specific²⁰²¹

General description

Certifications/Information	n.a.	
Emission class (formaldehyde)	Formaldehyde free	
Surface	smooth, hard	
Color	Grey	
Life cycle assessment data Steel profile, (GER)		5,33
Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	10,99 MJ	4
Use of freshwater resources (FW)	0,002314 m ³	4
Environmental impact per kg	A1-A3	
Global Warming Potential (GWP)	0,9944 Kg CO ₂ -eqv.	8
Environmental impact Transport, per 1000 kgkm (7850 kg/m³)		4
Production site: Europe/ZEITRAUM		
Truck ø - ca. 1500 km	A4	8
Total non-renewable primary energy (PENRT)	1812 MJ	
Use of freshwater resources (FW)	0,09582 m ³	
Global Warming Potential (GWP)	134 Kg CO ₂ -eqv.	
Main raw material origin: China/production location		0
Truck - ca. 2000 km	A4	
Total non-renewable primary energy (PENRT)	2416 MJ	
Use of freshwater resources (FW)	0,12776 m ³	
Global Warming Potential (GWP)	179,38 Kg CO ₂ -eqv.	
Container ship - ca. 10000 km	A4	
Total non-renewable primary energy (PENRT)	1094 MJ	
Use of freshwater resources (FW)	0,005636 m ³	
Global Warming Potential (GWP)	90,11 Kg CO ₂ -eqv.	

Sustainability Assessment

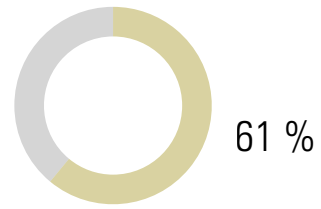
²⁰ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

²¹ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Longevity	Very durable/repairable (> 20 years)	10
Biological reproduction/ recycled material	50 - 60 %	6
Circulation potential	100 % (technological)	10
Socially compatible	Yes	8
Total average rating		7,22
Notes	The life cycle assessment of iron improves the more often the material has been recycled or the proportion of recycled material increases	



8 Polyamide



Tab. 8 A: Material data sheet, polyamide, general²²

Material group	Synthetic material; plastic
Name	Polyamide (GB, US); Polyamid (D)
Short name	PA
Manufactured in	Germany (GER)
Use	Machine and equipment construction; vehicle construction; electrical engineering; furniture construction

²² KALWEIT A. (2012) - Handbook of technical product design - materials and manufacturing. Berlin: Springer Verlag

Tab. 8 B: Material data sheet, polyamide, specific²³²⁴**General description**

Certifications/Information	n.a.	
Delivery forms	Granules, fibers, pipes, films, molded parts	
Color	Available in all colors	

Life cycle assessment data Nylon casting (PA 6.6) (GER) 3**Resource input per kg A1-A3**

Total non-renewable primary energy (PENRT)	251,7 MJ	0
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Use of freshwater resources (FW)	0,04378 m ³	10
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Environmental impact per kg A1-A3

Global Warming Potential (GWP)	16,91 Kg CO ₂ -eqv.	0
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Environmental impact Transport, per 1000 kgkm (1140 kg/m³) 6,5**Production site: Germany/ZEITRAUM**

Truck - ca. 500 km	A4	10
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Total non-renewable primary energy (PENRT)	604 MJ	
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Use of freshwater resources (FW)	0,03194 m ³	
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Global Warming Potential (GWP)	44,845 Kg CO ₂ -eqv.	
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Main raw material origin: n.a./production site

n.a. - ø > 7000 km	A4	3
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Total non-renewable primary energy (PENRT)	8456 MJ	
--------------------------------------------	---------	--

Use of freshwater resources (FW)	0,44716 m ³	
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Global Warming Potential (GWP)	627,83 Kg CO ₂ -eqv.	
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Sustainability Assessment

Longevity	Very durable (> 20 years)	8
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Biological reproduction/ recycled material	0 %	0
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Circulation potential	100 % (technological)	10
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Socially compatible	Yes	9
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Total average rating 6,08**Processing**

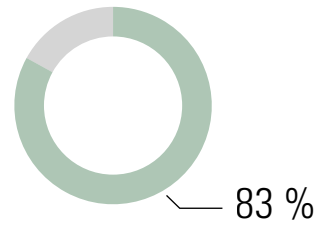
²³ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

²⁴ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Mechanically	Very good; with conventional plastic processing machines; drilling, sawing; milling; etc.	
Adhesion	Good; with adhesives for low-energy plastics	
Surface processing	Brushing; Sanding; Painting; Oiling; Embossing	
Resistance	Easy care; water resistant; resistant to fungi and insects	
Properties		
Elongation at break	50,0 %	
Density	1140 kg/m ³	
Moisture absorption	2,5 - 3,5 %	
Dielectric strength	25 kV/mm	
Notched impact strength (Charpy)	3,0 kJ/m ²	
Thermal properties		
Vicat softening temperature according to DIN EN ISO 306 Vicat B/50	250 °C	
Continuous operating temperature	-30 bis 95 °C	



9 Osmo, hard wax oil



Tab. 9 A: Material data sheet, Osmo, hard wax oil, general²⁵²⁶

Material group	Coating materials; Oils
Name	Hard wax oil (GB, US); Hartwachsöl (D)
Manufacturer	Osmo Holz und Color GmbH & Co. KG
Manufactured in	Germany (GER)
Version	Osmo Hard Wax Oil 3032 satin, 3062 matt
Use	Furniture construction; for interior use; also suitable for parquet, cork and terracotta

²⁵ KALWEIT A. (2012) - Handbook of technical product design - materials and manufacturing. Berlin: Springer Verlag

²⁶ Osmo (2019) - Osmo Hard Wax Oil 3032 satin, 3062 matte <<https://www.osmo.de>> Accessed, on 03/02/2019

Tab. 9 B: Material data sheet, Osmo, hard wax oil, specific²⁷²⁸

General description		
Certifications/Information	ISO 9001, ISO 14001, ISO 18001	
Emission class (formaldehyde)	Formaldehyde-free	
VOC's	< 500 g/l (volatile components emit during curing)	
Delivery forms	Liquid	
Color	yellowish (transparent/yellowish in cured form)	
Texture	Glossy to matt (cured)	
Contents		
50 - 60 % solids	Natural oils and waxes (sunflower oil, soybean oil, safflower oil, carnauba and candellila wax) Paraffins	
Additives	Siccatives (desiccants) and water-repellent additives	
Solvent	Desaromatized white spirit (gasoline-free - according to the purity requirements of the European Pharmacopoeia)	
Life cycle assessment data hard wax oil (GER)		5
Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	n.a.	
Use of freshwater resources (FW)	n.a.	
Environmental impact per kg	A1-A3	
Global Warming Potential (GWP)	n.a.	
Environmental impact Transport, per 1000 kgkm		9
Production site: Germany/ZEITRAUM		
Truck - ca. 200 km	A4	10
Total non-renewable primary energy (PENRT)	172,12 MJ	
Use of freshwater resources (FW)	0,012106 m ³	
Global Warming Potential (GWP)	12,822 Kg CO ₂ -eqv.	
Main raw material origin: n.a./production site		
n.a. - ø 3000 km	A4	8
Total non-renewable primary energy (PENRT)	3624 MJ	
Use of freshwater resources (FW)	0,19164 m ³	

²⁷ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

²⁸ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Global Warming Potential (GWP)	296,07 Kg CO ₂ -eqv.	
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Sustainability Assessment

Longevity	Very durable/repairable (> 20 years, with good care)	10
Biological reproduction/ recycled material	51 - 60 %	6
Circulation potential	100 % (biodegradable)	10
Socially compatible	Yes	10
Total average rating		8,33

Processing

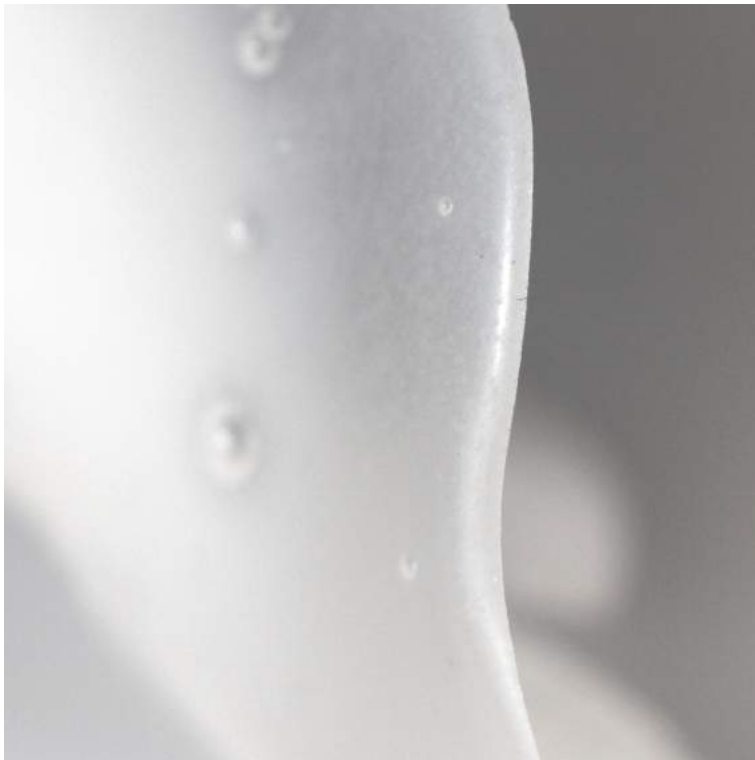
Application	With brush, spatula or spray gun	
Storage	Can be stored up to 5 years with tight closure	

Properties

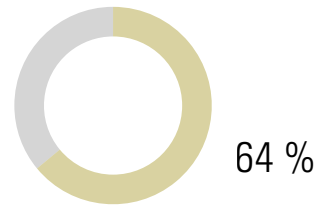
Density	0,89 g/cm ³	
Viscosity	Thixotropic, creamy	
Consistency	Medium viscosity	
Moisture resistance	Good	

Notes

Osmo Polyx®-Oil is based on natural vegetable oils and waxes; Osmo Polyx®-Oil contains neither biocides nor preservatives. It is harmless to humans, animals and plants when dry and complies with DIN 53160 (sweat- and saliva-proof) and EURO-NORM EN 71 (suitable for children's toys)



10 PVAc dispersion adhesive, D3



Tab. 10 A: Material data sheet, PVAc dispersion adhesive, D3, general^{29,30}

Material group	Synthetic material; adhesives; dispersion adhesives
Name	Dispersion Adhesive (GB, US); Dispersionsklebstoff, PVAc-(Polyvinylacetat) Klebstoffe, Weißleim (D)
Manufacturer	Kleiberit Klebstoffe GmbH
Manufactured in	Germany (GER)
Version	Kleiberit 303, D3-adhesive
Use	Furniture construction; especially for interiors; staircase construction, ship interior finishing; surface bonding of HWS; door and window production

²⁹ KALWEIT A. (2012) - Handbook of technical product design - materials and manufacturing. Berlin: Springer Verlag

³⁰ KEIBERIT (2019) - KLEIBERIT 303, D3, PVAc Adhesive <https://interior-construction.kleiberit.com/fileadmin/Content/Documents/DE/Infoblaetter/303_D3_Leim_D.pdf> Accessed, on 02/03/2019

Tab. 10 B: Material data sheet, PVAc dispersion adhesive, D3, specific^{31,32}

General description

Certifications/Information	ISO 9001, ISO 14001, ISO 50001	
Emission class (formaldehyde)	Formaldehyde-free	
Delivery forms	Liquid	
Color	Whitish (transparent in cured form)	
Texture	Glossy	

Life cycle assessment data Dispersion-based solvent-free adhesives, coatings and sealants (GER) 10

Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	26,7 MJ	10
Use of freshwater resources (FW)	0,00758 m ³	10

Environmental impact per kg	A1-A3	
Global Warming Potential (GWP)	0,955 Kg CO ₂ -eqv.	10

Environmental impact Transport, per 1000 kgkm 6,5

Production site: Germany/ZEITRAUM

Truck - ca. 200 km	A4	10
Total non-renewable primary energy (PENRT)	172,12 MJ	
Use of freshwater resources (FW)	0,012106 m ³	
Global Warming Potential (GWP)	12,822 Kg CO ₂ -eqv.	

Main raw material origin: n.a./production site

n.a. - ø > 7000 km	A4	3
Total non-renewable primary energy (PENRT)	8456 MJ	
Use of freshwater resources (FW)	0,44716 m ³	
Global Warming Potential (GWP)	627,83 Kg CO ₂ -eqv.	

Sustainability Assessment

Longevity	Very durable/moderately repairable (> 20 years)	9
Biological reproduction/ recycled material	0 %	0
Circulation potential	Only thermally recyclable	4
Socially compatible	Yes	9

³¹ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

³² MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Total average rating**6,41****Processing**

Adhesion	With brush, spatula or glue roller	
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Properties

Density	1,1 g/cm ³	
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PH level	3	
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Consistency	Medium viscosity	
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Moisture resistance	D3	
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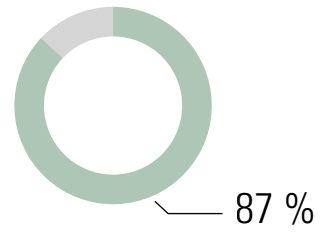
Heat resistance	Up to 120 °C	
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Notes

PVAc adhesive is available solvent-free and solvent-based	
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11 Cardboard, chairs



Tab. 11 A: Cardboard, chairs, general

Material group	Packaging
Name	Cardboard (GB, US); Karton (D)
Manufacturer	Schuhmacher Packaging GmbH
Manufactured in	Germany (GER)
Use	Packaging material for the production of cardboard boxes

Tab. 11 B: Cardboard chairs, specific³³³⁴

General description

Certifications/Information	ISO 9001, ISO 50001, DIN ISO 22000, DIN EN ISO 14001, EMAS, ISO 28000;2007, FSC	
Color	Brown	
Texture	matt	
Contents		
85 %	Recycled paper	
15 %	Primary raw material	

Life cycle assessment data „Kraftpapier“ (GER) 10

Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	5,888 MJ	
Use of freshwater resources (FW)	0,004899 m ³	
Environmental impact per kg	A1-A3	
Global Warming Potential (GWP)	-0,8973 Kg CO ₂ -eqv.	

Environmental impact Transport, per 1000 kgkm 9

Production site: Germany/ZEITRAUM		
Truck - ca. 200 km	A4	10
Total non-renewable primary energy (PENRT)	172,12 MJ	
Use of freshwater resources (FW)	0,012106 m ³	
Global Warming Potential (GWP)	12,822 Kg CO ₂ -eqv.	

Main raw material origin: Germany, Central Europe/Production site

Truck - ca. 1500 km	A4	8
Total non-renewable primary energy (PENRT)	1812 MJ	
Use of freshwater resources (FW)	0,09582 m ³	
Global Warming Potential (GWP)	134,535 Kg CO ₂ -eqv.	

Sustainability Assessment

Longevity	Moderately durable/repairable (< 10 years)	4
Biological reproduction/ recycled material	85 %	9

³³ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

³⁴ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Circulation potential	100 % (technological)	10
Socially compatible	Yes	10
Total average rating		8,66
Disposal note	Waste paper	

Information on all materials used by ZEITRAUM
can be found in our material library at:

www.zeitraum-moebel.com

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