

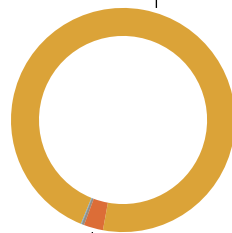
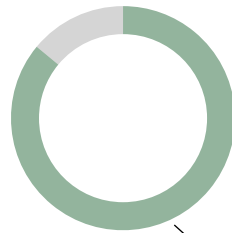
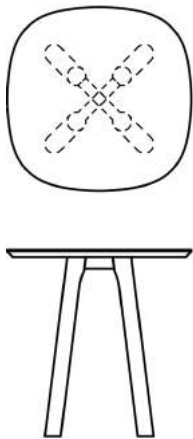
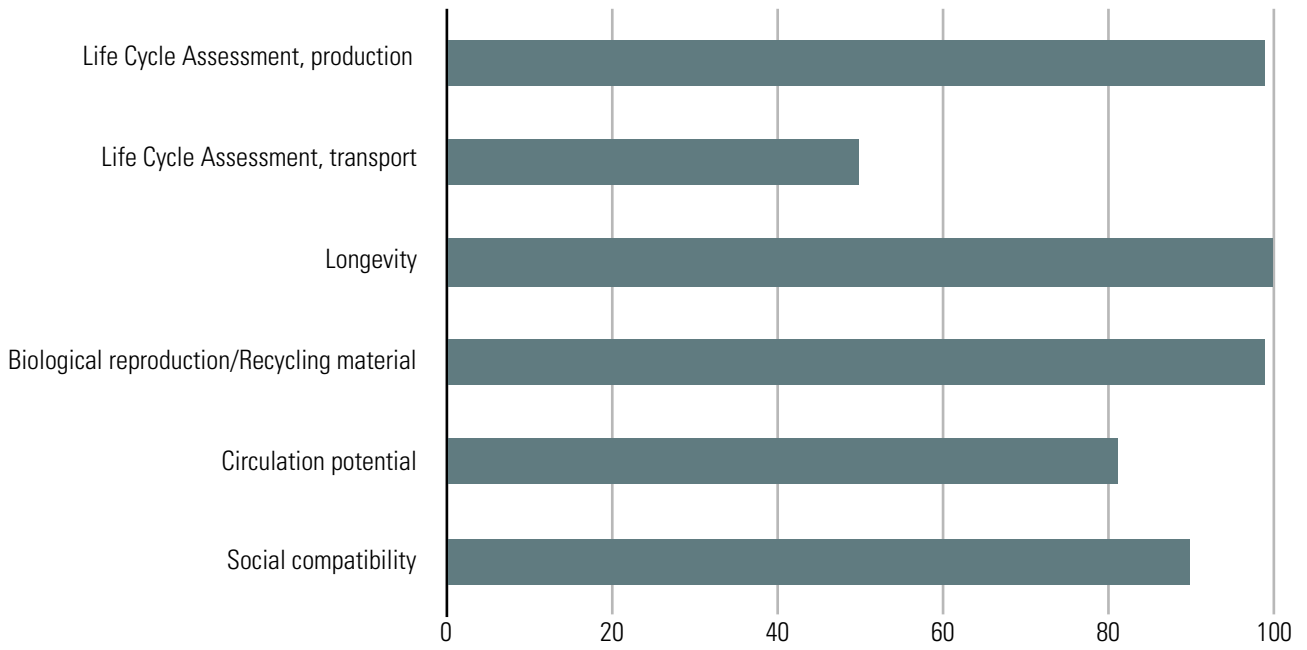
ZEITRAUM

RAIL
Café, Snack, Dine

Kaschkasch, 2016



RAIL Café, 70x70; walnut



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

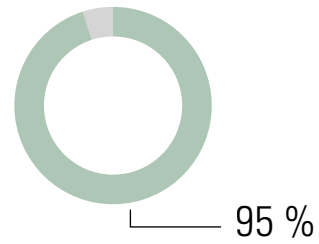
▬▬ Flat pack

RAIL Café, 70x70; walnut	Material/Product rating				
	Walnut	Steel	Natural oil, Osmo	PVAC	Weighted rating, %
Life Cycle Assessment, production	10	5,33	5	10	98,50174 %
Life Cycle Assessment, transport	5	4	9	6,5	49,8755 %
Longevity	10	10	10	9	99,967 %
Biological reproduction/Recycling material	10	9	6	0	99,428 %
Circulation potential	8	10	10	4	80,56 %
Social compatibility	9	8	10	9	89,74 %
Average rating, $\bar{\sigma}$	8,666	7,721	8,333	6,416	Total weight
Share in kg	11,8	0,34	0,045	0,016	12,201
Share in %	96,71 %	2,78 %	0,36 %	0,13 %	
Weighted rating	8,38	0,214	0,029	0,008	
Product rating in %	86,31				

Packaging	Material/Product rating			
	Cardboard	PE fleece	PP strapping	Weighted rating, %
Life Cycle Assessment, production	10	3	5	95,991 %
Life Cycle Assessment, transport	9	6,5	6,5	88,5195 %
Longevity	4	5	5	40,577 %
Biological reproduction/Recycling material	6	0	0	56,478 %
Circulation potential	10	10	10	99,98 %
Social compatibility	10	9	10	99,448 %
Average rating, $\bar{\sigma}$	8,166	5,583	6,083	Total weight
Share in kg	5,3	0,3	0,03	5,63
Share in %	94,13 %	5,32 %	0,53 %	
Weighted rating	7,686	0,297	0,032	
Product rating in %	80,15			



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**

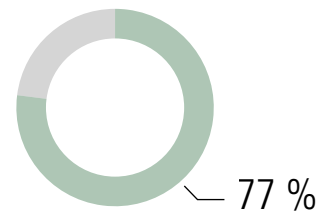
Certifications/Information	FSC, PEFC	
Life cycle assessment data hardwood, average (GER)		10
Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	2,18 MJ	10
Use of freshwater resources (FW)	0,00048 m ³	10
Environmental impact per m³	A1-A3	
Global Warming Potential (GWP)	-1,74 Kg CO 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 Steel



Tab. 2 A: Material data sheet, steel, general⁴

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

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, steel, specific⁵⁶

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

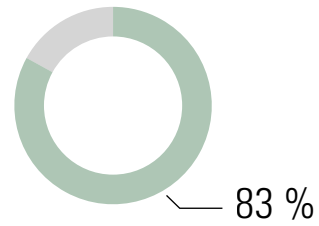
⁵ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

⁶ 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	80 - 90 %	9
Circulation potential	100 % (technological)	10
Socially compatible	Yes	8
Total average rating		7,72
Notes	The life cycle assessment of iron improves the more often the material has been recycled or the proportion of recycled material increases	



3 Osmo, hard wax oil



Tab. 3 A: Material data sheet, Osmo, hard wax oil, general⁷⁸

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

⁷ KALWEIT A. (2012) - Handbook of technical product design - materials and manufacturing. Berlin: Springer Verlag

⁸ Osmo (2019) - Osmo Hard Wax Oil 3032 satin, 3062 matte <<https://www.osmo.de>> Accessed, on 03/02/2019

Tab. 3 B: Material data sheet, Osmo, hard wax oil, specific⁹¹⁰

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	

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

¹⁰ 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

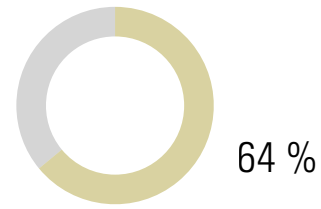
Density	0,89 g/cm ³	
Viscosity	Thixotropic, creamy	
Consistency	Medium viscosity	
Moisture resistance	Good	

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)



4 PVAc dispersion adhesive, D3



Tab. 4 A: Material data sheet, PVAc dispersion adhesive, D3, general¹¹¹²

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

¹¹ KALWEIT A. (2012) - Handbook of technical product design - materials and manufacturing. Berlin: Springer Verlag

¹² 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. 4 B: Material data sheet, PVAc dispersion adhesive, D3, specific¹³¹⁴**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
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Use of freshwater resources (FW)	0,00758 m ³	10
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Environmental impact per kg A1-A3

Global Warming Potential (GWP)	0,955 Kg CO ₂ -eqv.	10
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Environmental impact Transport, per 1000 kgkm 6,5**Production site: Germany/ZEITRAUM**

Truck - ca. 200 km	A4	10
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Total non-renewable primary energy (PENRT)	172,12 MJ	
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Use of freshwater resources (FW)	0,012106 m ³	
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Global Warming Potential (GWP)	12,822 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	
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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/moderately repairable (> 20 years)	9
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Biological reproduction/ recycled material	0 %	0
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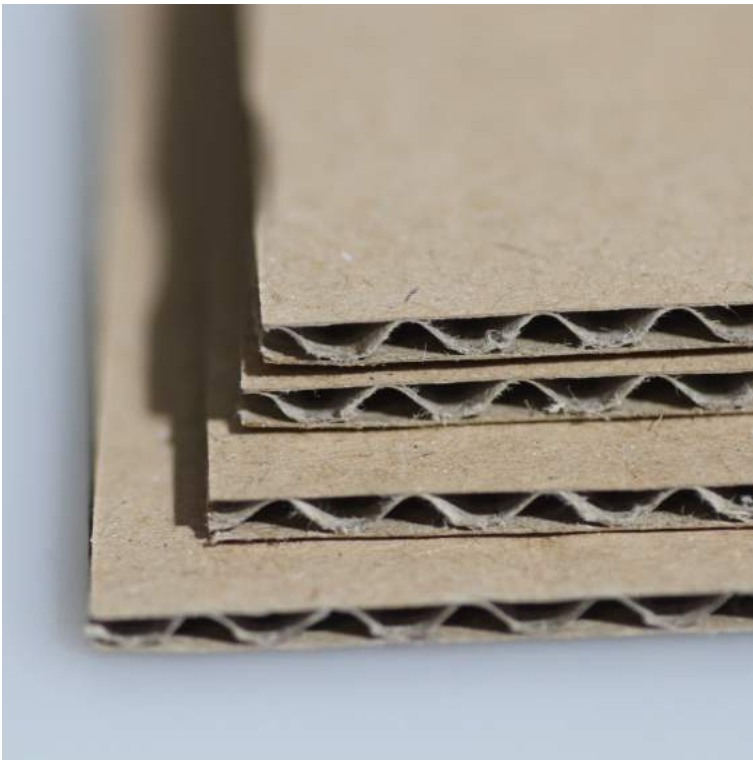
Circulation potential	Only thermally recyclable	4
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Socially compatible	Yes	9
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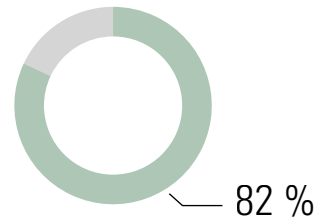
¹³ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

¹⁴ 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	
Properties		
Density	1,1 g/cm ³	
PH level	3	
Consistency	Medium viscosity	
Moisture resistance	D3	
Heat resistance	Up to 120 °C	
Notes	PVAc adhesive is available solvent-free and solvent-based	



5 Cardboard, beds, tables & storage



Tab. 5 A: Cardboard, beds, tables & storage, general

Material group	Packaging
Name	Cardboard (GB, US); Karton (D)
Manufacturer	Monowell GmbH & Co. KG
Manufactured in	Germany (GER)
Use	Packing material for individual wrapping of the furniture

Tab. 5 B: Cardboard, beds, tables & storage, specific¹⁵¹⁶

General description

Certifications/Information	ISO 9001, ISO 50001, ISO 22000 DE, ISO 22000 EN, FSC	
Color	Brown	
Texture	matt	
Contents		
60 %	Recycled paper	
40 %	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

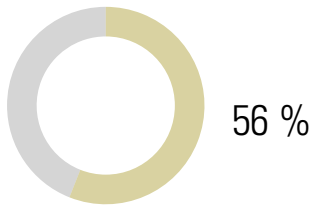
Longevity	Moderately durable/repairable (< 10 years)	4
Biological reproduction/ recycled material	60 %	6
Circulation potential	100 % (technological)	10

¹⁵ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

¹⁶ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

Socially compatible	Yes	10
Total average rating		8,16
Disposal note	Waste paper	

6 Polyester fleece



Tab. 6 A: Material data sheet, polyester fleece, general

Material group	Packaging
Name	Polyester fleece (GB); Polyestervlies (D)
Material abbreviation	PES
Manufactured in	Germany (GER)
Use	Packing material for protection

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

General description

Certifications/Information	n.a.	
Delivery form	Mats, wadding, etc.	
Texture	soft, fibrous	
Life cycle assessment data Comparative material for PE wadding (no data available) - PE nonwoven (GER)		3
Resource input per kg	A1-A3	
Total non-renewable primary energy (PENRT)	22 MJ	
Use of freshwater resources (FW)	0,00252 m ³	
Environmental impact per kg	A1-A3	
Global Warming Potential (GWP)	0,73 Kg CO ₂ -eqv.	
Environmental impact Transport, per 1000 kgkm (approx. 0.5 kg/m²)		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
Circulation potential	100 % (technological)	10
Socially compatible	Yes	9
Total average rating		5,58

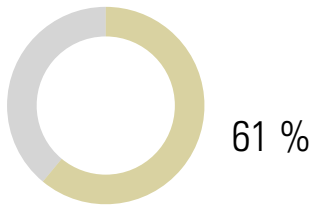
¹⁷ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

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

Disposal note

Recyclable waste

7 PP strapping



Tab. 7 A: Material data sheet, PP strapping, general

Material group	Packaging
Name	TEWE® Polypropylene strapping
Material abbreviation	PP
Manufacturer	Teufelberger
Manufactured in	Austria (AT)
Use	Packing material for protection

Tab. 7 B: Material data sheet, PP strapping, specific¹⁹²⁰

General description

Certifications/Information	ISO 9001, ISO 14001	
Life cycle assessment data Comparative material for PP (no data available) (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 (approx. 0.5 kg/m²)		6,5
Production site: Austria/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: 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
Circulation potential	100 % (technological)	10
Socially compatible	Yes	10
Total average rating		6,08
Disposal note	Recyclable waste	

¹⁹ BMI 2021: Oekobaudat. Database <https://www.oekobaudat.de/no_cache/en/database/search.html> Accessed, on 10/27/2021

²⁰ MATERIALARCHIV (2019) - Materialarchiv <<http://www.materialarchiv.ch/app-tablet/#search>> Accessed, on 03/01/2019

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

www.zeitraum-moebel.com

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