

Exterior 2022

Unboxing Carbon

The Catalog

**Henning
Larsen —**

Unboxing Carbon

The Catalog

This graphic collection of architectural materials presents complex data from Environmental Product Declarations (EPDs) in a visually accessible way, and in a unit that is readily understandable for architects: by square meter.

The Catalog is intended to give architects the means of assessing global warming potential (GWP) in the product production phases, thereby the means to align projects currently on the drawing boards with the recommendations of the IPCC 6th Report.

The critical window for a serious response to catastrophic climate change is now and the next few years. For this reason, the temporal aspect of carbon emissions, that is, the emissions from the production phase, the up-front carbon, must be a decision driver in the design process. The UN's newly published Emissions Gap report indicates an urgent system-wide transformation is needed to deliver the enormous CO₂e cuts. The report identifies various reduction strategies in the building sector, including selecting construction materials with lower CO₂e impacts.

Material selection is the realm of the architect and designer, and as the production process is directly linked to measurable environmental impacts, the architecture profession must evolve to meet the serious global challenges. Raising the bar of knowledge is essential for architects, a process that Henning Larsen has driven with the Unboxing Carbon Course: a carbon literacy course focusing

on material impacts. The Catalog is a product of the data workshop in the course, which has been conducted internally at Henning Larsen offices in Denmark and Norway, as well as with other Danish architecture studios. Special thanks to the co-authors JaJa Architects, Effekt Arkitekter, Dorte Mandrup, Arkitektforeningen course participants, Holscher Nordberg, and the enthusiastic colleagues at Henning Larsen for their generous contributions to this open-source catalog. We will update it annually.

How to read the data: The Catalog is organized by building component categories and presents the material with the lowest CO₂e impacts on the left of the page. The data is derived from currently valid product-specific or branch organization EPDs available in Northern European EPD databases such as EPD Danmark, EPD Norge, IBU, and International EPD. Each catalog entry lists the source of data (a hyperlinked EPD number), the thickness of the material, and the total GWP in the A1 to A3 phases per square meter. When available in the EPD, the density, the fire rating, and length of life information is also included. Unless noted, sub-structure, joints and surface treatment are not included in the EPD data. Gray entries indicate a recently expired EPD.

Despite efforts to ensure accuracy in reproduction of data and hyperlinks, errors can slip through. Please let us know at carbon@henninglarsen.com. *Copenhagen, October 31, 2022*



Unboxing
Carbon

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Facade

Bricks

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Used Bricks
Gamle Mursten
0.52 kg CO2e



Type: Used bricks (whole and half)
Thickness: 108 mm
Density: 1800 kg/m3
Lifetime: Not listed
EPD no: MD-16007-EN

Red Brick, Egersund
Wienerberger
10.7 kg CO2e



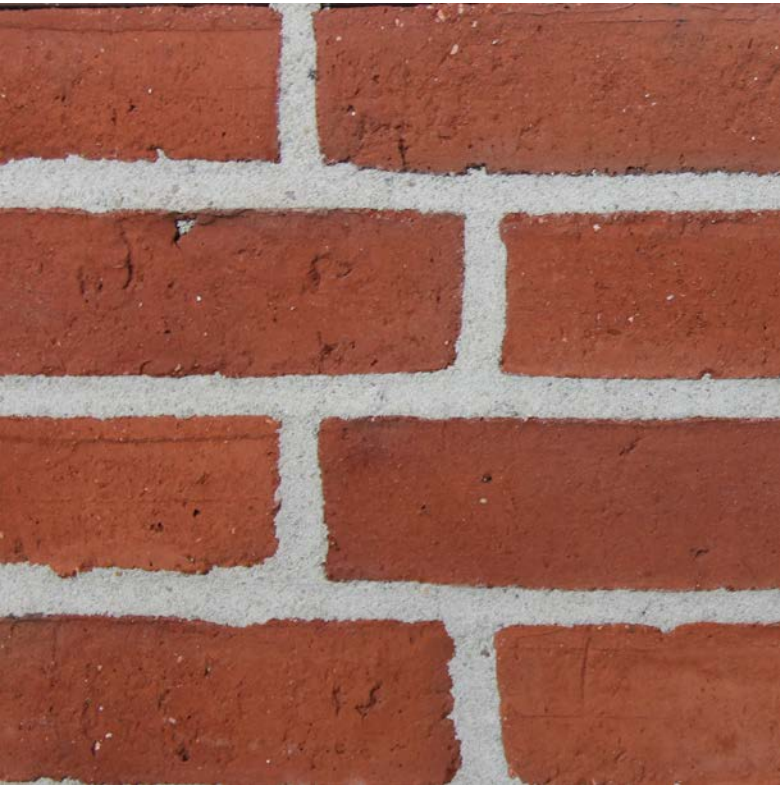
Type: biogas without Mn-oxide
Thickness: 108 mm
Density: 1450 kg/m3
Lifetime: 150 years
EPD no: MD-22001-EN

LESS Red Brick, Egersund
Wienerberger
11.9 kg CO2e



Type: biogas without Mn-oxide
Thickness: 108 mm
Density: 1438 kg/m3
Lifetime: 150 years
EPD no: MD-21027-EN

Greener Red Brick
Randers Tegl
13.2 kg CO2e



Type: biogas
Thickness: 108 mm
Density: 1620 kg/m3
Lifetime: 150 years
EPD no: MD-21001-EN

LESS Red Brick , Egersund
Wienerberger
18.3 kg CO2e



Type: biogas
Thickness: 108 mm
Density: 1598 kg/m3
Lifetime: 150 years
EPD no: MD-21028-EN

“Greener” Red Brick
Randers Tegl
18.8 kg CO2e

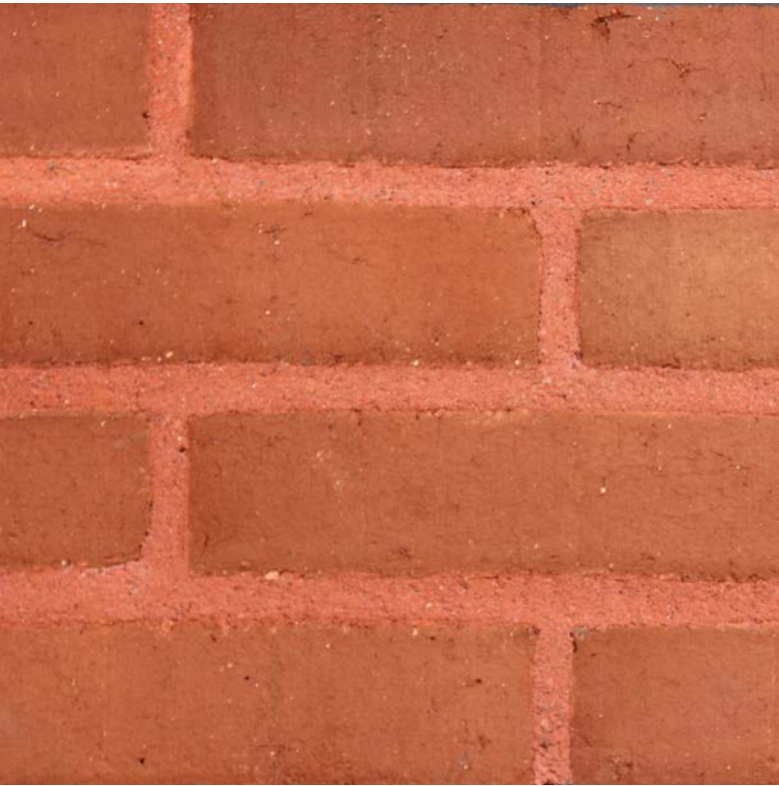


Type: biogas with iron oxide
Thickness: 108 mm
Density: 1750 kg/m3
Lifetime: 150 years
EPD no: MD-21053-EN

Bricks

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“Greener” Red Brick
Randers Tegl
19.1 kg CO2e



Type: biogas with Mn-oxide
Thickness: 108 mm
Density: 1750 kg/m3
Lifetime: 150 years
EPD no: MD-21052-EN

“Greener” Rose Brick
Randers Tegl
19.6 kg CO2e



Type: biogas, red/yellow-firing clay
Thickness: 108 mm
Density: 1800 kg/m3
Lifetime: 150 years
EPD no: MD-21055-EN

LESS Yellow Brick,
Egersund Wienerberger
21.2 kg CO2e



Type: biogas, red and yellow clay
Thickness: 108 mm
Density: 1525 kg/m3
Lifetime: 150 years
EPD no: MD-21062-EN

Yellow Brick, Egersund
Wienerberger
21.7 kg CO2e



Type: biogas, red and yellow clay
Thickness: 108 mm
Density: 1650 kg/m3
Lifetime: 150years
EPD no: MD-22004-EN

“Greener” Yellow Brick
Randers Tegl
23.5 kg CO2e



Type: biogas, yellow-firing clay
Thickness: 108 mm
Density: 1700 kg/m3
Lifetime: 150 years
EPD no: MD-21054-EN

“Greener” Rosé Brick
Randers Tegl
23.9 kg CO2e

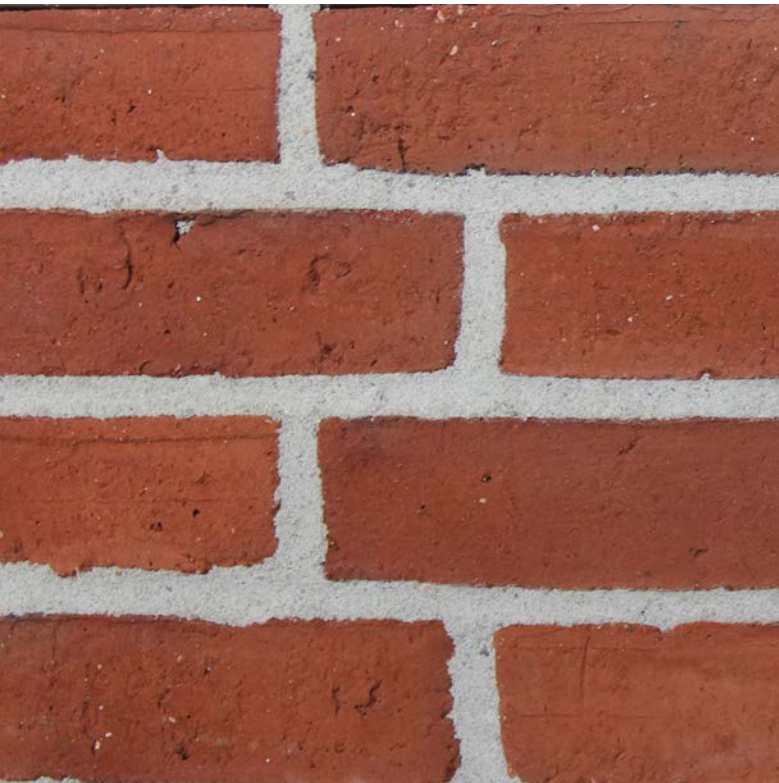


Type: biogas, red and yellow clay
Thickness: 108 mm
Density: 1800 kg/m3
Lifetime: 150 years
EPD no: MD-21003-EN

Bricks

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Red Brick, Egernsund
Wienerberger
24.3 kg CO2e



Type: natural gas, with Mn-oxide
Thickness: 108 mm
Density: 1450 kg/m3
Lifetime: 150 years
EPD no: MD-22001-EN

LESS Yellow Brick
Egernsund Wienerberger
25.6 kg CO2e



Type: biogas, yellow-firing clay
Thickness: 108mm
Density: 1463 kg/m3
Lifetime: 150 years
EPD no: MD-21029-EN

Yellow Brick
Egernsund Wienerberger
26.4 kg CO2e



Type: biogas, yellow and red clay
Thickness: 108 mm
Density: 1712 kg/m3
Lifetime: 150 years
EPD no: MD-21058-EN

Red Brick
Randers Tegl
37.2 kg CO2e



Type: red clay with ironoxide
Thickness: 108 mm
Density: 1750 kg/m3
Lifetime: 150 years
EPD no: MD-21041-EN

Yellow Brick
Egernsund Wienerberger
38.5 kg CO2e



Type: natural gas, red and yellow clay
Thickness: 108 mm
Density: kg/m3
Lifetime: 150 years
EPD no: MD-22004-EN

Yellow Brick
Egernsund Wienerberger
40.0 kg CO2e



Type: natural gas, yellow and red clay
Thickness: 108 mm
Density: 1712 kg/m3
Lifetime: years
EPD no: MD-21058-EN

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on

November, 2022

Bricks

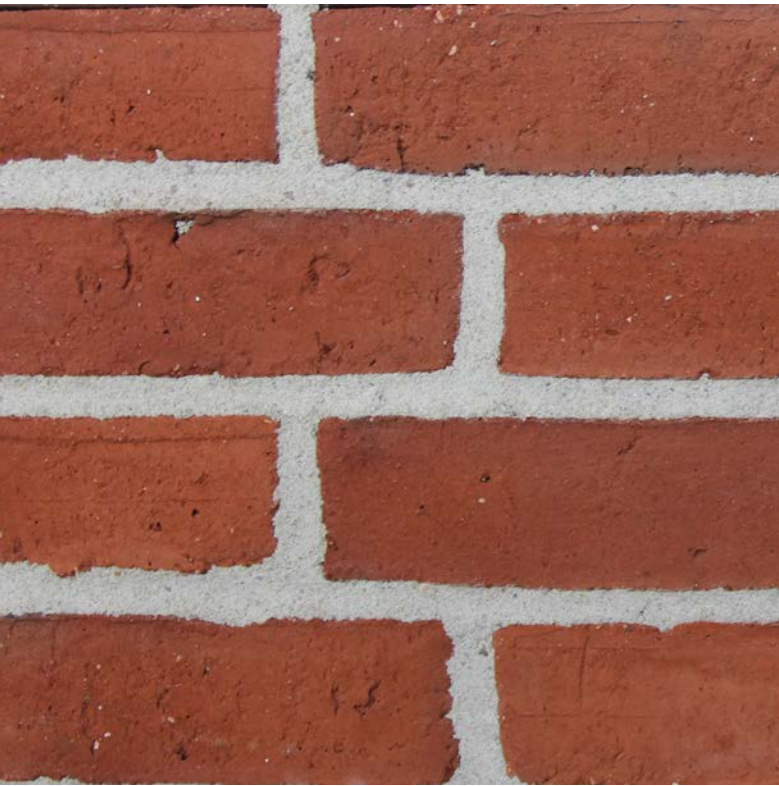
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Yellow Brick
Randers Tegl
41.8 kg CO2e



Type: yellow-firing clay from Vindø
Thickness: 108 mm
Density: 1800 kg/m3
Lifetime: 150 years
EPD no: MD-20030-EN

Red Brick
Branch Assoc.in Germany
44.9 kg CO2e



Type: yellow clay brick with holes
Thickness: 115 mm
Density: 1530 kg/m3
Lifetime: 150 years
EPD no: ZWM-20160126-ICG1-EN

Grey Brick
Randers Tegl
47.9 kg CO2e



Type: grey, yellow, &red firing clay
Thickness: 108 mm
Density: 1825 kg/m3
Lifetime: 150 years
EPD no: MD-17002-EN_rev1

Yellow Brick
Matzen Tegl
50.1 kg CO2e



Type: yellow-firing clay
Thickness: 108 mm
Density: 1600 kg/m3
Lifetime: 150 years
EPD no: MD-20044-EN

D-brick
Petersen Tegl A/S
59.7 kg CO2e



Type: German and British clay
Thickness: 108 mm
Density: 1825 kg/m3
Lifetime: 150 years
EPD no: MD-19006-EN

Yellow Brick
Randers Tegl
60.1 kg CO2e



Type: yellow clay from Hammershøj
Thickness: 108 mm
Density: 1825 kg/m3
Lifetime: 150 years
EPD no: MD-18015-EN

Cladding tiles without Sub-structure

Colosseum Nordic
Komproment
9.6 kg CO2e



Type: fired clay tiles - Nordic Red
Thickness: 17/35 mm
Density: 43.0 kg/m2
Lifetime: 150 years
EPD no: MD-21020-EN

Urban T
ZZ Wancor
11.8 kg CO2e



Type: red facade tile
Thickness: 19 mm
Density: 41.7 kg/m2
Lifetime: 150 years
EPD no: EPD-ZZW-20200283-CBB1

Urban L
ZZ Wancor
13.6 kg CO2e



Type: red facade tile
Thickness: 19 mm
Density: 47.7 kg/m2
Lifetime: 150 years
EPD no: EPD-ZZW-20200283-CBB1

Urban U
ZZ Wancor
16 kg CO2e



Type: red facade tile
Thickness: 19 mm
Density: 54.4 kg/m2
Lifetime: 150 years
EPD no: EPD-ZZW-20200283-CBB1

Pantheon Nordic
Komproment
21.5 kg CO2e



Type: fired clay tiles - Peat Black
Thickness: 17/35 mm
Density: 46.6 kg/m2
Lifetime: 150 years
EPD no: MD-21020-EN

Cover
Petersen Tegl A/S
36 kg CO2e



Type: German and British clay
Thickness: 18/37 mm
Density: 1825 kg/m3
Lifetime: 150 years
EPD no: MD-19006-EN

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Ceramic Cladding Tiles

Without sub-structure

Xtone Large Format
Urbatek, Porcelanosa Grupo
16.20 kg CO2e



Type: porcelain stoneware
Thickness: 6 mm
Density: 14.1 kg/m2
Lifetime: 50 years
Fire rating: A1FL/A1
EPD no: S-P-02909

Glazed & Unglazed
Tempio (Spain)
24.90 kg CO2e



Type: stoneware extruded facade tile
Thickness: not listed
Density: not listed
Lifetime: 50 years
Fire rating: A1FL/A1
EPD no: S-P-05854

Xtone Large Format
Urbatek, Porcelanosa Grupo
47.10 kg CO2e



Type: porcelain stoneware
Thickness: 20 mm
Density: 51.6 kg/m2
Lifetime: 50 years
Fire rating: A1FL/A1
EPD no: S-P-02909

Including sub-structure

Ceramic Facade
Tonalty
47.10 kg CO2e



Type: panels with substructure
Thickness: 22 mm
Density: 41.32 kg/m2
Lifetime: -
Fire rating: A1
EPD no: EPD-TON-20190011-IBA1

Ceramic Facade
Argeton
43.3 kg CO2e



Type: elements with substructure
Thickness: 24 mm
Density:40.57 kg/m2
Lifetime: 50 years
Fire rating: A1
EPD no: EPD-WIN-20140143-ICA2

Terrart
NBK Keramik
90.50 kg CO2e



Type: with aluminium substructure
Thickness: 31 mm
Density: 67.07 kg/m2
Lifetime: 50 years
Fire rating:
EPD no: EPD-NBK-20160120-CBE1

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Natural Stone Cladding

Semi-rijo, Pelsparite Limestone
Solancis, S.A.
4.52 kg CO2e



Type: Portuguese Branco Real, etc.
Thickness: 30 mm
Density: 70.5 kg/m2
Lifetime: not listed
EPD no: DAP 001:2022

Limestone
Franken-Schotter
4.60 kg CO2e



Type: jura limestone from Germany
Thickness: 30 mm
Density: 77.1 kg/m2
Lifetime: 50 years
EPD no: EPD-FRS-20170103-IBD1

Granite G358
Naturstein Montering NO
8.02 kg CO2e



Type: granite from China
Thickness: 30 mm
Density: 78.6 kg/m2
Lifetime: not listed
EPD no: NEPD-1635-653-NO

Granite G654
Naturstein Montering NO
13.20 kg CO2e



Type: granite from China
Thickness: 30 mm
Density: 84 kg/m2
Lifetime: not listed
EPD no: NEPD-1636-653-NO

Limestone
Portland Stone firms
18.51 kg CO2e



Type: natural stone from the UK
Thickness: 30 mm
Density: 69 kg/m2
Lifetime: not listed
EPD no: BREG EN_000389

Finnish Natural Stone
Kivi Ry (FI market average)
25.27 kg CO2e



Type: facade cladding
Thickness: 30 mm
Density: 81 kg/m2
Lifetime: not listed
EPD no: EPD-RTS_56_20

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Slate Cladding

1 of 2 pages

Cupa 12 Roof Slate
Cupa Pizarras S.A
3.41 kg CO2e



Type: Spanish dark grey roofing slate w/ thin laminations & smooth surface
Thickness: 5 mm
Tensity: 30.4 kg/m2
Lifetime: 60 years
EPD no: BREG EN 000232

Offerdal
Minera Skifer
3.84 kg CO2e



Type: natural stone quartzite schist, sawn edge, calibrated
Thickness: 15 mm
Density: 41.15 kg/m2
Lifetime: 60 years
EPD no: NEPD-1584-609-EN

Cupa Heavy 3 Roof Slate
Cupa Pizarras S.A
4.02 kg CO2e



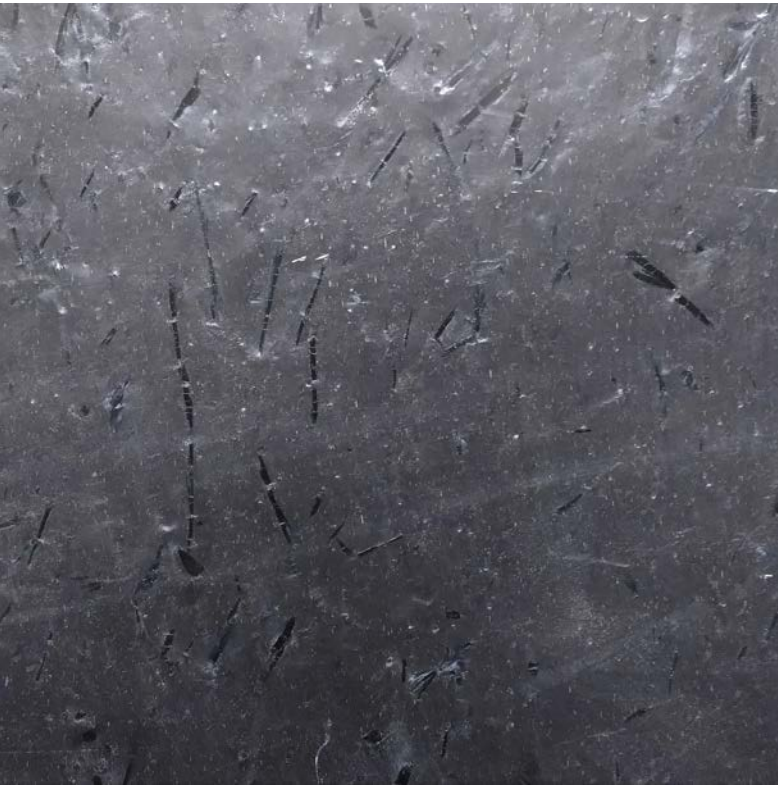
Type: Spanish blue black roofing slate with slightly gritty texture
Thickness: 7.5 mm
Density: 51.91 kg/m2
Lifetime: 60 years
EPD no: BREG EN 000246

Offerdal
Minera Skifer
4.04 kg CO2e



Type: natural stone quartzite schist, natural cleft surface
Thickness: 30 mm
Density: 81.97 kg/m2
Lifetime: 60 years
EPD no: NEPD-1584-609-EN

Finnish Slate Facade Stone,
Kivi ry
6.24 kg CO2e



Type: facade & outdoor pavement, **FI market average**
Thickness: 80 mm
Density: 216 kg/m2
Lifetime: 60 years
EPD no: EPD-RTS_57_20

Oppdal
Minera Skifer
7.00 kg CO2e



Type: natural stone quartzite schist, natural cleft w/broken edges
Thickness: 30 mm
Density: 82 kg/m2
Lifetime: 60 years
EPD no: NEPD-2907-1588-NO

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Slate Cladding

2 of 2 pages

Natural Stone Slate
Altaskifer
8.5 kg CO2e



Type: with sawn edge and calibrated thickness
Thickness: 15 mm
Density: 40.65 kg/m2
Lifetime: 60 years
EPD no: NEPD-1673-671-NO

Oppdal
Minera Skifer
8.83 kg CO2e



Type: natural stone quartzite schist, natural cleft w/sawn edges
Thickness: 30 mm
Density: 82 kg/m2
Lifetime: 60 years
EPD no: NEPD-2907-1588-NO

Otta,
Minera Skifer
11.34 kg CO2e



Type: natural stone phyllite schist, sawn/cut edge, no calibration
Thickness: 25 mm
Density: 70.42 kg/m2
Lifetime: 60 years
EPD no: NEPD-1585-609-EN

Natural Stone Slate,
Altaskifer
15.85 kg CO2e



Type: slate with sawn edges, no calibration
Thickness: 50 mm
Density: 135.5 kg/m2
Lifetime: 60 years
EPD no: NEPD-1673-671-NO

Otta
Minera Skifer
23.88 kg CO2e



Type: natural stone phyllite schist, sawn/cut edge, calibrated
Thickness: 20 mm
Density: 56.18 kg/m2
Lifetime: 60 years
EPD no: NEPD-1585-609-EN

Bricks of Slate,
Oppdal Sten AS
131 kg CO2e



Type: slate bricks, used for National Museum in Oslo
Thickness: 125 mm
Density: 332.8 kg/m2
Lifetime: 60 years
EPD no: NEPD-1209-378-NO

Wood Cladding

1 of 2 pages

Treated Cladding
Bergene Holm
-12.70 kg CO2e



Type: pine and spruce
Thickness: 19 mm
Density: 480 kg/m³
Lifetime: 60 years
Fire rating: not listed
EPD no: NEPD-1936-857

Painted Cladding
InnTre Kjeldstad
-11.70 kg CO2e



Type: painted spruce
Thickness: 19 mm
Density: 467 kg/m³
Lifetime: 60 years
Fire rating: not listed
EPD no: NEPD-3279-1921-NO

Pressure Treated Spruce
Bergene Holm AS
-11.50 kg CO2e



Type: cladding
Thickness: 19 mm
Density: 375 kg/m³
Lifetime: 60 years
Fire rating: not listed
EPD no: NEPD-1935-857-NO

Treated Cladding
Superwood
-10.90 kg CO2e



Type: treated with ferrous sulphate
Thickness: 21 mm
Density: 437 kg/m³
Lifetime: 60 years
Fire rating: D-s2, d0
EPD no: NEPD-1641-654

Fire Treated Spruce EXT.
Woodify
-10.80 kg CO2e



Type: fire impreg. & finished surface
Thickness: 19 mm
Density: 465 kg/m³
Lifetime: 60 years
Fire rating: B-s1,d0 if on A2-s1,d0
EPD no: NEPD-3304-1943-NO

Treated Cladding
Superwood
-10.06 kg CO2e



Type: treated with Signatur process
Thickness: 21 mm
Density: 437 kg/m³
Lifetime: 60 years
Fire rating: D-s2, d0
EPD no: NEPD-1641-654

Wood Cladding

2 of 2 pages

Thermo Treated Cladding
Frøslev
-8.82 kg CO2e



Type: NZ Abodo wood cladding
Thickness: 20 mm
Density: 420 kg/m3
Lifetime: not listed
Fire rating: D-s2, d2
EPD no: MD-20032-EN

Fire Treated Heatwood Pine
Woodify
-8.80 kg CO2e



Type: fire impregnated cladding
Thickness: 19 mm
Density: 553 kg/m3
Lifetime: 60 years
Fire rating: B-s1,d0 if on A2-s1,d0
EPD no: NEPD-3299-1942-NO

Bamboo X-treme
Moso
-7.43 kg CO2e



Type: bamboo cladding, unfinished
Thickness: 18 mm
Density: 1150 kg/m3
Guarantee: 25 years
Fire rating: B-s1, d0
EPD no: EPD-NIBE-20210625-20247

Embla ThermoWood,
Frøslev
-6.96 kg CO2e



Type: scotts pine and Norway spruce
Thickness: 20 mm
Density: 430 kg/m3
Lifetime: not listed
Fire rating: D-s1, d0
EPD no: MD-20033-EN

Termofuru
Moelven
-5.16 kg CO2e



Type: waterproof, fire-impreg. spruce
Thickness: 20 mm
Density: 435 kg/m3
Lifetime: min. 60 years
Fire rating: B-s1/2, d0
EPD no: NEPD-2554-1285-NO

Optimum Termowood
Woodify
-1.05 kg CO2e



Type: fire impreg., modified pine
Thickness: 21 mm
Density: 380 kg/m3
Lifetime: 60 years
Fire rating: B-s1,d0
EPD no: NEPD-1867-805-NO

GRC, Polymer Concrete & Fiber Cement

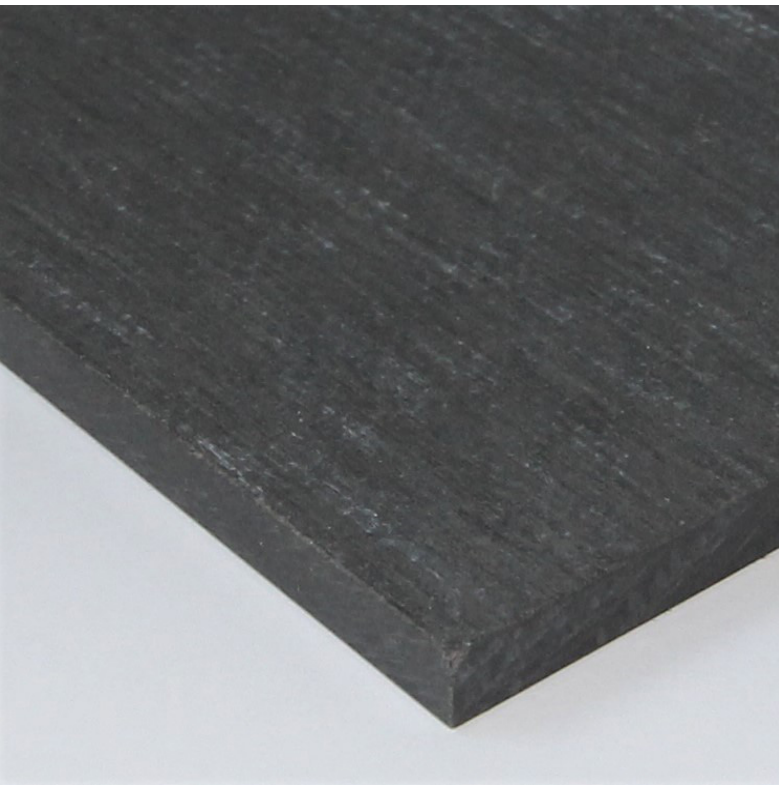
1 of 4 pages

Hardie Plank
James Hardie
7.34 kg CO2e



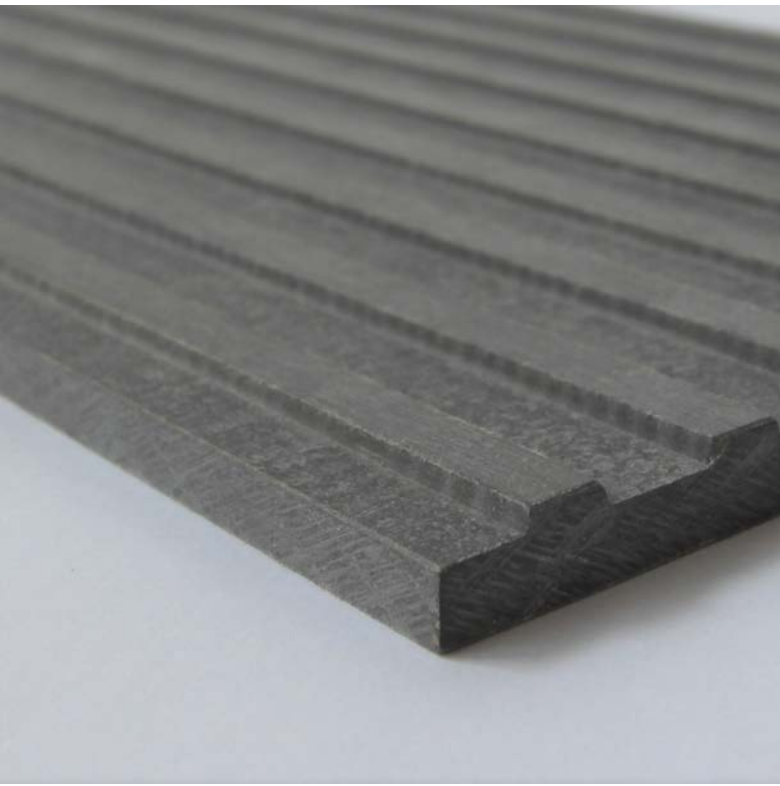
Type: fiber cement panels
Thickness: 8 mm
Density: 11.2 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: S-P-01432

Tectiva
Equitone
8.06 kg CO2e



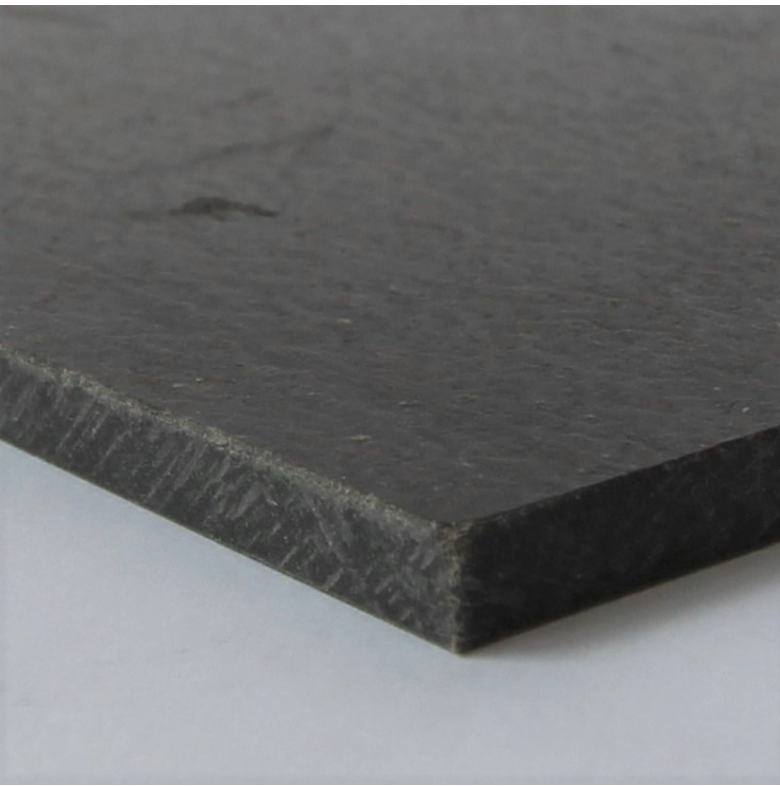
Type: fiber cement panels
Thickness: 8 mm
Density: 14.22 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-ETE-20190007-ICA1

Linea & Lunara
Equitone
9.79 kg CO2e



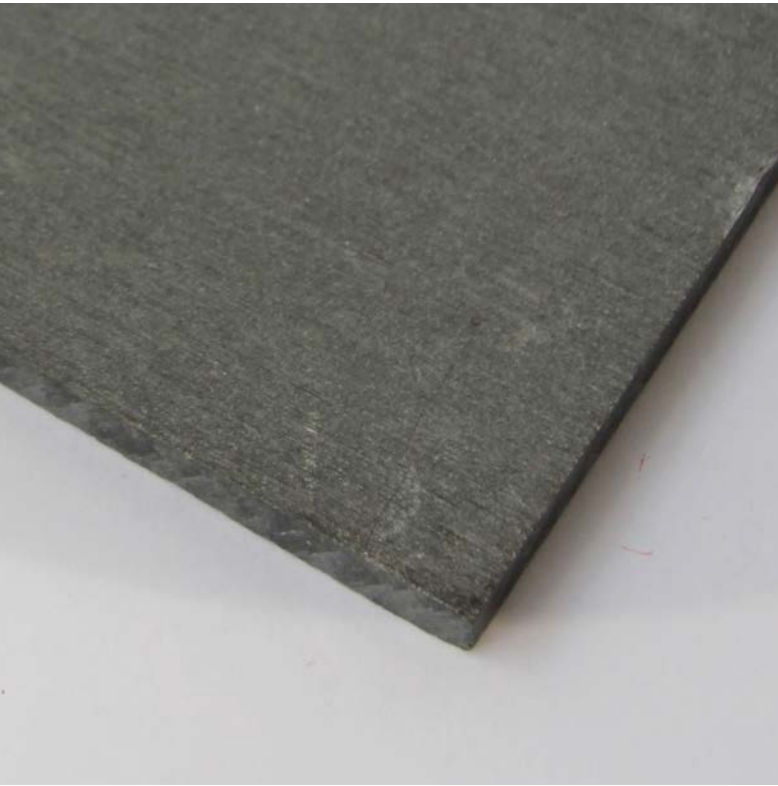
Type: fiber cement panels
Thickness: 10 mm
Density: 15.8 kg/m2
Lifetime: 50 years
Fire rating: A2-s1, d0
EPD no: EPD-ETE-20190128-CCA1

Deco
Cembrit
10 kg CO2e



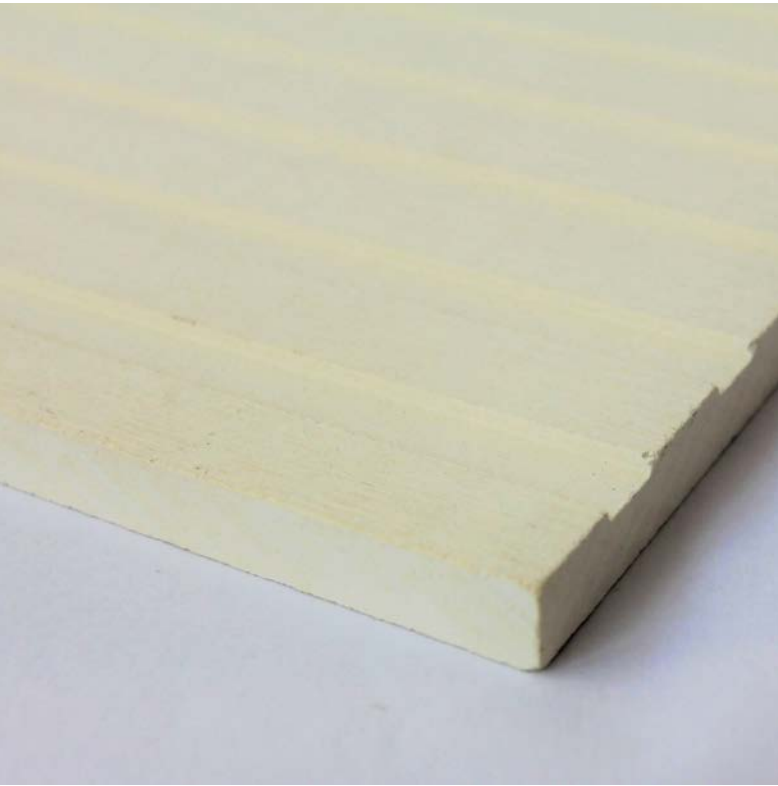
Type: fiber cement panels
Thickness: 8 mm
Density: 11.7 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: MD-20045-EN_rev2

Patina Rough
Cembrit
10.2 kg CO2e



Type: fiber cement panels
Thickness: 8 mm
Density: 11.7 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: MD-20045-EN_rev2

Patina Incline
Cembrit
10.7 kg CO2e

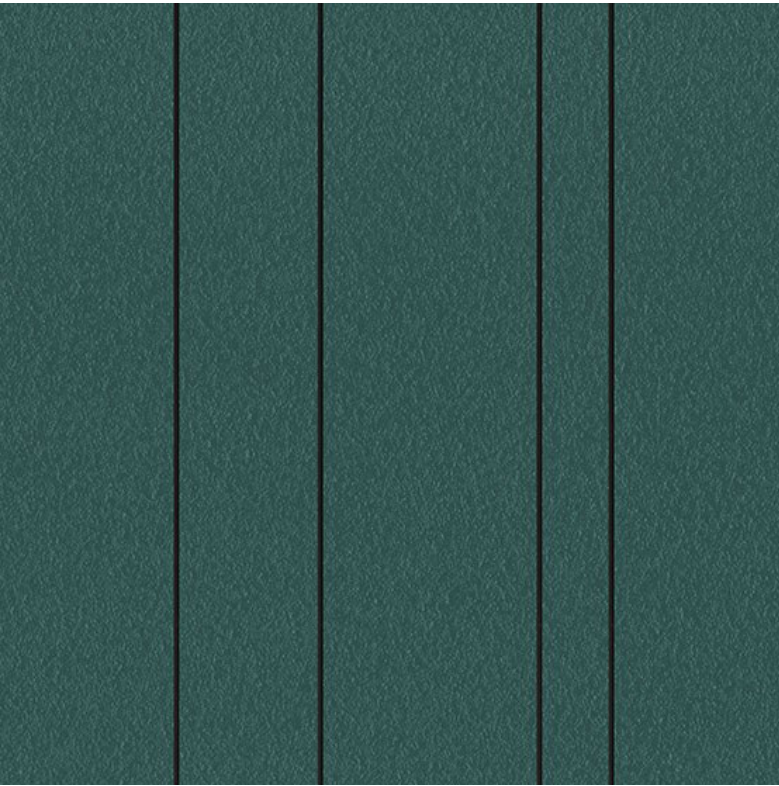


Type: fiber cement panels
Thickness: 8 mm
Density: 11.9 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: MD-20045-EN_rev2

GRC, Polymer Concrete & Fiber Cement

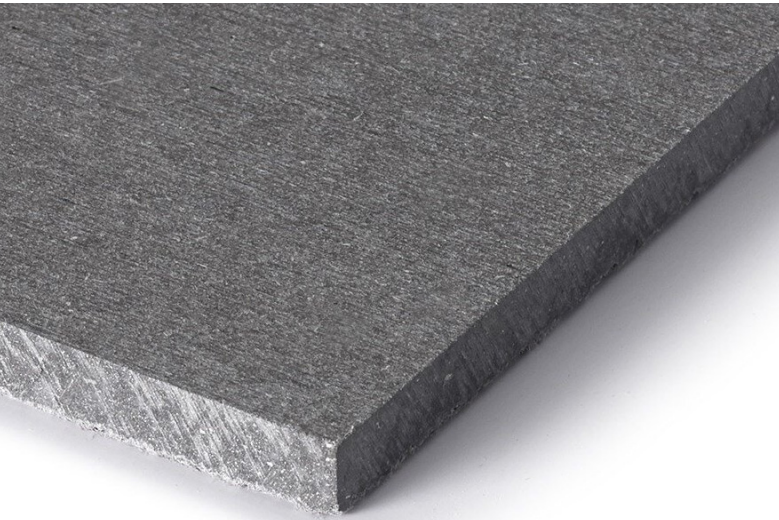
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Textura & Materia
Equitone
11.32 kg CO2e



Type: fiber cement panels
Thickness: 10 and 12
Density: 16.5 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-ELH-20180136-CAC1-EN

Patina Original
Cembrit
11.8 kg CO2e



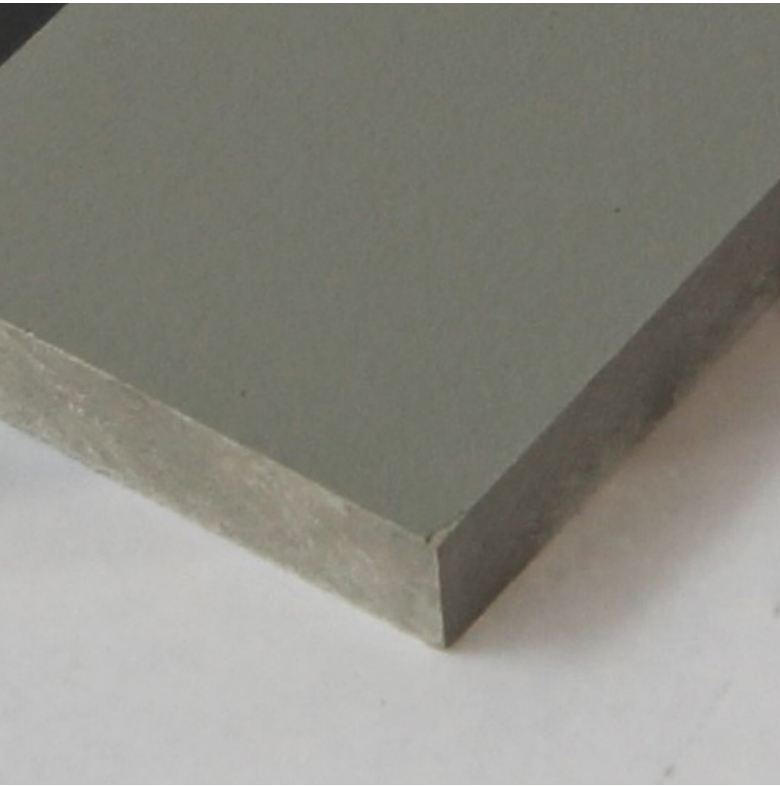
Type: fiber cement panels
Thickness: 8 mm
Density: 11.9 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: MD-20045-EN_rev2

Colorful Cover
Cembrit
16.1 kg CO2e



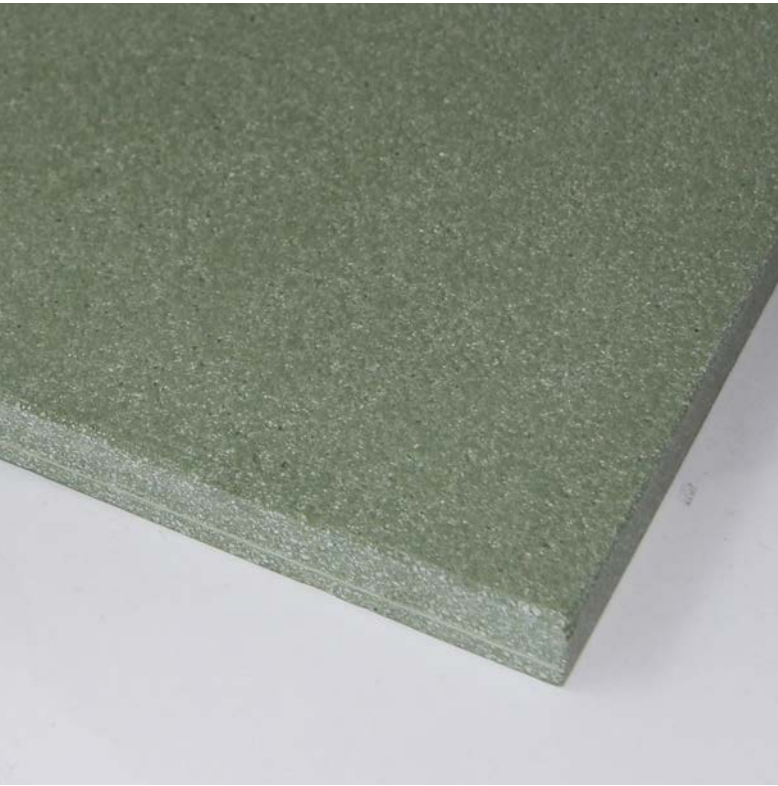
Type: fiber cement panels
Thickness: 8 mm
Density: 14.2 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: MD-20045-EN_rev2

Solid
Cembrit
16.2 kg CO2e



Type: fiber cement panels
Thickness: 8 mm
Density: 14.1 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: MD-20045-EN_rev2

Pictura & Natura
Equitone
16.31 kg CO2e



Type: fiber cement panels
Thickness: 8 mm
Density: 14.2 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-ETE-20190179-CCC1

Nature Medium
Steni
17.3 kg CO2e



Type: stone composite panels
Thickness: 8 mm
Density: 15 kg/m2
Lifetime: 60 years
Fire rating: B-S1,d0
EPD no: NEPD-2580-1307-EN

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

GRC, Polymer Concrete & Fiber Cement

3 of 4 pages

Colour
Steni
17.8 kg CO2e



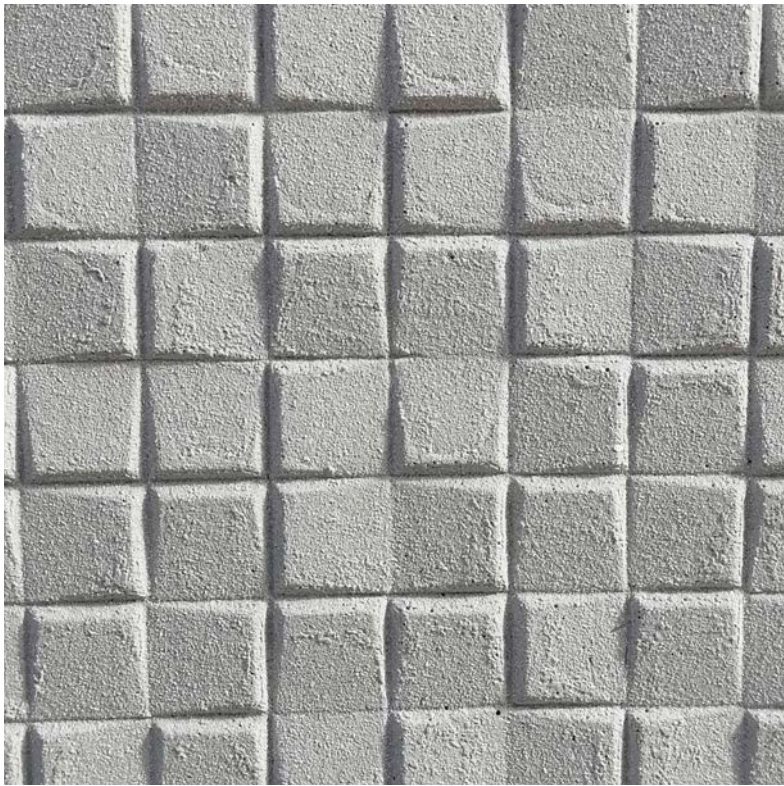
Type: stone composite panels
Thickness: 12 mm
Density: 12 kg/m2
Lifetime: 60 years
Fire rating: B-S1,d0
EPD no: NEPD-2581-1309-EN

Vision
Steni
17.9 kg CO2e



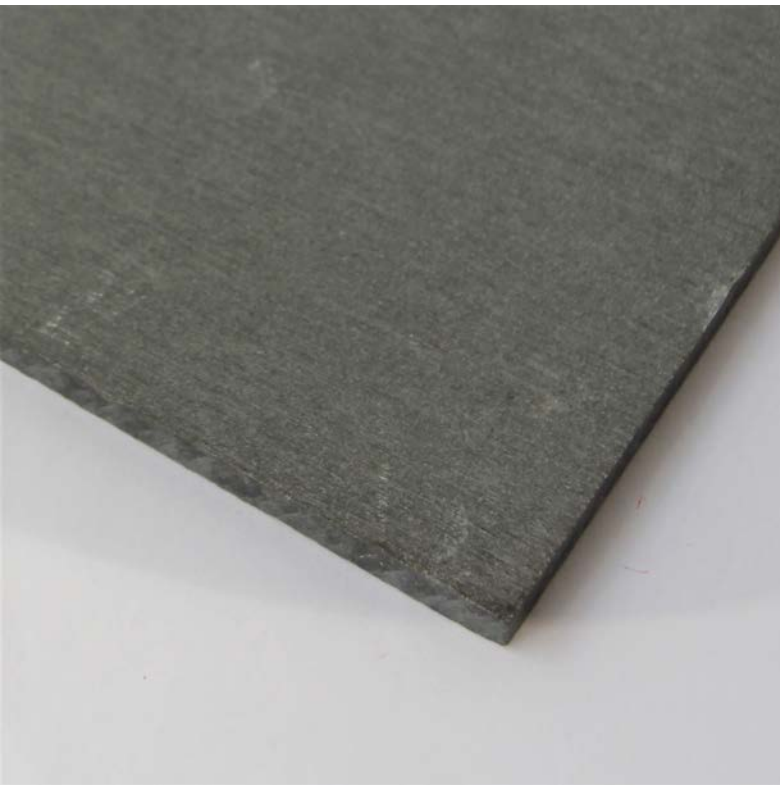
Type: stone composite panels
Thickness: 12 mm
Density: 12.0 kg/m2
Lifetime: 60 years
Fire rating: B-S1,d0
EPD no: NEPD-2657-1361-EN

GRC Element
BB Fiberbeton
19.72 kg CO2e



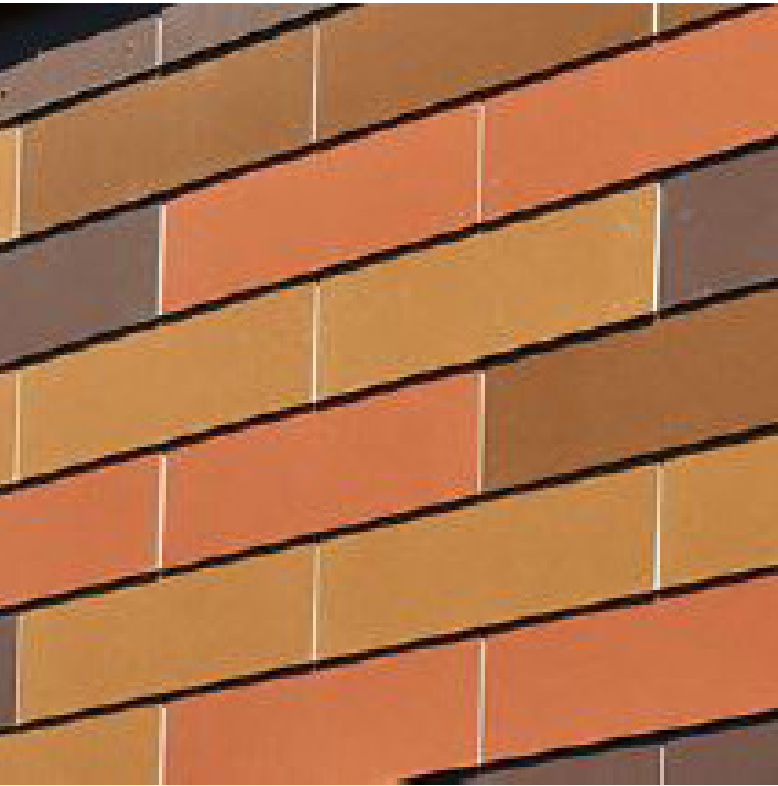
Type: fiberglass reinforced concrete
Thickness: 12 mm
Density: 23.4 kg/m2
Lifetime: 60 years
Fire rating: A2-s1,d0
EPD no: MD-21008-EN

GRC
Rieder Sales GmbH
20.7 kg CO2e



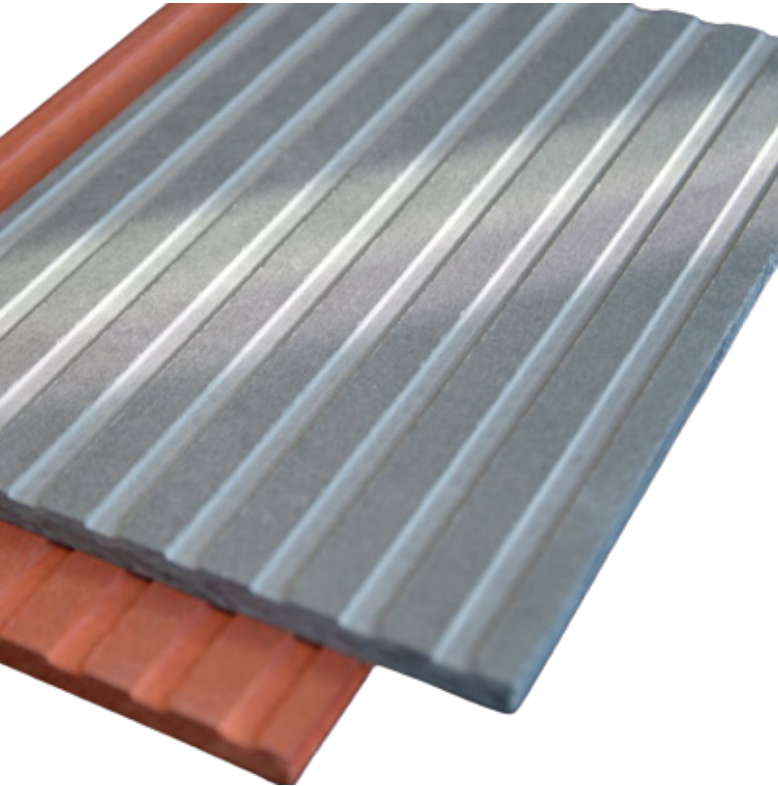
Type: fiberglass-reinforced concrete
Thickness: 13 mm
Density: 28.6 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-RSE-20180069-IAD1

Clinar
Swisspearl
21.21 kg CO2e



Type: fiber cement, lapped
Thickness: 6 mm
Density: 18.4 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-SWP-20180028-IAD1

Ceramapanel
Valcan
23.40 kg CO2e



Type: natural colored fiber cement
Thickness: 10 mm
Density: 18.0 kg/m2
Lifetime: 50 years
Fire rating: A1 or A2-s1, d0
EPD no: S-P-03995

GRC, Polymer Concrete & Fiber Cement

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Fibre C-Grey
Swisspearl
23.75 kg CO2e



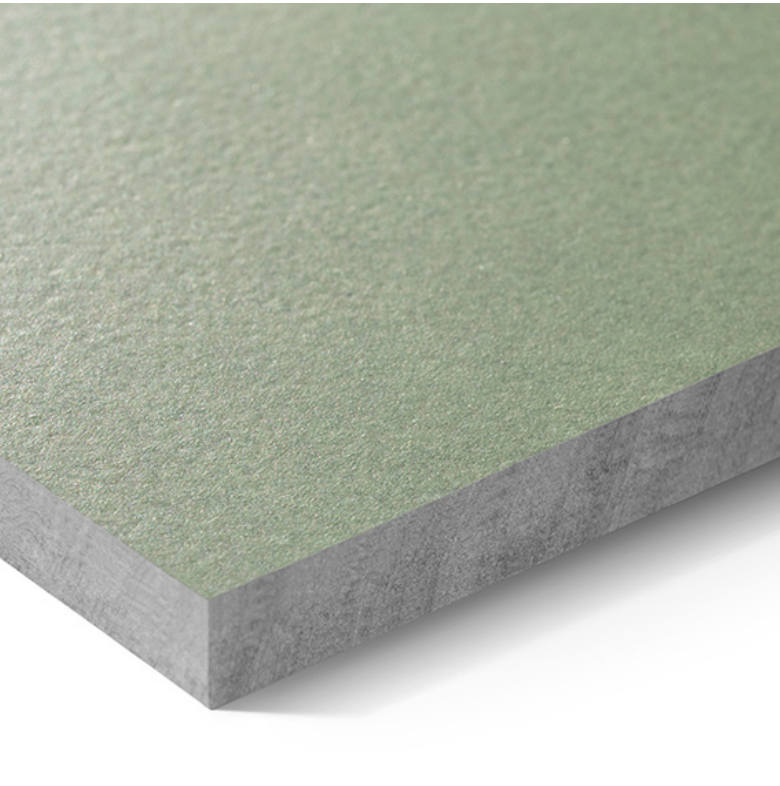
Type: gray plate coated fiber cement
Thickness: 12 mm
Density: 22.2 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-SWP-20180030-IAD1

Vanguard
ULMA
27 kg CO2e



Type: polymer concrete panels
Thickness: 14 mm
Density: 35 kg/m2
Lifetime: not listed
Fire rating: A2-s1, d0
EPD no: S-P-01096

Fibre C-Pigment
Swisspearl
28.42 kg CO2e



Type: pigmented plate coated
Thickness: 12 mm
Density: 22.2 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-SWP-20180031-IAD1

Creaktive
ULMA
31.40 kg CO2e



Type: polymer concrete panels
Thickness: 14 mm
Density: 35 kg/m2
Lifetime: not listed
Fire rating: A2-s1, d0
EPD no: S-P-01096

Fibre Concrete
Byggimpuls
32.15 kg CO2e



Type: fiber cement elements
Thickness: 12-15 mm
Density: 55 kg/m2
Lifetime: 60 years
Fire rating: not listed
EPD no: NEPD-1477-495-NO

Fibre C-White
Swisspearl
35.08 kg CO2e



Type: white cement coated panel
Thickness: 12 mm
Density: 22.2 kg/m2
Lifetime: 50 years
Fire rating: A2-s1,d0
EPD no: EPD-SWP-20180032-IAD1

Aluminium & Steel Cladding

1 of 2 pages

Copper Cladding Cassettes
Ruuki and Vimpeli
7.74 kg CO2e



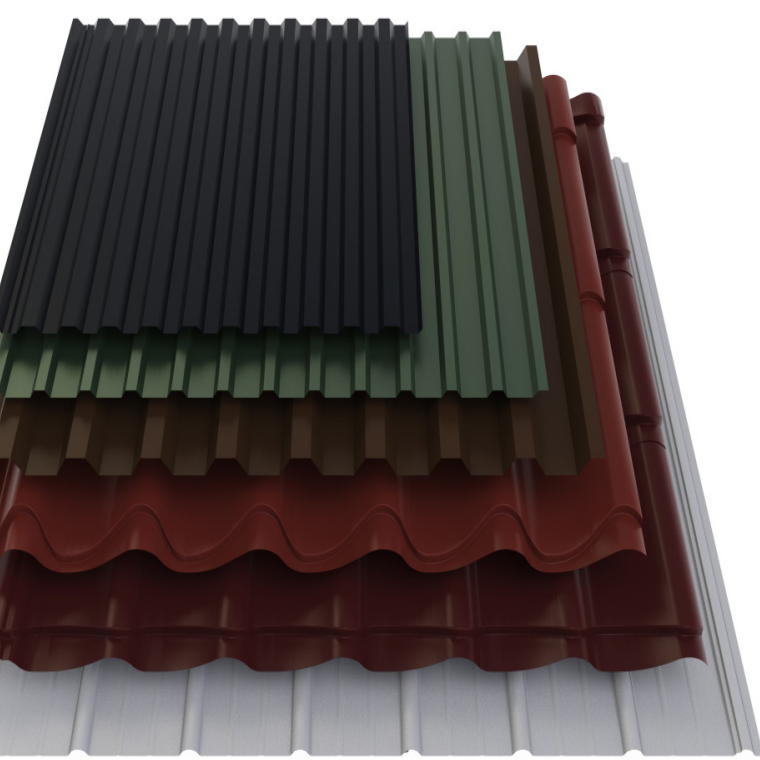
Type: all side foldes cassettes
Thickness: 1 mm
Density: 10.8 kg/m2
Lifetime: not listed
Fire rating: Class A1
EPD no: EPD RTS_190_22

Bronze Cladding Cassettes
Ruuki and Vimpeli
10.5 kg CO2e



Type: all side foldes cassettes
Thickness: 1 mm
Density: 10.5 kg/m2
Lifetime: not listed
Fire rating: Class A1
EPD no: EPD RTS_190_22

LV 30 Profile Sheetting
Lindab
12.9 kg CO2e



Type: precoated steel plates
Thickness: 0.6 mm
Density: 4.68 kg/m2
Lifetime: 60 years
Fire rating: A2-s1,d0
EPD no: NEPD-2814-1511-EN

Coloured Steel Plate
Greencoat
16.5 kg CO2e



Type: steel plates for facade
Thickness: 0.8 mm
Density: 6.28 kg/m2
Lifetime: 50 years
Fire rating: A2-s1, d0
EPD no: S-P-01922

Classic
Rheinzink
17.4 kg CO2e



Type: electrolytic high-grade fine zinc
Thickness: 0.7 mm
Density: 5.70 kg/m2
Lifetime: 50 years
Fire rating: Class A1
EPD no: MD-20034-EN

Brass Cladding Cassettes
Ruuki and Vimpeli
19.0 kg CO2e



Type: all side foldes cassettes
Thickness: 1 mm
Density: 10.5 kg/m2
Lifetime: not listed
Fire rating: Class A1
EPD no: EPD RTS_190_22

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Aluminium & Steel Cladding

2 of 2 pages

prePATINA
Rheinzink
22.7 kg CO2e



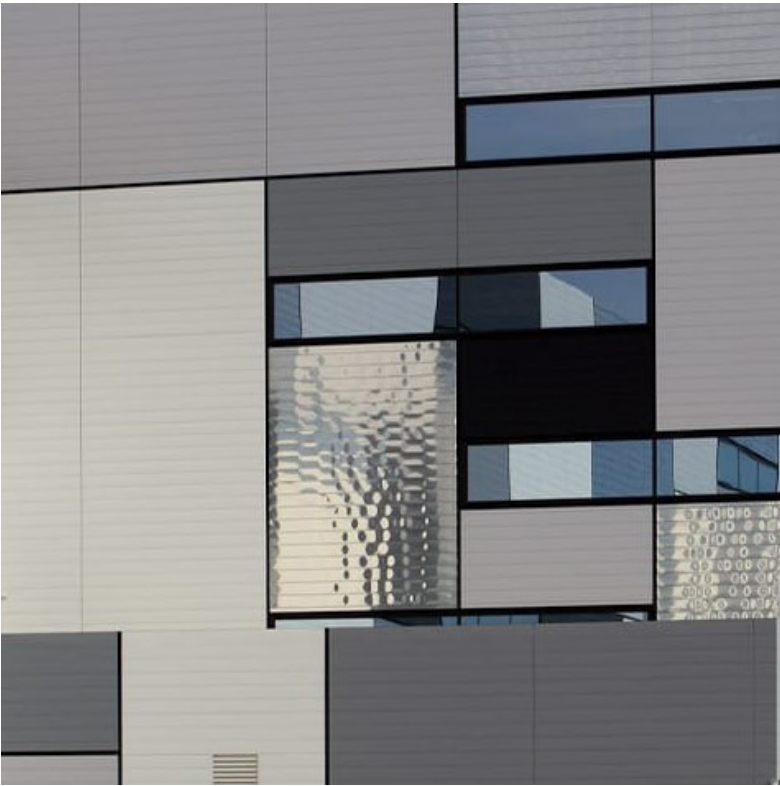
Type: titanium zinc sheets
Thickness: 0.7 mm
Density: 5.70 kg/m2
Lifetime: 50 years
Fire rating: Class A1
EPD no: MD-20035-EN

4mm Bonded Aluminium
Branch Assoc.
26.7 kg CO2e



Type: aluminum with PU core
Thickness: 4 mm
Density: 7.0 kg/m2
Lifetime: 50 years
Fire rating: B-s1,d0
EPD no: EPD-GDA-2019132-IBG1

FC Facade System
Kalzip
28.0 kg CO2e



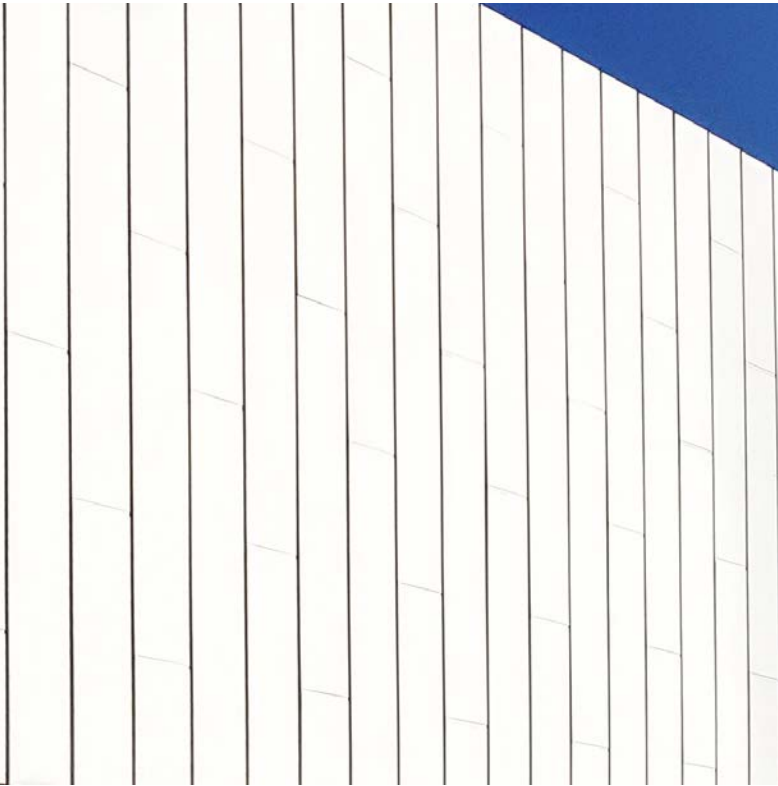
Type: aluminium facade panels
Thickness: 1 mm
Density: 4.25 kg/m2
Lifetime: 50 years
Fire rating: B-s1,d0
EPD no: EPD-KAL-20160283-IBC1-EN

Classic Shipboard Panel
Rheinzink
31.8 kg CO2e



Type: electrolytic high-grade fine zinc
Thickness: 1 mm
Density: 10.4 kg/m2
Lifetime: 50 years
Fire rating: Class A1
EPD no: MD-20034-EN

Stainless Steel Cassettes
Ruuki and Vimpeli
38.0 kg CO2e



Type: all side foldes cassettes
Thickness: 1 mm
Density: 9.4 kg/m2
Lifetime: not listed
Fire rating: Class A1
EPD no: EPD RTS_190_22

prePATINA Shipboard Panel
Rheinzink
41.5 kg CO2e



Type: titanium zinc sheets
Thickness: 1 mm
Density: 10.4 kg/m2
Lifetime: 50 years
Fire rating: Class A1
EPD no: EPD RTS_190_22

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Glass Panels

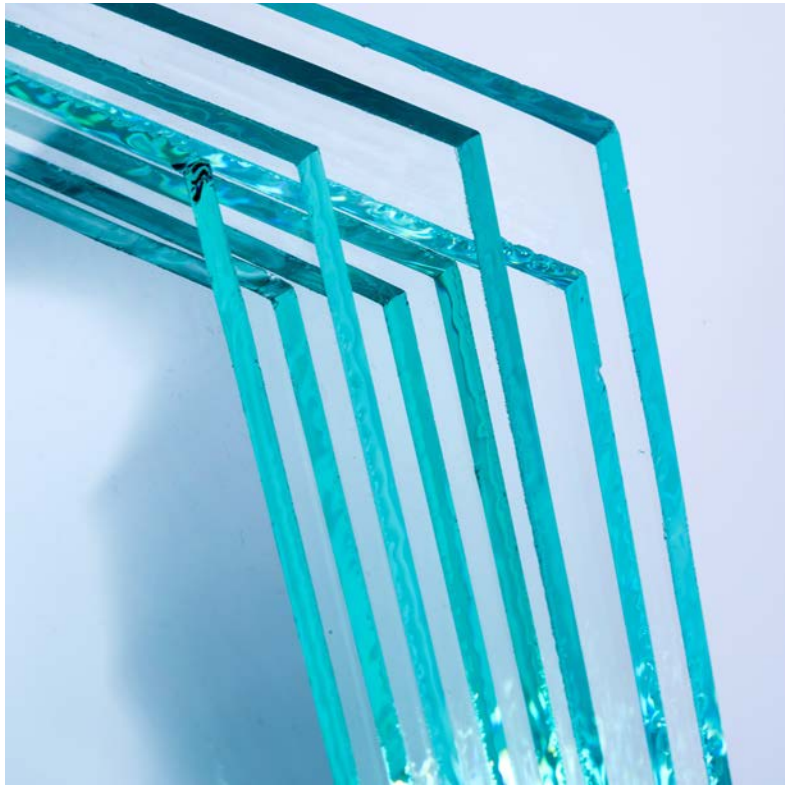
1 of 2 pages

Safety Glass
Okalux
7.93 kg CO2e



Type: laminated safety glass
Thickness: 1 mm
Density: - kg/m2
Lifetime: - years
EPD no: M-EPD-FEV-GB-002015

Magnetron
Saint-Gobain
11.9 kg CO2e



Type: coated glass
Thickness: 4 mm
Density: 10 kg/m2
Lifetime: 30 years
EPD no: S-P-00926

Clear Glass
Trakya Cam Sanayii
12.75 kg CO2e



Type: single float glass
Thickness: 4.53 mm
Density: 10.82 kg/m2
Lifetime: - years
EPD no: EPD-TCS-20170105-CAD1

Float Glass
Asahi India Glass
12.9 kg CO2e



Type: clear floating glass
Thickness: 4 mm
Density: - kg/m2
Lifetime: - years
EPD no: S-P-01114

Securit
Saint-Gobain Glass
15.5 kg CO2e



Type: thermally toughened safety
Thickness: 4 mm
Density: 10 kg/m2
Lifetime: 30 years
EPD no: S-P-00927

Diamant
Saint-Gobain Glass
16.2 kg CO2e

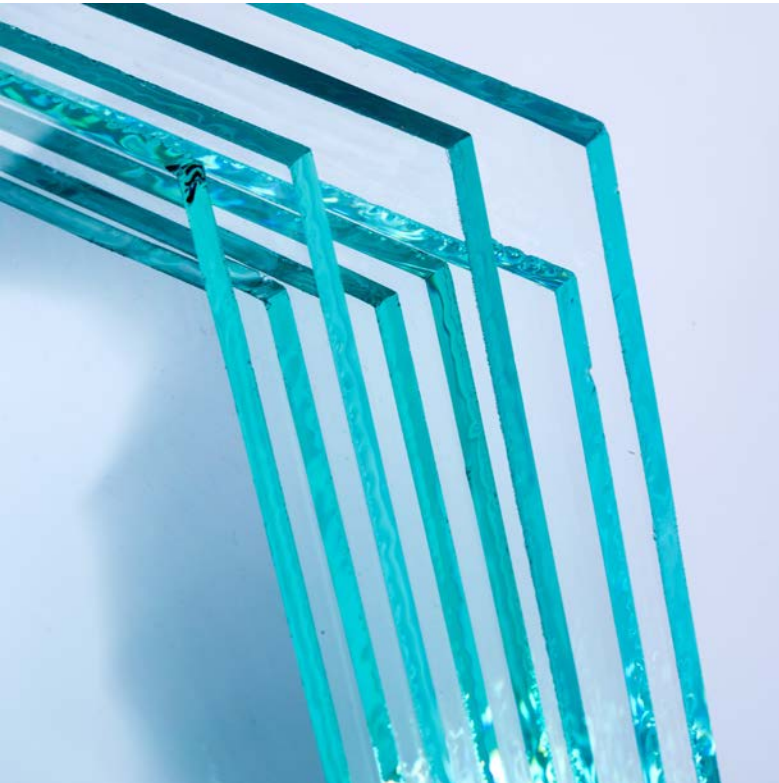


type: thermally toughened
thickness: 4 mm
density: 10 kg/m2
lifetime: 30 years
EPD no: S-P-00927

Glass Panels

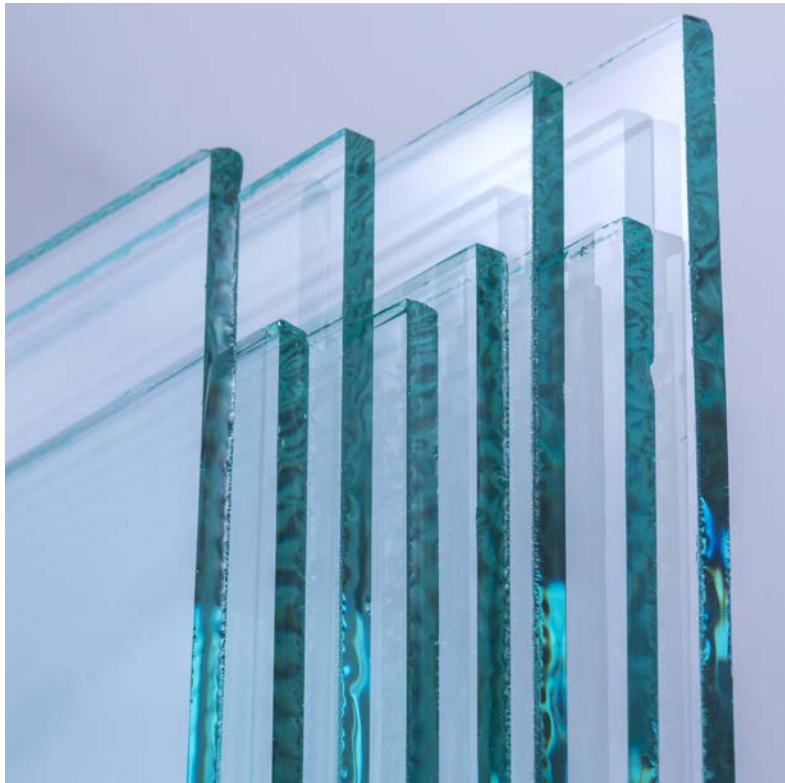
2 of 2 pages

Magneton
Saint-Gobain Glass France
22.8 kg CO2e



Type: coated glass
Thickness: 8 mm
Density: 20 kg/m2
Lifetime: 30 years
EPD no: S-P-00926

STADIP Protect 33.2
Saint-Gobain
23.1 kg CO2e



Type: laminated safety glass
Thickness: 6.8 mm
Density: - kg/m2
Lifetime: - years
EPD no: S-P-00930

Insulating Glass
Cardinal
26.5 kg CO2e



Type: insulating glass
Thickness: 6 mm
Density: 15.6 kg/m2
Lifetime: - years
EPD no: ASTM-EPD149

Securit
Saint-Gobain Glass
27.9 kg CO2e



Type: thermally toughened safety
Thickness: 8 mm
Density 20 kg/m2:
Lifetime: 30 years
EPD no: S-P-00927

STADIP Protect 44,2
Saint-Gobain Glass France
28.6 kg CO2e



Type: laminated safety glass
Thickness: 8.8 mm
Density: - kg/m2
Lifetime: - years
EPD no: S-P-00930

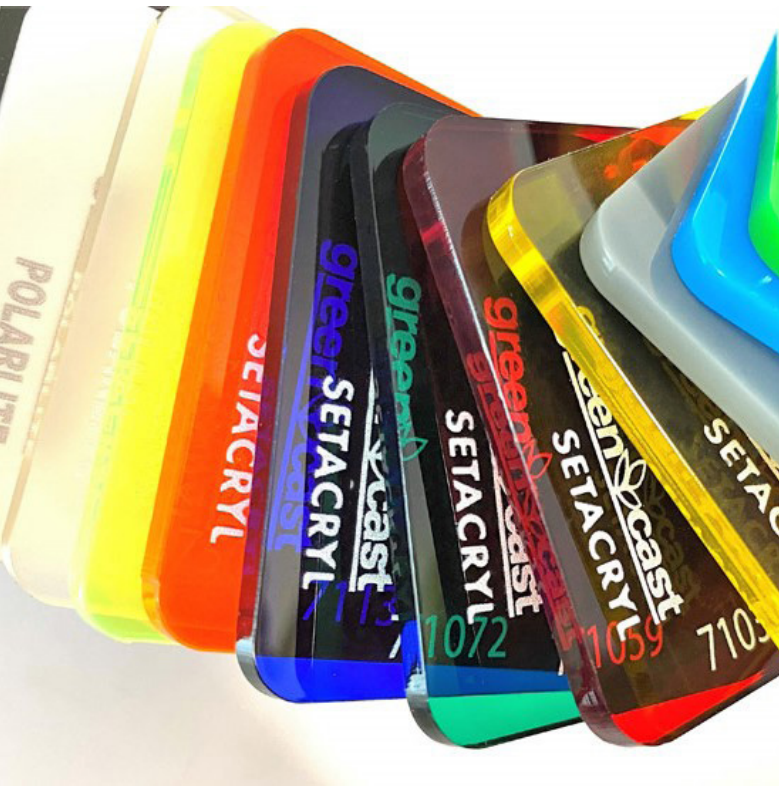
Recycled Glass
Magna Glaskeramik
76.3 kg CO2e



Type: recycled translucent glass
Thickness: 21 mm
Density: 50.4 kg/m2
Lifetime: - years
EPD no: EPD-MGK-23.0

Plastic Panels

Greencast 3mm Sheet
Madreperla
7.6 kg CO2e



Type: acrylic panel, recycled PMMA
Thickness: 3 mm
Density: 3.4 kg/m2
Lifetime: 20 years
Fire rating: DIN4102 “B2” and EU “E”
EPD no: S-P-03495

LBE Tongue & Groove 30mm
Rodeca
14.0 kg CO2e



Type: polycarbonate panel
Thickness: 30 mm
Density: 3.1 kg/m2
Lifetime: 30 years
Fire rating: B-s1, d0
EPD no: EPD-RLE-33.0

Plexiglas Solid 3mm Sheet
Röhm
15.3 kg CO2e



Type: acrylic panel
Thickness: 3 mm
Density: 3.57 kg/m2
Lifetime: 20 years
Fire rating: DIN4102 “B2” and EU “E”
EPD no: EPD-EVO-20180023-IAD1

LBE Tongue & Groove 60mm
Rodeca
23.0 kg CO2e



Type: polycarbonate panel
Thickness: 60 mm
Density: 6.6 kg/m2
Lifetime: 30 years
Fire rating: B-s1, d0
EPD no: EPD-RLE-33.0

Greencast 10mm Sheet
Madreperla
25.5 kg CO2e



Type: acrylic panel, recycled PMMA
Thickness: 10 mm
Density: 11.9 kg/m2
Lifetime: 20 years
Fire rating: DIN4102 “B2” and EU “E”
EPD no: S-P-03495

Plexiglas Solid 10mm Sheet
Röhm
50.9 kg CO2e

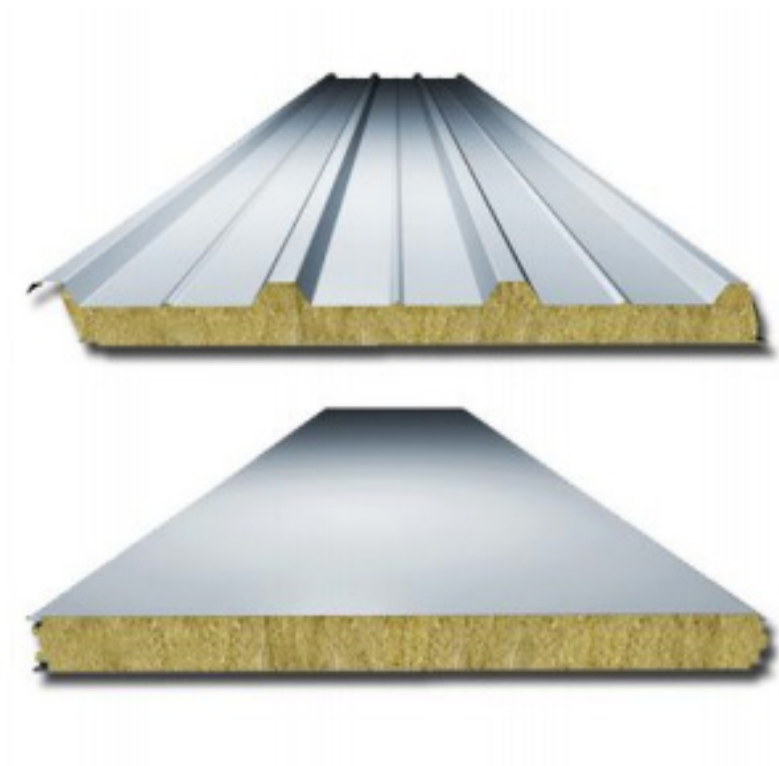


Type: acrylic panel
Thickness: 10 mm
Density: 11.9 kg/m2
Lifetime: 20 years
Fire rating: DIN4102 “B2” and EU “E”
EPD no: EPD-EVO-20180023-IAD1

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Metal Sandwich Panels (Systems)

Double Skin Steel Facade
European Branch Assoc.
35.9 kg CO2e



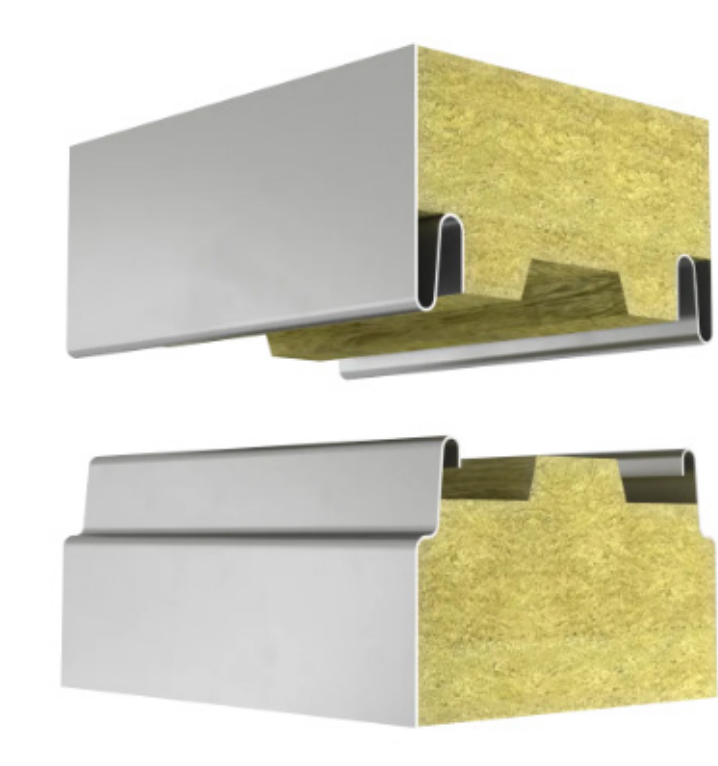
Type: mineral wool core panel
U-value 0.45 W/m2*K
Thickness: 100 mm
Density: 20.2 kg/m2
Lifetime: 40-45 years
Fire rating: A2-s1, d0
EPD no: EPD-PPA-20180075-CBG2

SPA E Panels
Ruukki
38.6 kg CO2e



Type: stone wool core panel
U-value: 0.41 W/m2*K
Thickness: 100 mm
Density: 17.6 kg/m2
Lifetime: min. 50 years
Fire rating: A2-s1, d0
EPD no: RTS_51_20

SPB Panels
Ruukki
38.7 kg CO2e



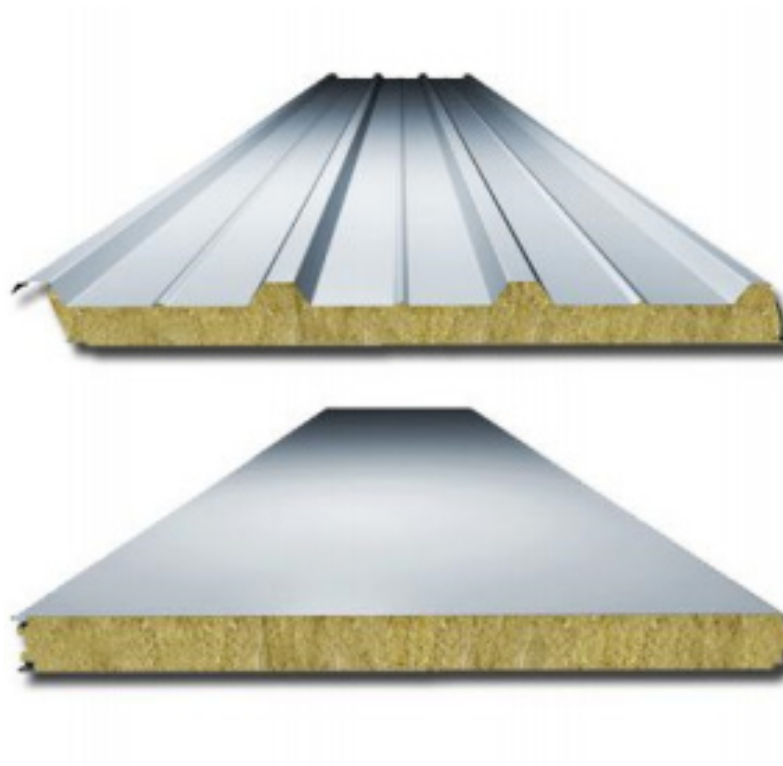
Type: panels with stone wool core
U-value: 0.41 W/m2*K
Thickness: 100 mm
Density: 17.6 kg/m2
Lifetime: min. 50 years
Fire rating: A2-s1, d0
EPD no: RTS_51_20

SPA LIFE Panels
Ruukki
40.7 kg CO2e



Type: panels with glass wool core
U-value: 0.16 W/m2*K
Thickness: 230 mm
Density: 22.4 kg/m2
Lifetime: min. 50 years
Fire rating: A2-s1, d0
EPD no: RTS_51_20

Double Skin Steel Facade
European Branch Assoc.
51.0 kg CO2e



Type: panels with mineral wool core
U-value 0.45 W/m2*K
Thickness: 200 mm
Density: not listed
Lifetime: 40-45 years
Fire rating: A2-s1, d0
EPD no: EPD-PPA-20180075-CBG2

SPA E Panels
Ruukki
66.6 kg CO2e



Type: panels with stone wool core
U-value: 0.17 W/m2*K
Thickness: 230 mm
Density: 34.4 kg/m²
Lifetime: min. 50 years
Fire rating: A2-s1, d0
EPD no: RTS_51_20

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Paint

Exterior Paint

GCS Exterior Premium
Graphenstone
0.22 kg CO2e



Type: non-organic lime binder
2 layers
Density: 1.40 kg/l
Spreading rate: 6.5 m²/l
EPD no: S-P-01050

Jotashield Ultra Clean
Jotun
0.50 kg CO2e



Type: organic acrylic binder
2 layers
Density: 1.3 kg/l
Spreading rate: 11 m²/l
EPD no: NEPD-3062-1728

Exterior Silicate Paint
Keim (Market Data)
0.74 kg CO2e



Type: non-organic lime binder
2 layers
Density: 1.35 kg/l
Spreading rate: 0.35 kg/m²
EPD no: EPD-VDL-KEI-20200168-IBG1

Contour Aqua-PU
Sigma Coatings
0.75 kg CO2e



Type: acrylic polyurethane binder, wood
lacquer
2 layers
Density: 1.40 kg/l
Spreading rate: 13 m²/l
EPD no: EPD-PPG-20210123-CBC1

06 Wood Tex Oil Paint W 60
Flügger
0.77 kg CO2e



Type: oil binder
2 layers
Density: 1.2 kg/l
Spreading rate: 8 m²/l
EPD no: NEPD-2591-1315

Drygolin Nordic Extreme
Jotun
1.49 kg CO2e



Type: outdoor wood protection, binder not
listed
2 - 3 layers
Density: 1.23 kg/l
Spreading rate: 7 m²/l
EPD no: NEPD-2405-1208

Impacts from production only, A1 - A3
Transport after production and end of life not included
Data from 3. party verified EPDs valid on
November, 2022

Picture Register

Bricks			
Page no.	Picture no.	EPD-no	Rights
2	1	MD-16007-EN	From EPD
	2	MD-22001-EN	Belongs to Henning Larsen
	3	MD-21027-EN	From EPD
	4	MD-21001-EN	Belongs to Henning Larsen
	5	MD-21028-EN	From EPD
	6	MD-21053-EN	Belongs to Henning Larsen
3	1	MD-21052-EN	Belongs to Henning Larsen
	2	MD-21055-EN	Belongs to Henning Larsen
	3	MD-21062-EN	From EPD
	4	MD-22004-EN	Belongs to Henning Larsen
	5	MD-21054-EN	Belongs to Henning Larsen
	6	MD-21003-EN	Belongs to Henning Larsen
4	1	MD-22001-EN	Belongs to Henning Larsen
	2	MD-21029-EN	Belongs to Henning Larsen
	3	MD-21058-EN	Belongs to Henning Larsen
	4	MD-21041-EN	Belongs to Henning Larsen
	5	MD-22004-EN	Belongs to Henning Larsen
	6	EPD-MD-21058-EN	Belongs to Henning Larsen
5	1	MD-20030-EN	Belongs to Henning Larsen
	2	EPD-ZWM-20160126-ICG1-EN	Belongs to Henning Larsen
	3	MD-17002-EN_rev1	Belongs to Henning Larsen
	4	MD-20044-EN	Belongs to Henning Larsen
	5	MD-19006-EN	Belongs to Henning Larsen
	6	MD-18015-EN	Belongs to Henning Larsen
Cladding tiles without sub-structure			
6	1	MD-21020-EN	From producer's webpage
	2	EPD-ZZW-20200283-CBB1-EN	From producer's webpage
	3	EPD-ZZW-20200283-CBB1-EN	From producer's webpage
	4	EPD-ZZW-20200283-CBB1-EN	From producer's webpage
	5	MD-21020-EN	From producer's webpage
	6	MD-19006-EN	From producer's webpage
Ceramic cladding tiles			
7	1	EPD-TON-20190011-IBA1-DE	From producer's webpage
	2	EPD-WIN-20140143-ICA2-EN	From EPD
	3	EPD-NBK-20160120-CBE1-DE	From EPD
	4	S-P-02909	from AdobeStock
	5	S-P-05854	From EPD
	6	S-P-02909	from AdobeStock

Natural stone cladding			
Page no.	Picture no.	EPD-no	Rights
8	1	DAP 001:2022	from AdobeStock
	2	EPD-FRS-20170103-IBD1-EN	from AdobeStock
	3	NEPD-1635-653-NO	Belongs to Henning Larsen
	4	NEPD-1636-653-NO	Belongs to Henning Larsen
	5	BREG EN_000389	from AdobeStock
	6	EPD-RTS_56_20	from AdobeStock
Slate cladding			
9	1	BREG EN EPD No.: 000232	From Splash
	2	NEPD-1584-609-EN	Belongs to Henning Larsen
	3	BREG EN EPD No.: 000246	From Splash
	4	NEPD-1584-609-EN	Belongs to Henning Larsen
	5	EPD-RTS_57_20	Belongs to Henning Larsen
	6	NEPD-2907-1588-NO	Belongs to Henning Larsen
10	1	NEPD-1673-671-NO	Belongs to Henning Larsen
	2	NEPD-2907-1588-NO	Belongs to Henning Larsen
	3	NEPD-1585-609-EN	Belongs to Henning Larsen
	4	NEPD-1673-671-NO	Belongs to Henning Larsen
	5	NEPD-1585-609-EN	Belongs to Henning Larsen
	6	NEPD-1209-378-NO	From EPD
Wood			
11	1	NEPD-1936-857	From producer's webpage
	2	NEPD-3279-1921-NO	Belongs to Henning Larsen
	3	NEPD-1935-857-NO	Belongs to Henning Larsen
	4	NEPD-1641-654	from AdobeStock
	5	NEPD-3304-1943-NO	Belongs to Henning Larsen
	6	NEPD-1641-654	from AdobeStock
12	1	MD-20032-EN	from AdobeStock
	2	NEPD-3299-1942-NO	from AdobeStock
	3	MD-20033-EN	Belongs to Henning Larsen
	4	NEPD-2554-1285-NO	Belongs to Henning Larsen
	5	NEPD-1867-805-NO	Belongs to Henning Larsen
	6	EPD-NIBE-20210625-20247	Belongs to Henning Larsen
GRC, Polymer concrete & Fiber Cement			
13	1	S-P-01432	From producer's webpage
	2	EPD-ETE-20190007-ICA1-EN	Belongs to Henning Larsen
	3	EPD-ETE-20190128-CCA1-EN	Belongs to Henning Larsen
	4	MD-20045-EN_rev2	Belongs to Henning Larsen
	5	MD-20045-EN_rev2	Belongs to Henning Larsen
	6	MD-20045-EN_rev2	Belongs to Henning Larsen

GRC, Polymer concrete & Fiber Cement			
Page no.	Picture no.	EPD-no	Rights
14	1	EPD-ELH-20180136-CAC1-EN	From producer's webpage
	2	MD-20045-EN_rev2	From producer's webpage
	3	MD-20045-EN_rev2	Belongs to Henning Larsen
	4	MD-20045-EN_rev2	Belongs to Henning Larsen
	5	EPD-ETE-20190179-CCC1-EN	Belongs to Henning Larsen
	6	NEPD-2580-1307-EN	Belongs to Henning Larsen
15	1	NEPD-2581-1309-EN	From EPD
	2	NEPD-2657-1361-EN	Belongs to Henning Larsen
	3	MD-21008-EN	Belongs to Henning Larsen
	4	EPD-RSE-20180069-IAD1-DE	Belongs to Henning Larsen
	5	EPD-SWP-20180028-IAD1-EN	From producer's webpage
	6	S-P-03995	From producer's webpage
16	1	EPD-SWP-20180030-IAD1-EN	From producer's webpage
	2	EPD-S-P-01096	From EPD
	3	EPD-SWP-20180031-IAD1-EN	From producer's webpage
	4	EPD-S-P-01096	From EPD
	5	NEPD-1477-495-NO	Belongs to Henning Larsen
	6	EPD-SWP-20180032-IAD1-EN	Belongs to Henning Larsen
Metal & Aluminium cladding			
17	1	RTS EPD RTS_190_22	From EPD
	2	RTS EPD RTS_190_22	From producer's webpage
	3	NEPD-2814-1511-EN	From EPD
	4	S-P-01922	From EPD
	5	MD-20034-EN	From EPD
	6	RTS EPD RTS_190_22	From EPD
18	1	MD-20035-EN	From producer's webpage
	2	EPD-GDA-2019132-IBG1-EN	Belongs to Henning Larsen
	3	EPD-KAL-20160283-IBC1-EN	Belongs to Henning Larsen
	4	MD-20034-EN	From producer's webpage
	5	RTS EPD RTS_190_22	Belongs to Rambøll
	6	MD-20035-EN	From producer's webpage

Glass panels			
19	1	M--EPD-FEV-GB-002015	From EPD
	2	S-P-00926	from AdobeStock
	3	EPD-TCS-20170106-CAD1-EN	from AdobeStock
	4	S-P-01114	from AdobeStock
	5	S-P-00927	from AdobeStock
	6	S-P-00927	from AdobeStock
Page no.	Picture no.	EPD-no	Rights
20	1	S-P-00926	from AdobeStock
	2	S-P-00930	from AdobeStock
	3	ASTM-EPD149	From EPD
	4	S-P-00927	from AdobeStock
	5	S-P-00930	from AdobeStock
	6	EPD-MGK-23.0	from AdobeStock
Plastic Panels			
21	1	S-P-03495	from AdobeStock
	2	EPD-RLE-33.0	Belongs to Henning Larsen
	3	EPD-EVO-20180023-IAD1-EN	from AdobeStock
	4	EPD-RLE-33.0	Belongs to Henning Larsen
	5	S-P-03495	from AdobeStock
	6	EPD-EVO-20180023-IAD1-EN	from AdobeStock
Metal Sandwich Panels			
22	1	EPD-PPA-20180075-CBG2-EN	From EPD
	2	RTS_51_20	From producer's webpage
	3	RTS_51_20	From producer's webpage
	4	RTS_51_20	From producer's webpage
	5	EPD-PPA-20180075-CBG2-EN	From EPD
	6	RTS_51_20	From producer's webpage
Outdoor paint			
24	1	S-P-01050	From EPD
	2	NEPD-3062-1728-EN	From EPD
	3	NEPD-2591-1315-EN	Belongs to Henning Larsen
	4	EPD-PPG-20210123-CBC1-EN	Belongs to Henning Larsen
	5	EPD-VDL-KEI-20200168-IBG1	From EPD
	6	NEPD-2405-1208-NO	From EPD