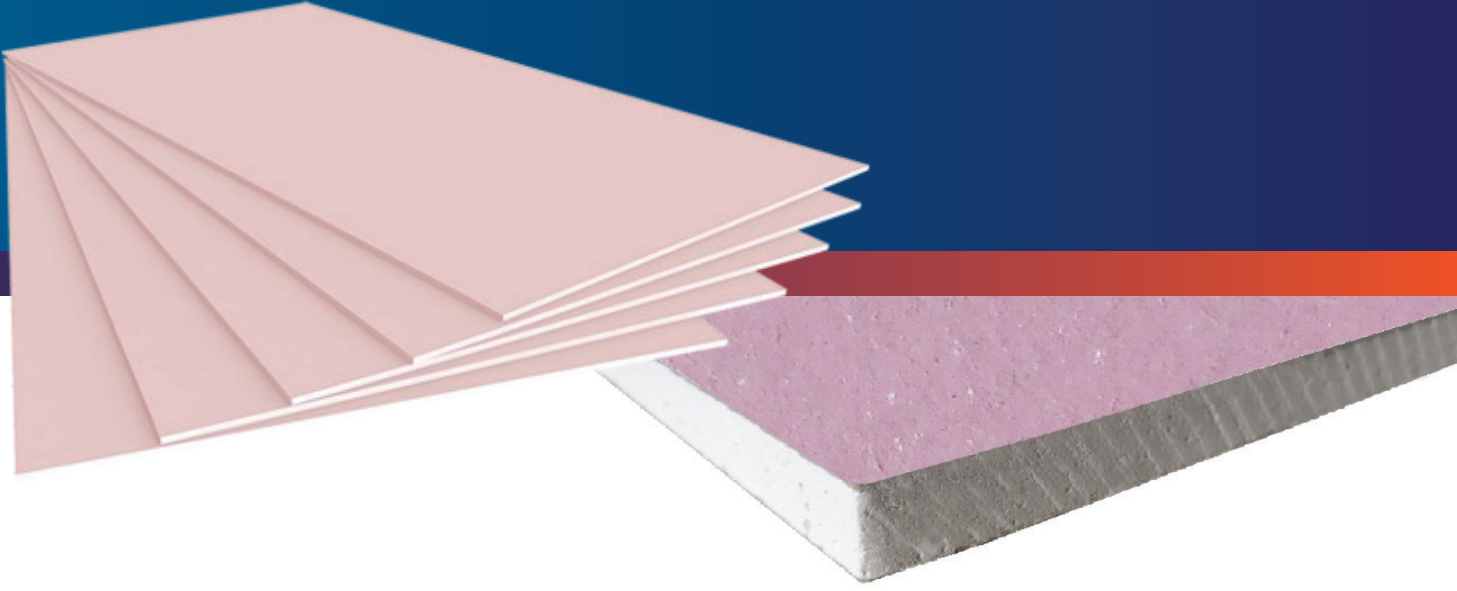




AYTAŞ
ALÇI

ENVIRONMENTAL PRODUCT DECLARATION



In accordance with ISO14025 and EN 15804:2012+A2:2019/AC:2021 for

 **Aypan Red Type F**

Manufactured by AYTAŞ Alçı Enerji Maden ve İnş. San.Tic. A.Ş.

Programme: The International EPD® System

Programme Operator: EPD International AB

Local Operator: EPD Türkiye

S-P Code: S-P-08757

Publication Date: 2023-10-15

Validity Date: 2028-10-14

Geographical Scope: Türkiye

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.



GENERAL INFORMATION

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ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR) Product Category Rules (PCR): 2019:14 Version 1.2.5, Construction Products and Construction Services, EN 15804:2012+A2:2019/AC:2021 for Sustainability of Construction Works

PCR review was conducted by: The Technical Committee of the International EPD® System.
Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
EPD verification by individual verifier

Third party verifier: Prof. Ing. Vladimír Kočí, Ph.D., MBA LCA Studio Šárecká 5,16000
Prague 6 - Czech Republic

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No ☒

Life Cycle Assessment (LCA)

LCA accountability: Metsims Sustainability Consulting

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/-functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

ABOUT THE AYTAŞ ALÇI



AYTAŞ Alçı A.Ş. was established in 2007 in Ankara, Bala, wherein the highest quality gypsum stratum is located. Two production plants, namely AYGIPS and AYPAN are located on an overall of open area of 100.000 square meters and closed area of 22.000 square meters. AYGIPS powder gypsum production plant was activated on February, 2008. AYGIPS plant has a capacity of 2200 tones powder gypsum per day. AYPAN production plant was activated on May 2009 and its annual capacity is 25.000.000 square meter plasterboard. AYTAŞ Alçı is acting with the vision to make AYGIPS, AYPAN, AYSIST and OUTWEAR brands most wanted in international market, and to be able to answer constantly changing consumer needs, and to create a respectful brand, which continuously improves in order to comply with rapidly and continuously changing environmental conditions as well as contributes to the widening of usage area of gypsum-based construction materials.

AYTAŞ Alçı is increasing its being well-known not only within Turkey but also in surrounding countries. An overall of 25 countries, such as United Kingdom, Spain, Nigeria, Ukraine, Azerbaijan, Belgium, Bulgaria, Armenia, Georgia, Cyprus, Macedonia, Malta, Sudan, Syria, Rusia, Turkmenistan, Jordan, Afghanistan, and Greece, are among the countries, where AYGIPS, AYPAN, OUTWEAR and AYSIST branded products are exported to.

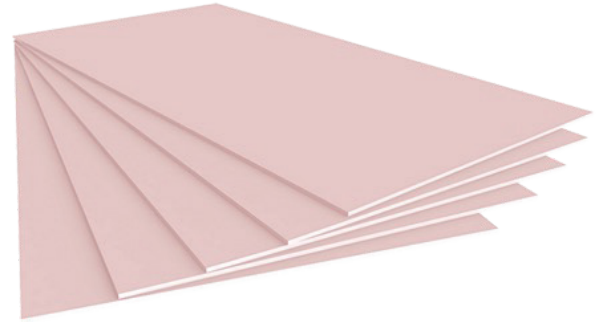
ABOUT THE PRODUCT

Aypan Red is used for construction of internal space suspended ceilings, curtain walls, shaft walls and section walls, where fire resistance is requested.

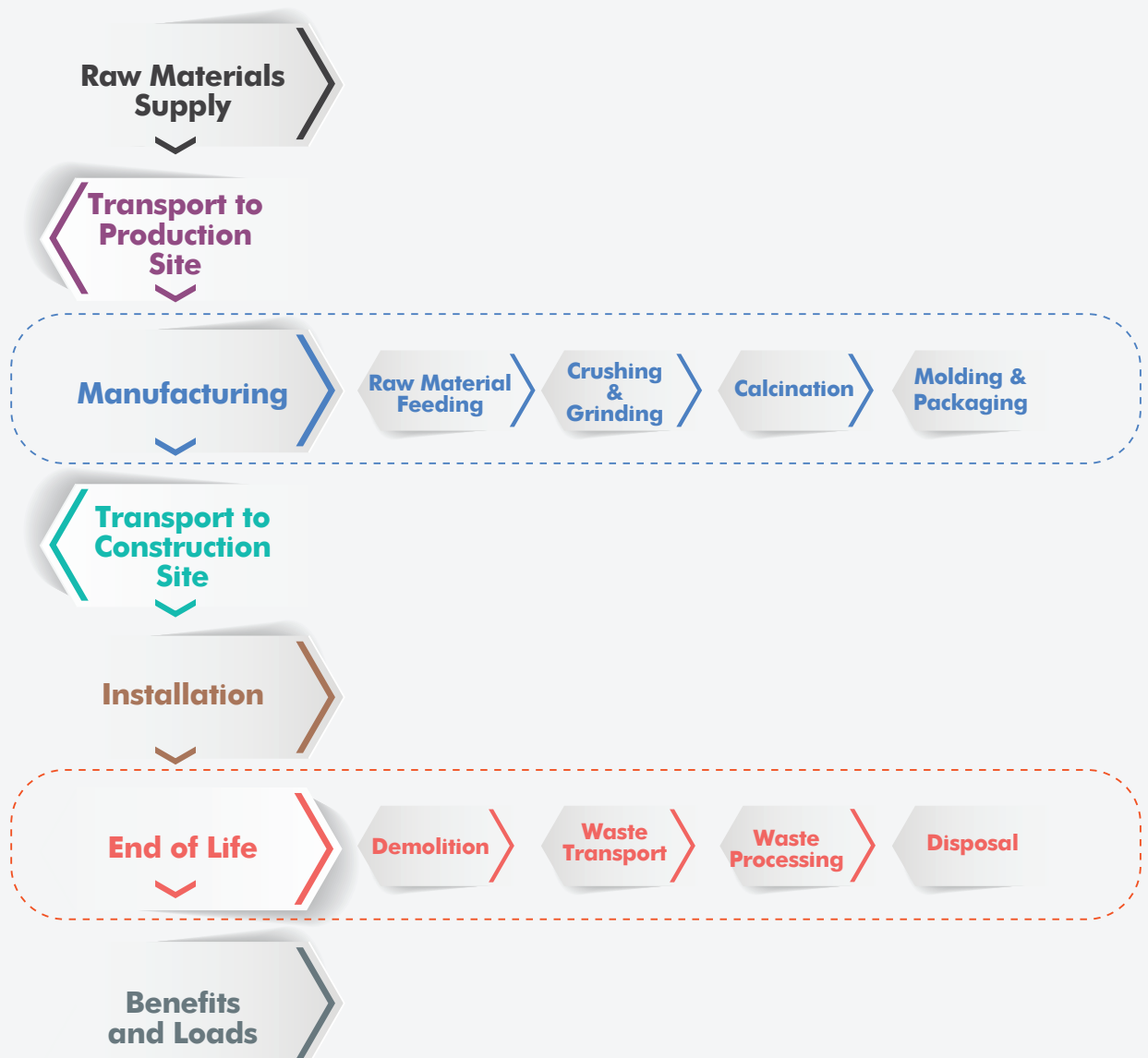
- Aypan red is composed of highly pure gypsum at the core and special surface cardboard, covered to both sides. Section, referred as core, is reinforced by additives and fibers, produced specifically for this work in order to increase fire resistance performance of the gypsum plate.
- Highly pure natural gypsum at core section maintains hardness, resistance, lightness and processability to the plate.
- Plate's flexibility and resistance is maintained via special surface cardboard, available on both sides.
- It can be covered with tiles with using primers and flex adhesives, appropriate for wet volumes.
- It can be cut easily via utility knife.
- All applications, constructed with Aypan Red, are light, flexible and solid, and as it is attached to the building bearings via flexible adhesion details, it maintains secure structures against earthquake.
- Fire resistance of the structure increases at the locations, where Aypan Red are used. By means of selecting appropriate systems, walls, maintaining fire resistance for 180 min., might be constructed.
- Walls, constructed with using Aypan Red, have thinner cross-sections compared to traditionally constructed walls, and saves location.
- It is easy to use, and maintains rapid construction. It maintains cost effective construction applications.

| Technical Specification | |
|---|--------------|
| Reference Standart | TS EN 520+A1 |
| Specifications | |
| Length (mm) | 1800 - 3600 |
| Width (mm) | 900 - 1200 |
| Thickness (mm) | 12.5 |
| Average Weight (kg/m ²) | ≤ 10 |
| Flexural Strength - Perpendicular to Liner Paper Fibers (N) | ≥550 |
| Flexural Strength - Parallel to Liner Paper Fibers (N) | ≥ 210 |
| Edge Type | KK, IK |
| Thermal Conductivity – λ (W/mK) | 0.25 |
| Core Cohesion | ≥ 15 min |
| Fire Class | A2- s1, d0 |

The product UN CPC code is 37530 according to Central Product Classification (CPC) Version 2.1.



SYSTEM BOUNDARIES & DESCRIPTION



A1 - RAW MATERIAL SUPPLY

Production starts with raw materials mainly locally sourced, but some transported from other parts of the world. 'Raw material supply' includes raw material extraction and pre-treatment processes before production.

A2 - TRANSPORT

Transport information of the raw materials are provided by the manufacturer. The distances and routes are calculated accordingly.

| Transport Mode | Type |
|----------------|---|
| Road | Vehicle: Lorry Size Class: >32 metric ton Emission Standard: EURO5 Fuel Type: Diesel |
| Sea | Vehicle: Container Ship DWT (Load Capacity): 43000 tonnes Fuel Type: Heavy Fuel Oil |

A3 - MANUFACTURING

Gypsum extracted from the gypsum quarry is first crushed in crusher to have smaller particle sizes. Then it is calcined in the kilns and transferred to the gypsum hemi-hydrate silos at plasterboard production area. Gypsum hemi-hydrate, additives and water are fed into mixer to have a homogenous mixture then slurry from mixer is poured between two layer of plasterboard paper. Before feeding to drier plasterboard is cut. After drier plasterboard is trimmed to exact dimensions, stacked and packed.

The production processes are given below respectively.

- Crushing
- Calcination
- Mixing
- Cutting
- Drying
- Trimming
- Stacking
- Packaging

A4 - TRANSPORT

Transport of final product to customers are considered and the routes and distances are calculated accordingly. Transport routes were provided by the manufacturer for 2022.

| Transport Mode | Type |
|----------------|---|
| Road | Vehicle: Lorry Size Class: >32 metric ton Emission Standard: EURO5 Fuel Type: Diesel |
| Sea | Vehicle: Container Ship DWT (Load Capacity): 43000 tonnes Fuel Type: Heavy Fuel Oil |

A5 - INSTALLATION

For the implementation of the AYPAN Red Type F Plasterboard; plaster, screws and metal profiles are used for the implementation of the product. Amount of this materials is given in the table.

| Parameter | Value |
|--------------|-----------|
| Plaster | 1.5 kg |
| Screws | 18 pieces |
| Metal Profil | 3 meters |

C1 - DECONSTRUCTION / DEMOLITION

There is no energy use during uninstalation, manpower and some tools are sufficient.

C2 - WASTE TRANSPORT

This step includes the transport of materials after they reach their end-of-life. The average distance was assumed 50 km by truck from demolition site to a waste or recycling area.

| Vehicle Type | Value |
|--------------|--|
| Vehicle Type | Vehicle: Lorry Size Class: 7.5-16 metric ton Emission Standard: EURO5 Fuel Type: Diesel |
| Distance | 50 km (assumption) |

C3 - WASTE PROCESSING

The product is considered to be landfilled without reuse, recovery or recycling. It is classified as ‘nonhazardous waste’ in the European list of waste products. The effects of any treatment process to the demolished waste is included in this stage. It is assumed that no treatment is needed as 100 % of the material goes to a landfill.

C4 – DISPOSAL STAGE

All gypsum-based plasterboards end up at construction and demolition waste landfills as their final fate and modelled as such in the LCA.

D - BENEFITS

No potential benefits of recycling and re-use were taken into account in the current LCA report. Only the benefit due to the recycling of the packaging has been calculated.



LCA Information

Declared Unit: **1 m² of AYPAN Red Type F Plasterboard**

Time Representativeness: 2022

Database(s) and LCA Software: Ecoinvent 3.9.1 and SimaPro 9.5

System Boundaries: Cradle to grave. The results of the LCA with the indicators as per EPD requirement are given in the following tables for product manufacture (A1, A2, A3), construction process stage (A4, A5), end of life stage (C1, C2, C3, C4) and benefits and load stage (D).

| | Product Stage | | | Construction Process Stage | | Use Stage | | | | | | | End of Life Stage | | | | Benefits and Loads |
|----------------------|---------------------|-----------|---------------|----------------------------|---------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|--|
| | Raw Material Supply | Transport | Manufacturing | Transport | Construction Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational Energy Use | Operational Water Use | De-construction demolition | Transport | Waste processing | Disposal | Reuse - Recovery - Recycling potential |
| Module | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Modules Declared | X | X | X | X | X | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |
| Geography | GLO | GLO | TR | GLO | GLO | - | - | - | - | - | - | - | GLO | GLO | GLO | GLO | GLO |
| Specific Data Used | >90% | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – Products | 0% | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – Sites | 0% | | | | | - | - | - | - | - | - | - | - | - | - | - | - |

(X = Module included, ND = Not declared)

The inventory for the LCA study is based on the 2022 production figures. This EPD's system boundary is cradle to grave.

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2022 production figures. In addition, hazardous and non-hazardous waste amounts were also allocated from the 2022 total waste generation.

Cut-Off Criteria

1% cut-off is applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR. There are no co-product allocations within the LCA study underlying this EPD. The regional energy datasets were used for all energy calculations. Data quality assessment is given below table.

| LCA Stages | Data Type |
|------------------------|---|
| Raw Material Supply | Generic database, plant spesific data |
| Raw Material Transport | Generic database, plant spesific data |
| Manufacturing | Generic database, plant spesific data |
| Product Transport | Generic database, generic data |
| Demolition | Generic database, scenario and generic data |
| Waste Transport | Generic database, scenario and generic data |
| Waste Processing | - |
| Disposal | Generic database, scenario and generic data |
| Benefits and Loads | Generic database, scenario and generic data |

Content Declarations

Product Composition

Materials Used in the Production of 1 m² AYPAN Red Type F

| Product Composition (% in mass) | |
|---------------------------------|---------|
| Calcium Sulfate | 50-55 % |
| Water | 40-45 % |
| Paper | 0-5 % |
| Additives | <1% |

Packaging

40 grams of strip is used for 1 m² product packaging.

LCA Results

Information on biogenic carbon content according to EN 15804+A2

| Biogenic Carbon Content | Unit | Quantity |
|--------------------------------------|------|----------|
| Biogenic carbon content in product | kg C | 0.152 |
| Biogenic carbon content in packaging | kg C | 0.001 |

Environmental Impact Category Indicators According to EN 15804 for Aypan Red Type F 12.5 mm Plasterboard

| IMPACT CATEGORY | UNIT | A1 – A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|-------------------------|--|----------|----------|----------|----------|----------|----|----------|-----------|
| GWP – Fossil | kg CO ₂ eq | 2.33 | 0.599 | 4.66 | 0.498 | 0.102 | 0 | 0.081 | -0.051 |
| GWP – Biogenic | kg CO ₂ eq | -0.267 | 6.10E-04 | 0.030 | 0.007 | 2.63E-04 | 0 | 1.73E-04 | 9.94E-04 |
| GWP – Luluc | kg CO ₂ eq | 0.008 | 2.92E-04 | 0.003 | 0.006 | 4.60E-05 | 0 | 4.74E-05 | -3.15E-05 |
| GWP – Total | kg CO ₂ eq | 2.07 | 0.600 | 4.69 | 0.511 | 0.103 | 0 | 0.081 | -0.050 |
| ODP | kg CFC-11 eq | 6.83E-08 | 9.14E-09 | 8.00E-08 | 3.26E-09 | 2.17E-09 | 0 | 2.24E-09 | -2.84E-10 |
| AP | mol H+ eq | 0.008 | 0.002 | 0.020 | 0.004 | 3.10E-04 | 0 | 5.82E-04 | -1.84E-04 |
| EP – Freshwater | kg P eq | 0.001 | 4.72E-05 | 0.002 | 5.64E-04 | 6.87E-06 | 0 | 6.43E-06 | -8.91E-06 |
| EP – Marine | kg N eq | 0.003 | 0.001 | 0.005 | 5.89E-04 | 1.06E-04 | 0 | 2.23E-04 | -3.44E-05 |
| EP – Terrestrial | mol N eq | 0.023 | 0.008 | 0.046 | 0.005 | 0.001 | 0 | 0.002 | -3.53E-04 |
| POCP | kg NMVOC | 0.007 | 0.003 | 0.021 | 0.002 | 4.65E-04 | 0 | 8.33E-04 | -1.56E-04 |
| ADPE | kg Sb eq | 7.68E-06 | 1.56E-06 | 2.81E-05 | 5.27E-07 | 3.18E-07 | 0 | 1.07E-07 | -1.83E-07 |
| ADPF | MJ | 33.7 | 8.5 | 49.2 | 5.14 | 1.40 | 0 | 1.92 | -1.58 |
| WDP | m ³ depriv. | 0.968 | 0.044 | 0.506 | 0.275 | 0.005 | 0 | 0.085 | -0.044 |
| PM | disease inc. | 5.67E-08 | 4.50E-08 | 3.49E-07 | 1.55E-08 | 5.54E-09 | 0 | 1.24E-08 | -1.81E-09 |
| IR | kBq U-235 eq | 0.085 | 0.008 | 0.156 | 0.004 | 0.002 | 0 | 0.001 | -0.004 |
| ETP – FW | CTUe | 9.83 | 4.98 | 48.2 | 0.642 | 0.752 | 0 | 0.944 | -0.060 |
| HTTP – C | CTUh | 6.97E-10 | 2.53E-10 | 3.25E-08 | 1.05E-10 | 4.17E-11 | 0 | 3.29E-11 | -1.45E-11 |
| HTTP – NC | CTUh | 1.95E-08 | 8.15E-09 | 1.84E-07 | 4.58E-09 | 1.23E-09 | 0 | 9.32E-10 | -3.46E-10 |
| SQP | Pt | 72.6 | 8.50 | 14.8 | 0.505 | 0.718 | 0 | 3.82 | -0.195 |
| Acronyms | GWP-total: Climate change, GWP-fossil: Climate change - fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality. | | | | | | | | |
| Legend | A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, A5: Installation, C1: Deconstruction / Demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary | | | | | | | | |
| Disclaimer 1 | This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator. | | | | | | | | |
| Disclaimer 2 | The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. | | | | | | | | |

Additional Mandatory and Voluntary Impact Category Indicators for Aypan Red Type F 12.5 mm Plasterboard

| Climate impact | | | | | | | | | |
|-------------------|-----------------------|---------|-------|------|-------|-------|----|-------|--------|
| INDICATOR | UNIT | A1 – A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| *GHG – GWP | kg CO ₂ eq | 2,30 | 0,586 | 4,50 | 0,499 | 0.100 | 0 | 0.078 | -0.049 |

GHG-GWP = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology

* The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013

A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, A5: Construction, C1: Deconstruction / demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary

Resource Use Indicators for Aypan Red Type F 12.5 mm Plasterboard

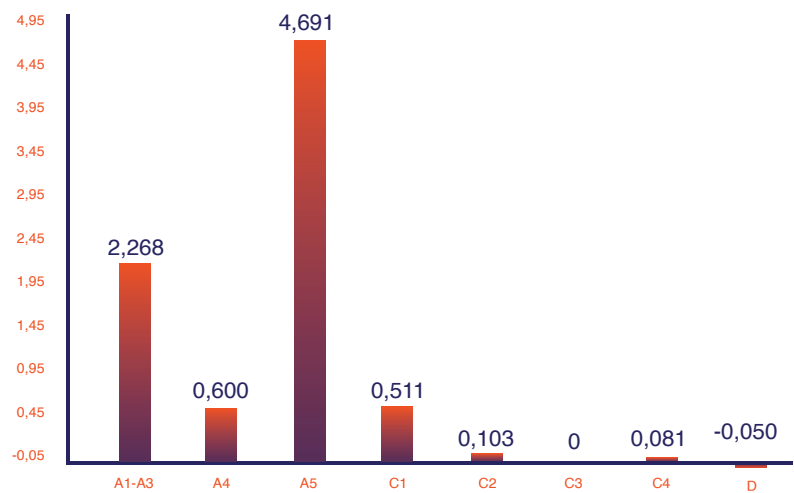
| Resource use | | | | | | | | | |
|-----------------|---|---------|-------|-------|-------|----------|----|-------|-----------|
| IMPACT CATEGORY | UNIT | A1 – A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| PERE | MJ | 14.8 | 0.107 | 4.20 | 1.70 | 0.024 | 0 | 0.016 | -0.061 |
| PERM | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PERT | MJ | 14.8 | 0.107 | 4.20 | 1.70 | 0.024 | 0 | 0.016 | -0.061 |
| PENRE | MJ | 33.7 | 8.49 | 49.2 | 1.70 | 1.40 | 0 | 1.92 | -1.58 |
| PENRM | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PENRT | MJ | 33.7 | 8.49 | 49.2 | 1.70 | 1.40 | 0 | 1.92 | -1.58 |
| SM | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | m³ | 0.056 | 0.002 | 0.053 | 0.002 | 2.19E-04 | 0 | 0.002 | -1.37E-04 |
| Acronyms | PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water. | | | | | | | | |

Output Flow Indicators for Aypan Red Type F 12.5 mm Plasterboard

| Waste & Output Flows | | | | | | | | | |
|----------------------|--|----------|----|----|----|----|----|----|---|
| IMPACT CATEGORY | UNIT | A1 – A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| HWD | kg | 2.27E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NHWD | kg | 2.88E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RWD | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CRU | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MFR | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MER | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EE (Electrical) | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EE (Thermal) | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Acronyms | HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal. | | | | | | | | |

Interpretation

It is seen that the greatest impact on the global warming potential comes from the A5-installation phase. The main reason for this is the production of steel profiles used in its installation rather than the plasterboard product. The biggest impact from the plasterboard itself is due to the raw material stage.



GWP Distribution of LCA Stages

References

GPI/ General Programme Instructions of the International EPD® System. Version 4.0. EN ISO 9001/ Quality Management Systems - Requirements EN ISO 14001/ Environmental Management Systems - Requirements

EN ISO 50001/ Energy Management Systems - Requirements ISO 14020:2000/ Environmental Labels and Declarations - General principles

EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations - Principles and procedures

ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006) PCR 2019:14 Construction products (EN 15804:A2) (1.2.5) prepared by IVL Swedish Environmental Research Institute, EPD International Secretariat, date 2022-11-01.

The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

SimaPro / SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

Metsims / www.metsims.com

AYTAŞ Alçı / <https://www.aygips.com.tr/en>

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