

# Annex

## Acoustic fleece for Heradesign Alpha+ series

### For Heradesign acoustic panels (Euroclass B)

to the

#### **ENVIRONMENTAL PRODUCT DECLARATION**

as per *ISO 14025* and *EN 15804+A2*

|                                 |                                       |
|---------------------------------|---------------------------------------|
| <b>Owner of the Declaration</b> | Knauf Ceiling Solutions GmbH & Co. KG |
| <b>Declaration number</b>       | EPD-KNA-20230255-IBI1-EN              |
| <b>Issue date</b>               | See EPD                               |
| <b>Valid to</b>                 | See EPD                               |

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## General Information

This appendix contains the LCA results for a declared unit of 1 m<sup>2</sup> acoustic fleece for Heradesign Alpha+ Series with a surface weight of 70 g/m<sup>2</sup>.

## General Information on use stages

By adding the environmental impacts of the Heradesign acoustic panels Euroclass B and the declared acoustic fleece, a simplified calculation of the environmental impacts of the Heradesign Alpha+ series with acoustic fleece is possible. Since both declarations are based on surface, an addition of the results per m<sup>2</sup> is possible.

## 2. LCA: Scenarios and additional technical information

The acoustic fleece is a layer applied without additional adhesive. For the calculation the following life cycle phases of the acoustic fleece are part of the analysis:

- Module A1-A3: Production of the acoustic fleece incl. 1000 km transport to production site (conservative assumption based on supplier)
- Module C2: Transport to the landfill (50 km default-scenario)
- Module C4: Landfilling of the acoustic fleece

Module C1, C3 and D of the acoustic fleece do not contain any relevant environmental impacts and are to be declared as "0".

The information needed for the calculation of the environmental impacts of the acoustic fleece was collected during data collection for the EPD creation.

It should be noted that the data and methodological assumptions used for the preparation of the LCAs of the products listed comply with the requirements of *EN 15804+A2* as well as *IBU, PCR Part A* and are thus suitable for use in an EPD.

Applying the acoustic fleece leads to an improvement in sound absorption. For example, the  $\alpha_w$ -value can be increased from 0.65 (LH) (HERADESIGN FINE) to 0.8 (HERADESIGN FINE Alpha+). The remaining properties, such as thermal conductivity, are only marginally affected.

### 3. LCA: Results

#### DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

| PRODUCT STAGE       |           |               | CONSTRUCTION PROCESS STAGE          |          | USE STAGE |             |        |             |               |                        |                       | END OF LIFE STAGE          |           |                  |          | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES |
|---------------------|-----------|---------------|-------------------------------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|---|
| Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential              |
| A1                  | A2        | A3            | A4                                  | A5       | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                         | C2        | C3               | C4       | D   |
| X                   | X         | X             | ND                                  | ND       | ND        | ND          | MNR    | MNR         | MNR           | ND                     | ND                    | X                          | X         | X                | X        | X   |

#### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT acc. to EN 15804+A2: 1 m<sup>2</sup> acoustic fleece (70 g/m<sup>2</sup>)

| Core Indicator | Unit                               | A1-A3    | C1       | C2       | C3       | C4       | D        |
|----------------|------------------------------------|----------|----------|----------|----------|----------|----------|
| GWP-total      | [kg CO <sub>2</sub> -Eq.]          | 1.42E-01 | 0.00E+00 | 2.12E-04 | 0.00E+00 | 1.05E-03 | 0.00E+00 |
| GWP-fossil     | [kg CO <sub>2</sub> -Eq.]          | 1.41E-01 | 0.00E+00 | 2.11E-04 | 0.00E+00 | 1.04E-03 | 0.00E+00 |
| GWP-biogenic   | [kg CO <sub>2</sub> -Eq.]          | 9.04E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-luluc      | [kg CO <sub>2</sub> -Eq.]          | 5.07E-05 | 0.00E+00 | 1.42E-06 | 0.00E+00 | 1.93E-06 | 0.00E+00 |
| ODP            | [kg CFC11-Eq.]                     | 1.16E-12 | 0.00E+00 | 2.06E-17 | 0.00E+00 | 2.45E-15 | 0.00E+00 |
| AP             | [mol H <sup>+</sup> -Eq.]          | 8.50E-04 | 0.00E+00 | 7.02E-07 | 0.00E+00 | 7.41E-06 | 0.00E+00 |
| EP-freshwater  | [kg P-Eq.]                         | 3.42E-07 | 0.00E+00 | 7.51E-10 | 0.00E+00 | 1.77E-09 | 0.00E+00 |
| EP-marine      | [kg N-Eq.]                         | 1.44E-04 | 0.00E+00 | 3.21E-07 | 0.00E+00 | 1.89E-06 | 0.00E+00 |
| EP-terrestrial | [mol N-Eq.]                        | 1.32E-03 | 0.00E+00 | 3.60E-06 | 0.00E+00 | 2.08E-05 | 0.00E+00 |
| POCP           | [kg NMVOC-Eq.]                     | 3.59E-04 | 0.00E+00 | 6.30E-07 | 0.00E+00 | 5.75E-06 | 0.00E+00 |
| ADPE           | [kg Sb-Eq.]                        | 4.30E-08 | 0.00E+00 | 2.12E-11 | 0.00E+00 | 1.07E-10 | 0.00E+00 |
| ADPF           | [MJ]                               | 2.28E+00 | 0.00E+00 | 2.76E-03 | 0.00E+00 | 1.37E-02 | 0.00E+00 |
| WDP            | [m <sup>3</sup> world-Eq deprived] | 1.37E-02 | 0.00E+00 | 2.35E-06 | 0.00E+00 | 1.15E-04 | 0.00E+00 |

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

#### RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE acc. to EN 15804+A2: 1 m<sup>2</sup> acoustic fleece (70 g/m<sup>2</sup>)

| Indicator | Unit              | A1-A3    | C1       | C2       | C3       | C4       | D        |
|-----------|-------------------|----------|----------|----------|----------|----------|----------|
| PERE      | [MJ]              | 5.51E-01 | 0.00E+00 | 1.91E-04 | 0.00E+00 | 2.05E-03 | 0.00E+00 |
| PERM      | [MJ]              | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT      | [MJ]              | 5.51E-01 | 0.00E+00 | 1.91E-04 | 0.00E+00 | 2.05E-03 | 0.00E+00 |
| PENRE     | [MJ]              | 2.28E+00 | 0.00E+00 | 2.77E-03 | 0.00E+00 | 1.37E-02 | 0.00E+00 |
| PENRM     | [MJ]              | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT     | [MJ]              | 2.28E+00 | 0.00E+00 | 2.77E-03 | 0.00E+00 | 1.37E-02 | 0.00E+00 |
| SM        | [kg]              | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF       | [MJ]              | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF      | [MJ]              | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW        | [m <sup>3</sup> ] | 4.85E-04 | 0.00E+00 | 2.21E-07 | 0.00E+00 | 3.48E-06 | 0.00E+00 |

Caption: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

#### RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS acc. to EN 15804+A2: 1 m<sup>2</sup> acoustic fleece (70 g/m<sup>2</sup>)

| Indicator | Unit | A1-A3    | C1       | C2       | C3       | C4       | D        |
|-----------|------|----------|----------|----------|----------|----------|----------|
| HWD       | [kg] | 3.79E-10 | 0.00E+00 | 1.47E-14 | 0.00E+00 | 7.03E-13 | 0.00E+00 |
| NHWD      | [kg] | 1.68E-02 | 0.00E+00 | 4.51E-07 | 0.00E+00 | 7.01E-02 | 0.00E+00 |
| RWD       | [kg] | 6.10E-05 | 0.00E+00 | 5.14E-09 | 0.00E+00 | 1.52E-07 | 0.00E+00 |
| CRU       | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR       | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER       | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE       | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EET       | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

**RESULTS OF THE LCA – additional impact categories acc. to EN 15804+A2-optional: 1 m<sup>2</sup> acoustic fleece (70 g/m<sup>2</sup>)**

| Indicator | Unit  | A1-A3 | C1 | C2 | C3 | C4 | D  |
|-----------|---|-------|----|----|----|----|----|
| PM        | [Disease Incidence]   | ND    | ND | ND | ND | ND | ND |
| IRP       | [kBq U235-Eq.]  | ND    | ND | ND | ND | ND | ND |
| ETP-fw    | [CTUe]  | ND    | ND | ND | ND | ND | ND |
| HTP-c     | [CTUh]  | ND    | ND | ND | ND | ND | ND |
| HTP-nc    | [CTUh]  | ND    | ND | ND | ND | ND | ND |
| SQP       | [-]   | ND    | ND | ND | ND | ND | ND |
| Caption   | PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index |       |    |    |    |    |    |

The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer 1 – for the indicator IRP:

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 – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.