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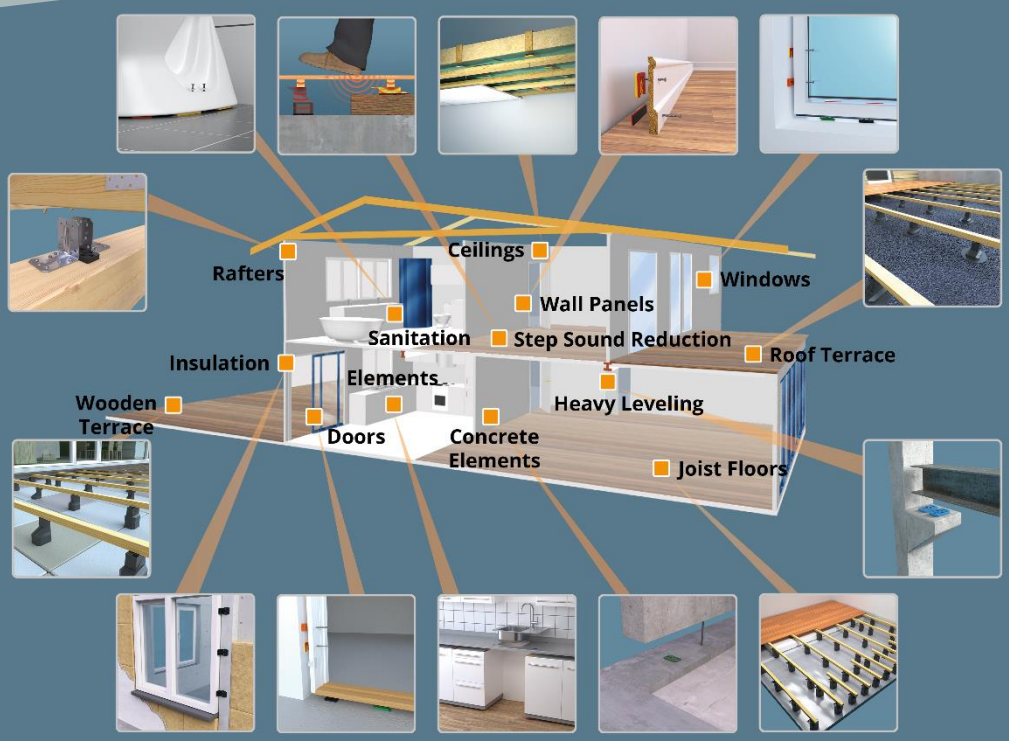
ECO PLATFORM EPD VERIFIED

Owner: Knudsen Kilen A/S
No.: MD-24004-EN_rev1
Issued: 07-02-2024
Revision: 05-02-2025
Valid to: 11-08-2028

3rd PARTY **VERIFIED**

# EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025 & EN 15804**



**Owner of declaration**
Knudsen Kilen A/S
Industrivej 21
DK 3300 Frederiksværk
CVR: 87 43 28 15

**Programme**
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

**Declared product(s)**
Knudsen Kilen Height Adjustment Products

Number of declared datasets/product variations: 1 product group

This EPD covers the product group of Knudsen Kilen Height Adjustment products: Height Adjustment Products, LDPE

**Production site**
Industrivej 21, DK 3300 Frederiksværk

**Product(s) use**
The products are applied in buildings as height adjustment and levelling solutions in rafters, ceilings, windows, wall panels, sanitations, step sound reductions, roof terraces, insulation, elements, doors, wooden terraces, concrete elements and joist flows.

**Declared/ functional unit**
1 kg of Knudsen Kilen Height Adjustment Products

**Year of production site data (A3)**
2022

**EPD version**
Version 2.0: update of product types and name

**Issued:** 07-01-2024
**Valid to:** 11-08-2028

**Basis of calculation**
This EPD is developed in accordance with the European standard EN 15804+A2.

**Comparability**
EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

**Validity**
This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

**Use**
The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

**EPD type**
☒Cradle-to-gate with modules C1-C4 and D
☐Cradle-to-gate with options, modules C1-C4 and D
☐Cradle-to-grave and module D
☐Cradle-to-gate
☐Cradle-to-gate with options

CEN standard EN 15804 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025

☐ internal ☒ external

Third party verifier:

*Guangli Du Aalborg University, BUILD*

*Martha Katrine Sørensen*
*EPD Danmark*

| Life cycle stages and modules (MND = module not declared) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | | | Construction process | | Use | | | | | | | End of life | | | | Beyond the system boundary |
| Raw material supply | Transport | Manufacturing | Transport | Installation process | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Re-use, recovery and recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | MND | MND | MND | MND | MND | MND | MND | MND | MND | X | X | X | X | X |

# Product information

### Product description

This EPD covers the product group, Height Adjustment Products, LDPE of Knudsen Kilen Height Adjustment Products. Besides the product group Height Adjustment Products, LDPE, there are four other product groups of Knudsen Kilen Height Adjustment Products, which are covered in separate EPD documents. The declared unit is 1 kg. In Table 1 on page 8 an overview of the weight per Height Adjustment Product, LDPE, is listed. The height Adjustment Products coved by this EPD is marked in bold text for Height Adjustment Products, LDPE.

The main material components for the declared product group, Height Adjustment Products, LDPE are listed in the table below.

| Material | Weight-% of declared product group |
|---|---|
| LDPE granulate | 98.5 |
| Master batch, LDPE | 1.5 |

### Product packaging:

The composition of the sales- and transport packaging of the Knudsen Kilen Height Adjustment Products, Product group Height Adjustment Products, LDPE is listed below.

| Material | Weight-% of packaging |
|---|---|
| Cardboard | 21.6 |
| EU pallet, wood | 50.6 |
| Plastic wrap, LDPE | 0.4 |
| Plastic box, PP | 27.4 |

### Representativity

This declaration, including data collection and the modelled foreground system including results, represents the production of 1 kg Knudsen Kilen Height Adjustment Product from the production site located in Frederiksværk, Denmark. Product specific data are based on average values collected in the period January 2022 to December 2022. Background data is based on Managed LCA Content (MLC) database from Sphera (version 2023.1) and Ecoinvent database version 3.8 and the data is less than 10 years old. Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

### Hazardous substances

Knudsen Kilen does not contain substances listed on the "Candidate List of Substances of Very High Concern for authorisation"

(http://echa.europa.eu/candidate-list-table)

### Essential characteristics

Knudsen Kilen is the Danish construction industry's leading supplier of height adjustment and levelling solutions.

Knudsen Kilen height adjustment and levelling solutions are produced in accordance with the ISO 9001:200 standard. The products made from HDPE, LDPE, and PS are fire class B2/DIN 4102-1 and do not develop toxic smoke in case of fire. The products made from Regupol and Regupol resist (PU bonded rubber) are fire class EN13501-1 Class E and B2/DIN 4102-1 respectively, and develop toxic smoke in case of fire.

Furthermore, Knudsen Kilen height adjustment and levelling solutions do not split when pierced by nails and screws and are not affected by moisture, rot, or fungus.

Further technical information can be obtained by contacting the manufacturer Knudsen Kilen A/S or from their webpage:

https://knudsenkilen.dk/knudsen-downloads

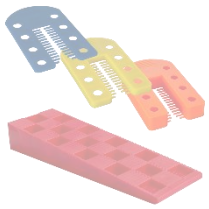
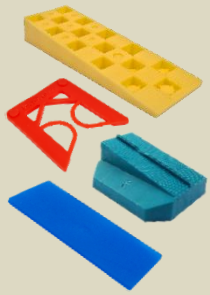
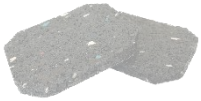
### Reference Service Life (RSL)

Not applicable.
Knudsen Kilen height adjustment products has a lifespan of 75 years in an environment of 20 degrees celcius. This lifespan has been tested by the Danish Technological Institute for injection molded black wedges produced from secondary LDPE. More information can be found on the manufacturer's webpage or by contacting them:

https://knudsenkilen.dk/om-knudsen/knudsen-og-miljoet

**Picture of product(s)**

Below are pictures of the Product groups of Knudsen Kilen Height Adjustment Products. In this EPD the product group Height Adjustment Products, LDPE is covered. The other four product groups of Knudsen Kilen Height Adjustment Products are covered in separate EPD documents.

| **Product group** Height Adjustment Products, HDPE | **Product group** Height Adjustment Products, LDPE | **Product group** Combi Sole, PS | **Product group** Sound Reducer, Regupol | **Product group** Sound Reducer Light, Regupol Resist |
|---|---|---|---|---|
|  |  | | |  |

The declared Product group is *Height Adjustment Products, LDPE*.

Within Knudsen Kilen Height Adjustment Products, there are several different product types, which are listed in Table 1 with the corresponding weight per piece and product group it belongs to.

# LCA background

### Declared unit

The LCI and LCIA results in this EPD relates to the declared unit of 1 kg of the product group, *Height Adjustment Products, LDPE* of Knudsen Kilen Height Adjustment Products used for different places in the building.

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | kg |
| Density | 910-925 | kg/m$^3$ |
| Conversion factor to 1 kg | 1 | kg/kg |

The weights per Height Adjustment Products are listed in Table 1 on page 8 with the corresponding product group it belongs to.

A mass-based allocation factor was used to allocate energy use in production and energy use for utilities at the factory among the different products and product groups produced at the factory. Linearity between the energy use of the injection molding machines and produced mass is assumed.

### Functional unit

Not defined.

### PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804:2012+A2:2019, which serves as the core PCR.

### Guarantee of Origin – certificates

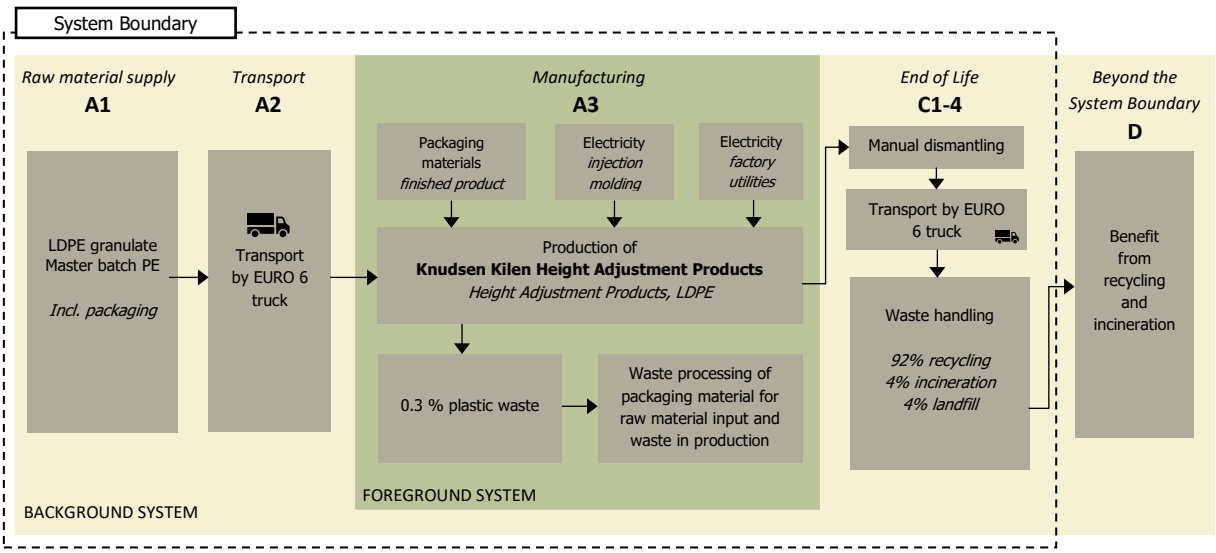
Foreground system:

No use of certified green electricity in the foreground system. The products are produced using electricity modelled as Danish residual electricity mix from 2021 in the production.

Background system:

No use of certified green electricity in the background system. Upstream processes are modelled using national energy mixes. Downstream processes are modelled using national energy mixes.

### Flow diagram



### System boundary

This EPD is based on a cradle-to-gate LCA with life cycle modules A1-3, C1-4 and D declared, in which 100 weight-% has been accounted for. In the production of 1 kg Knudsen Kilen Height Adjustment Products, Height Adjustment Products, LDPE, a waste of 0.3% occurs in the production in module A3.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes. Packaging material for some of the raw materials in module A1 has been excluded as no data was available. This exclusion of data is in alignment with the requirements in EN 15804.

**Product stage (A1-A3) includes**:

A1 – Extraction and processing of raw materials
A2 – Transport to the production site
A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the "end-of-waste" state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

The product stage includes raw materials as input material, transport to the manufacturer's production site in Frederiksværk, electricity for plastic injection molding machines and utilities at the factory site, packaging materials for the finished declared product as well as waste processing of the material waste in production and the raw materials' packaging materials up to the "end-of-waste" state or final disposal, according to EN15804+A2 §6.3.5.2.

The production of the declared Knudsen Kilen Height Adjustment Products is located at the manufacturer's factory in Frederiksværk, Denmark. The raw materials in module A1 for the product group, Height Adjustment Products, LDPE, are low density polyethylene (LDPE) granulates (secondary material) and LDPE master batch.

The packaging materials for the above-mentioned raw materials are plastic bags.

The transport of the raw materials in module A2 is also included in the product stage and consists of transport by truck from Sweden and Denmark.

The production at the factory in Frederiksværk consists of plastic injection molding. Besides electricity consumption for the plastic injection molding machines, electricity consumption for utilities at the factory is also included in the product stage.

Once the product group, Height Adjustment Products, LDPE have been injection molded, the products are packaged with packaging materials consisting of EU pallets (wood), plastic wrap, cardboard and plastic boxes. All these packaging materials are also included in the product stage in module A3. The EU pallets (wood) are assumed reused 25 times before disposal (EPD Danmark, 2023) (Environment, 2021). Thus, the modelling has been done accordingly with 1/25 virgin material input and 24/25 secondary input material. For the packaging materials in A3 the biogenic carbon content from renewable materials (cardboard and wood), is calculated based on the standard EN16485 as 0.5 kg C/kg dry matter. The cardboard has a moisture content of 7.5% (Mahakalkar, Sambare, & Sunheriya, 2019) and the wood has a moisture content of 15%. The biogenic carbon content is calculated from 100% of the material weight input. There is no biogenic carbon content in the declared product leaving the system boundary.

The packaging materials for the raw material input appearing in module A1 and the waste in production are treated up to "end-of-waste-state" in module A3. This includes waste treatment of plastic. The plastic is modelled with a waste treatment of 92% recycling, 4% incineration and 4% landfill based on national Danish waste statistics from 2020 for the building and construction waste (Miljøministeriet Miljøstyrelsen, 2020). The recycling treatment is modelled as part of module A3, and impacts relating to the treatment is reported as part of module A3.

As stated in EN15804+A2 §6.3.5.2 the flows leaving the system at the end-of-waste state of the boundary of A1-3 (waste from production and packaging material from raw material inputs) shall be allocated as co-products and loads and benefits from these flows shall not be declared in module D. This rule is applied to handle all waste treatment from A1-3 in module A3 and no potential load and benefits from these waste processes are declared in module D.

**End of Life (C1-C4) includes:**

Module C1 is assumed to be zero using manual dismantling.

In C2, the transport distances scenario is set to 50 km by truck based on a Danish national scenario.

In module C3-C4, 92% of the plastic is recycled, 4% is incinerated and 4% is landfilled. This waste scenario is based on national Danish waste statistics from 2020 (Miljøministeriet Miljøstyrelsen, 2020).

The generated waste in module C3-4 is included up to the "end-of-waste" state, including a process for sorting of waste at the waste facility before the plastic materials are recycled.

The potential from the recycling and incineration of the materials beyond the system boundary is calculated in module D.

**Re-use, recovery and recycling potential (D) includes:**

Module D includes reuse, recovery and/or recycling potential, expressed as net impact and benefits, due to reuse, recycling and incineration of materials with energy recovery in module C3.

To calculate the amount of net-scrap for credit in module D, the secondary input material in A1 has been deducted from the amount of material for recycling and incineration credit in module D. This calculation rules takes effect for the product group Height Adjustment Products, LDPE, because the LDPE granulated input in A1 is 100% secondary material input.

The plastic has a recycling rate of 92%. The credit is calculated as the difference between production of new plastic granulates and the production of plastic granulates from secondary material. The process for production of plastic granulates from secondary material, calculates that an input of 1.19 kg plastic is needed to produce 1 kg of plastic granulates from secondary material.

By crediting the difference between these two production types, the impacts from producing plastic granulates from secondary plastic material are subtracted from the potentially avoided impacts of producing primary plastic granulates. This ensures that overestimating of the credit in module D is avoided.

4% of the plastic is incinerated with energy recovery. The energy recovery is credited in module D and the energy recovered is based on the calorific values of the different raw materials. Datasets for energy recovery efficiency at the plant have been adjusted to be representative of the efficiency for heat and electricity recovery at Danish combined heating and power plants (CPH plant). The total efficiency for CHP plants in Denmark is around 85-90% (Hjørring Varmeforsyning, 2023), (Støvring Kraftvarmeværk, 2023), (Hofor, 2023), (Rambøll, 2023), (Lundgren, 2009). The efficiency for electricity is set to 43.5% and the efficiency for heat (steam) is set to 45.5%, which is based on average values from actual CHP plants in Denmark (Hjørring Varmeforsyning, 2023), (Støvring Kraftvarmeværk, 2023).

**Table 1 - Weight of different Knudsen Kilen Height Adjustment Products and specification of declared product group**

| Product and product no. | Weight per piece [g] | Conversion factor to 1 kg | Material* | Declared Product group |
|---|---|---|---|---|
| **Product type: Wedges** | | | | |
| Brown (90x45x15mm) product no. 971116080 | 12.44 | 0.01244 | LDPE | Height Adjustment Products, **LDPE** |
| Yellow (150x45x25mm) product no. 911300068 | 34.69 | 0.03469 | LDPE | Height Adjustment Products, **LDPE** |
| Terrace, black (150x45x25mm) product no. 911300030 | 34.50 | 0.0345 | LDPE | Height Adjustment Products, **LDPE** |
| Grey (150x45x50mm) product no. 9061904122D | 83.16 | 0.08316 | LDPE | Height Adjustment Products, **LDPE** |
| Black (150x45x70mm) product no. 9062004032D | 123.09 | 0.12309 | LDPE | Height Adjustment Products, **LDPE** |
| Green (80x30x10mm) product no. 910200080 | 6.75 | 0.00675 | LDPE | Height Adjustment Products, **LDPE** |
| Orange (80x40x8mm) product no. 928700110 | 6.55 | 0.00655 | LDPE | Height Adjustment Products, **LDPE** |
| **Product type: Combi wedges** | | | | |
| Combi top small (80x43x19mm) product no. 975308120 | 12.50 | 0.01250 | LDPE | Height Adjustment Products, **LDPE** |
| Combi top medium (130x43x28mm) product no. 975408120 | 26.29 | 0.02629 | LDPE | Height Adjustment Products, **LDPE** |
| Combi base (100x80x40mm) product no. 975208120 | 51.00 | 0.05100 | LDPE | Height Adjustment Products, **LDPE** |
| Combi Extension (35x80x100 mm) product no. 975108120 | 57.00 | 0.05700 | LDPE | Height Adjustment Products, **LDPE** |
| Combi Top Large (43x43x130 mm) Product no. 975508120 | 46.00 | 0.04600 | LDPE | Height Adjustment Products, **LDPE** |
| **Product type: Combi max** | | | | |
| Combi max top (54x42x100 mm) product no. 986408220 | 32.74 | 0.03274 | LDPE | Height Adjustment Products, **LDPE** |
| Combi max high (105x80x100 mm) product no. 985104221 | 110.25 | 0.11025 | LDPE | Height Adjustment Products, **LDPE** |
| Combi max low (75x80x100 mm) product no. 987808220 | 80.00 | 0.08000 | LDPE | Height Adjustment Products, **LDPE** |
| **Product type: Shims** | | | | |
| Blue (50x22x1mm) product no. 987316051 | 1.11 | 0.00111 | LDPE | Height Adjustment Products, **LDPE** |
| Black (50x22x2mm) product no. 987316031 | 2.01 | 0.00201 | LDPE | Height Adjustment Products, **LDPE** |
| Red (50x22x3mm) product no. 987316041 | 2.93 | 0.00293 | LDPE | Height Adjustment Products, **LDPE** |
| White (50x22x4mm) product no. 987316021 | 4.03 | 0.00403 | LDPE | Height Adjustment Products, **LDPE** |

| | | | | |
|---|---|---|---|---|
| Yellow (50x22x5mm)<br>product no. 987316061 | 4.92 | 0.00492 | LDPE | Height Adjustment Products, **LDPE** |
| Blue (100x22x1mm)<br>product no. 987316050 | 2.18 | 0.00218 | LDPE | Height Adjustment Products, **LDPE** |
| Black (100x22x2mm)<br>product no. 987316030 | 3.83 | 0.00383 | LDPE | Height Adjustment Products, **LDPE** |
| Red (100x22x3mm)<br>product no. 987316040 | 5.71 | 0.00571 | LDPE | Height Adjustment Products, **LDPE** |
| White (100x22x4mm)<br>product no. 987316020 | 7.69 | 0.00769 | LDPE | Height Adjustment Products, **LDPE** |
| Yellow (100x22x5mm)<br>product no. 987316060 | 9.49 | 0.00949 | LDPE | Height Adjustment Products, **LDPE** |
| **Product type: Hanger shims** | | | | |
| Blue (54x46x1mm)<br>product no. 973204050 | 1.15 | 0.00115 | LDPE | Height Adjustment Products, **LDPE** |
| Black (54x46x2mm)<br>product no. 973204030 | 1.87 | 0.00187 | LDPE | Height Adjustment Products, **LDPE** |
| Red (54x46x3mm)<br>product no. 973204040 | 2.45 | 0.00245 | LDPE | Height Adjustment Products, **LDPE** |
| White (54x46x4mm)<br>product no. 973204010 | 3.05 | 0.00305 | LDPE | Height Adjustment Products, **LDPE** |
| Yellow (54x46x5mm)<br>product no. 973204060 | 3.66 | 0.00366 | LDPE | Height Adjustment Products, **LDPE** |
| Brown (54x46x10mm)<br>product no. 973204220 | 6.46 | 0.00646 | LDPE | Height Adjustment Products, **LDPE** |
| **Product type: Sound wedges** | | | | |
| Yellow wedge w/sound reducer<br>product no. 8701212K | 64.00 | 0.064 | Combi | Combi |
| | *34.00* | *0.034* | LDPE | Height Adjustment Products, **LDPE** |
| | *30.00* | *0.030* | Regupol | Sound Reducer, Regupol |
| Combi Top Medium wedge w/sound reducer<br>product no. 8701214K | 50.00 | 0.050 | Combi | Combi |
| | *26.00* | *0.026* | LDPE | Height Adjustment Products, **LDPE** |
| | *24.00* | *0.024* | Regupol | Sound Reducer, Regupol |
| Combi top large w/sound reducer<br>product no. 8701217K | 70.00 | 0.070 | Combi | Combi |
| | *46.00* | *0.046* | LDPE | Height Adjustment Products, **LDPE** |
| | *24.00* | *0.024* | Regupol | Sound Reducer, Regupol |

** LDPE = low density polyethylene, HDPE = high density polyethylene, PS = polystyrene, Regupol = polyurethane bonded rubber fibers, Regupol resist = polyurethane bonded rubber fibers made from secondary material, Combi = combination of two declared Product groups to calculate the impacts related to these specific products*

# LCA results

Product group: Height Adjustment products, LDPE

| ENVIRONMENTAL IMPACTS PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| GWP-total | [kg $CO_2$ eq.] | 3.76E-01 | 1.06E-02 | 7.36E-01 | 1.12E+00 | 0.00E+00 | 4.34E-03 | 1.36E-01 | 2.80E-03 | -1.70E-02 |
| GWP-fossil | [kg $CO_2$ eq.] | 3.73E-01 | 1.04E-02 | 8.13E-01 | 1.20E+00 | 0.00E+00 | 4.29E-03 | 1.35E-01 | 2.84E-03 | -1.68E-02 |
| GWP-biogenic | [kg $CO_2$ eq.] | 3.01E-03 | 3.08E-05 | -7.76E-02 | -7.46E-02 | 0.00E+00 | 1.27E-05 | 1.68E-04 | -3.24E-05 | -1.63E-04 |
| GWP-luluc | [kg $CO_2$ eq.] | 4.51E-05 | 9.67E-05 | 3.40E-04 | 4.81E-04 | 0.00E+00 | 3.98E-05 | 2.13E-06 | 2.26E-06 | -2.07E-06 |
| ODP | [kg CFC 11 eq.] | 2.05E-09 | 1.36E-15 | 1.30E-11 | 2.06E-09 | 0.00E+00 | 5.59E-16 | 2.53E-09 | 4.62E-15 | -1.11E-13 |
| AP | [mol $H^+$ eq.] | 1.02E-03 | 1.56E-05 | 8.20E-04 | 1.85E-03 | 0.00E+00 | 6.40E-06 | 7.42E-05 | 8.25E-06 | -2.51E-05 |
| EP-freshwater | [kg P-eq.] | 8.51E-06 | 3.82E-08 | 1.64E-06 | 1.02E-05 | 0.00E+00 | 1.57E-08 | 6.65E-07 | 5.30E-07 | -2.32E-08 |
| EP-marine | [kg N eq.] | 1.56E-04 | 5.68E-06 | 2.91E-04 | 4.53E-04 | 0.00E+00 | 2.34E-06 | 2.59E-05 | 1.89E-06 | -7.79E-06 |
| EP-terrestrial | [mol N eq.] | 1.60E-03 | 6.71E-05 | 3.06E-03 | 4.72E-03 | 0.00E+00 | 2.76E-05 | 3.14E-04 | 2.08E-05 | -7.90E-05 |
| POCP | [kg NMVOC eq.] | 4.42E-04 | 1.37E-05 | 8.35E-04 | 1.29E-03 | 0.00E+00 | 5.62E-06 | 8.15E-05 | 6.00E-06 | -2.52E-05 |
| ADPm[1] | [kg Sb eq.] | 1.87E-07 | 6.88E-10 | 3.26E-08 | 2.20E-07 | 0.00E+00 | 2.83E-10 | 3.42E-08 | 7.27E-11 | -1.36E-09 |
| ADPf[1] | [MJ] | 5.79E+00 | 1.42E-01 | 1.49E+01 | 2.08E+01 | 0.00E+00 | 5.85E-02 | 2.07E-01 | 4.11E-02 | -7.63E-01 |
| WDP[1] | [$m^3$] | 8.74E-02 | 1.26E-04 | 2.15E-02 | 1.09E-01 | 0.00E+00 | 5.19E-05 | 2.26E-02 | -3.88E-05 | 1.73E-04 |
| Caption | GWP-total = Global Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use | | | | | | | | | | |
| Disclaimer | [1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. | | | | | | | | | |

| ADDITIONAL ENVIRONMENTAL IMPACTS PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| PM | [Disease incidence] | 6.00E-09 | 1.29E-10 | 9.79E-09 | 1.59E-08 | 0.00E+00 | 5.30E-11 | 5.06E-09 | 8.00E-11 | -1.82E-10 |
| IRP[2] | [kBq U235 eq.] | 1.14E-01 | 3.99E-05 | 1.01E-01 | 2.15E-01 | 0.00E+00 | 1.64E-05 | 1.89E-03 | 7.19E-05 | 4.55E-04 |
| ETP-fw[1] | [CTUe] | 3.04E+00 | 1.01E-01 | 4.25E+00 | 7.39E+00 | 0.00E+00 | 4.16E-02 | 1.82E-01 | 3.91E-02 | -3.38E-01 |
| HTP-c[1] | [CTUh] | 2.06E-10 | 2.07E-12 | 1.06E-10 | 3.14E-10 | 0.00E+00 | 8.51E-13 | 6.78E-12 | 1.80E-12 | -8.87E-12 |
| HTP-nc[1] | [CTUh] | 3.11E-09 | 1.10E-10 | 4.49E-09 | 7.72E-09 | 0.00E+00 | 4.54E-11 | 1.08E-10 | 1.50E-10 | -3.77E-10 |
| SQP[1] | - | 1.83E+00 | 5.95E-02 | 5.17E+00 | 7.06E+00 | 0.00E+00 | 2.45E-02 | 4.76E-01 | 3.56E-03 | -8.30E-02 |
| Caption | PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless) | | | | | | | | | |
| Disclaimers | [1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.<br>[2] 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. | | | | | | | | | |

| RESOURCE USE PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| PERE | [MJ] | 2.61E+00 | 1.04E-02 | 1.93E+00 | 4.55E+00 | 0.00E+00 | 4.26E-03 | 2.18E-02 | 3.71E-03 | -7.20E-02 |
| PERM | [MJ] | 0.00E+00 | 0.00E+00 | 2.61E+00 | 2.61E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | [MJ] | 2.61E+00 | 1.04E-02 | 4.54E+00 | 7.16E+00 | 0.00E+00 | 4.26E-03 | 2.18E-02 | 3.71E-03 | -7.20E-02 |
| PENRE | [MJ] | 5.14E+00 | 1.43E-01 | 1.25E+01 | 1.78E+01 | 0.00E+00 | 5.87E-02 | 4.20E+01 | 1.78E+00 | -7.63E-01 |
| PENRM | [MJ] | 4.36E+01 | 0.00E+00 | 2.39E+00 | 4.60E+01 | 0.00E+00 | 0.00E+00 | -4.18E+01 | -1.74E+00 | 0.00E+00 |
| PENRT | [MJ] | 4.88E+01 | 1.43E-01 | 1.49E+01 | 6.38E+01 | 0.00E+00 | 5.87E-02 | 2.08E-01 | 4.11E-02 | -7.63E-01 |
| SM | [kg] | 9.88E-01 | 0.00E+00 | 1.03E-01 | 1.09E+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 | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW | [$m^3$] | 3.11E-03 | 1.13E-05 | 2.30E-03 | 5.42E-03 | 0.00E+00 | 4.66E-06 | 5.28E-04 | 4.05E-07 | -7.52E-05 |
| 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 = Net use of fresh water | | | | | | | | | |

| WASTE CATEGORIES AND OUTPUT FLOWS PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| HWD | [kg] | -1.93E-10 | 4.42E-13 | 1.46E-08 | 1.44E-08 | 0.00E+00 | 1.82E-13 | 3.35E-13 | 3.46E-12 | -5.36E-11 |
| NHWD | [kg] | 1.23E-01 | 2.18E-05 | 6.35E-03 | 1.29E-01 | 0.00E+00 | 8.96E-06 | 4.97E-04 | 3.98E-02 | 1.19E-03 |
| RWD | [kg] | 6.76E-04 | 2.67E-07 | 8.77E-04 | 1.55E-03 | 0.00E+00 | 1.10E-07 | 8.96E-07 | 4.86E-07 | -1.54E-07 |
| | | | | | | | | | | |
| CRU | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 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 | 2.84E-03 | 2.84E-03 | 0.00E+00 | 0.00E+00 | 1.38E-02 | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EE | [MJ] | 0.00E+00 | 0.00E+00 | 1.19E-02 | 1.19E-02 | 0.00E+00 | 0.00E+00 | 2.32E-02 | 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; EE = Exported energy | | | | | | | | | |

| BIOGENIC CARBON CONTENT PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | |
|---|---|---|
| **Parameter** | **Unit** | **At the factory gate** |
| Biogenic carbon content in product | kg C | 0.00E+0 |
| Biogenic carbon content in accompanying packaging | kg C | 6.59E-02 |
| Note | 1 kg biogenic carbon is equivalent to 44/12 kg of $CO_2$ | |

# Additional information

## LCA interpretation

The results in accordance with DS/EN 15804+A2 show that the life cycle modules A1-A3 have the largest contribution to most of the 13 core environmental impact categories. The life cycle modules A1-A3 have the largest contribution to 12 out of the 13 core environmental impact categories, whereas the life cycle modules C1-C4 have the largest contribution to only 1, which is ODP.

For Product group 2, the process Electricity from injection molding has the largest contribution in 6 of the 13 core environmental impact categories. It is the the process of packaging, which is contributing the most to the impact category of Climate Change biogenic, due to the use of the biogenic materials of wood and cardboard.

The EoL has a low impact due to the high share of recycling instead of incineration.

## Technical information on scenarios

**Reference service life**

| RSL information | | Unit |
|---|---|---|
| Reference service Life – not applicable | - | Years |

**End of life (C1-C4)**

| Scenario information | Value | Unit |
|---|---|---|
| Collected separately | 1 | kg |
| Collected with mixed waste | - | kg |
| For reuse | - | kg |
| For recycling | 0.92 | kg |
| For energy recovery | 0.04 | kg |
| For final disposal | 0.04 | kg |
| Assumptions for scenario development | - | As appropriate |

**Re-use, recovery and recycling potential (D)**

| Scenario information/Materiel | Value | Unit |
|---|---|---|
| Displaced material | 0.0116 | kg |
| Energy recovery from waste incineration | 0.0006 | kg |

### Indoor air

*The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.*

### Soil and water

*The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.*

# References

| | |
|---|---|
| **Publisher** | epddanmark<br>www.epddanmark.dk<br>Template version 2023.1 |
| **Programme operator** | Danish Technological Institute<br>Buildings & Environment<br>Gregersensvej<br>DK-2630 Taastrup<br>www.teknologisk.dk |
| **LCA-practitioner** | Nana Lin Rasmussen<br>Morten Ryberg<br><br>Sweco A/S<br>Ørestads Blvd. 41,<br>2300 København,<br>Denmark<br>SWECO |
| **LCA software /background data** | *LCA for Experts (LCA FE)* version 10.7.<br><br>Generic data are primarily based on life cycle inventory data from Spheras database Managed LCA Content (MLC) version 2023.1 and Ecoinvent database 3.8. |
| **3rd party verifier** | Guangli Du<br><br>BUILD – Institut for Byggeri, By og Miljø, Aalborg Universitet København |

**General programme instructions**
General Programme Instructions, version 2.0, spring 2020
www.epddanmark.dk

**EN 15804**
DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

**EN 15942**
DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

**ISO 14025**
DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

**ISO 14040**
DS/EN ISO 14040:2008 – " Environmental management – Life cycle assessment – Principles and framework"

**ISO 14044**
DS/EN ISO 14044:2008 – " Environmental management – Life cycle assessment – Requirements and guidelines"

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This appendix refers to the EPD MD-24004-EN, developed according to EN15804+A2:2019.
Results in the appendix communicates LCA results in the format described in EN15804+A1:2013, in order to accommodate a need in the transition period between the two standard revisions. The appendix cannot stand alone, as the reference EPD describes the basis of the assessment.

## Height Adjustment products, LDPE

| ENVIRONMENTAL IMPACTS PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| GWP | [kg $CO_2$-eq.] | 3.69E-01 | 1.03E-02 | 7.16E-01 | 1.10E+00 | 0.00E+00 | 4.23E-03 | 1.35E-01 | 2.65E-03 | -1.62E-02 |
| ODP | [kg CFC11-eq.] | 1.78E-09 | 1.60E-15 | 1.23E-11 | 1.79E-09 | 0.00E+00 | 6.58E-16 | 2.00E-09 | 5.44E-15 | -1.30E-13 |
| AP | [kg $SO_2$-eq.] | 8.56E-04 | 1.11E-05 | 6.18E-04 | 1.49E-03 | 0.00E+00 | 4.56E-06 | 5.33E-05 | 6.68E-06 | -1.95E-05 |
| EP | [kg $PO_4^{3-}$-eq.] | 1.16E-04 | 2.43E-06 | 1.20E-04 | 2.38E-04 | 0.00E+00 | 1.00E-06 | 6.88E-04 | 7.62E-06 | -3.09E-06 |
| POCP | [kg ethene-eq.] | 5.94E-05 | -1.13E-06 | 7.37E-05 | 1.32E-04 | 0.00E+00 | -4.66E-07 | 6.21E-06 | 6.04E-07 | -3.74E-06 |
| ADPE | [kg Sb-eq.] | 1.91E-07 | 6.90E-10 | 3.86E-08 | 2.30E-07 | 0.00E+00 | 2.84E-10 | 3.42E-08 | 7.59E-11 | -1.36E-09 |
| ADPF | [MJ] | 3.79E+00 | 1.40E-01 | 1.23E+01 | 1.63E+01 | 0.00E+00 | 5.76E-02 | 1.88E-01 | 3.90E-02 | -7.60E-01 |
| Caption | GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential of soil and water; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources | | | | | | | | | |

| RESOURCE USE PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| PERE | [MJ] | 2.61E+00 | 1.04E-02 | 1.93E+00 | 4.55E+00 | 0.00E+00 | 4.26E-03 | 2.18E-02 | 3.71E-03 | -7.20E-02 |
| PERM | [MJ] | 0.00E+00 | 0.00E+00 | 2.61E+00 | 2.61E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | [MJ] | 2.61E+00 | 1.04E-02 | 4.54E+00 | 7.16E+00 | 0.00E+00 | 4.26E-03 | 2.18E-02 | 3.71E-03 | -7.20E-02 |
| PENRE | [MJ] | 5.14E+00 | 1.43E-01 | 1.25E+01 | 1.78E+01 | 0.00E+00 | 5.87E-02 | 4.20E+01 | 1.78E+00 | -7.63E-01 |
| PENRM | [MJ] | 4.36E+01 | 0.00E+00 | 2.39E+00 | 4.60E+01 | 0.00E+00 | 0.00E+00 | -4.18E+01 | -1.74E+00 | 0.00E+00 |
| PENRT | [MJ] | 4.88E+01 | 1.43E-01 | 1.49E+01 | 6.38E+01 | 0.00E+00 | 5.87E-02 | 2.08E-01 | 4.11E-02 | -7.63E-01 |
| SM | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 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 | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW | [$m^3$] | 3.11E-03 | 1.13E-05 | 2.30E-03 | 5.42E-03 | 0.00E+00 | 4.66E-06 | 5.28E-04 | 4.05E-07 | -7.52E-05 |
| 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 | | | | | | | | | |

| WASTE CATEGORIES AND OUTPUT FLOWS PER 1 kg Knudsen Kilen Height Adjustment products, LDPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| HWD | [kg] | -1.93E-10 | 4.42E-13 | 1.46E-08 | 1.44E-08 | 0.00E+00 | 1.82E-13 | 3.35E-13 | 3.46E-12 | -5.36E-11 |
| NHWD | [kg] | 1.23E-01 | 2.18E-05 | 6.35E-03 | 1.29E-01 | 0.00E+00 | 8.96E-06 | 4.97E-04 | 3.98E-02 | 1.19E-03 |
| RWD | [kg] | 6.76E-04 | 2.67E-07 | 8.77E-04 | 1.55E-03 | 0.00E+00 | 1.10E-07 | 8.96E-07 | 4.86E-07 | -1.54E-07 |
| | | | | | | | | | | |
| CRU | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 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 | 2.84E-03 | 2.84E-03 | 0.00E+00 | 0.00E+00 | 1.38E-02 | 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 | 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 | 1.14E-02 | 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 | 1.19E-02 | 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; EET = Exported thermal energy | | | | | | | | | |

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