Environmental Product Declaration

Reflecta

UNDERFLOOR INSULATION AND HEAT REFLECTOR

The Reflecta plate enables even heat distribution across the floor and due to its low profile, it is the ideal system for renovation.

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Chemelex is a global leader in electrical heat tracing products and services, mineral-insulated fire rated wiring, electrical floor heating systems, and fluid Leak detection systems. The company supports customers with products and services in industries ranging from commercial and residential construction, data centers, energy, industrial process heating and transportation. Its products are marketed globally under leading brands including Raychem, Tracer, NuHeat, and Pyrotenax.

Chemelex's Raychem brand is at the forefront of the heat tracing industry. Products include industrial process heating systems, pipe freeze protection, surface snow melting & de-icing, floor heating, and hot water temperature maintenance. Raychem's solutions are vital in sectors including energy, infrastructure, and commercial & residential building. Applications ensure accurate temperature maintenance for operational efficiency, enhanced safety and customer comfort.

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

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T2 Reflecta
Underfloor insulation and heat reflector

CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

According to ISO 14025 and EN 15804+A2

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Solutions www.ul.com 333 Pfingsten Rd, Northbrook, IL 60062 www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	UL Solutions General Program Instructions v.2.7 2022
MANUFACTURER NAME AND ADDRESS	Chemelex, 15375 Memorial Drive, Houston, TX 77079, United States
DECLARATION NUMBER	4791545949.104.1
DECLARED PRODUCT & FUNCTIONAL UNIT	1 square meter of Reflecta insulation board providing an R-value of 0.429 m^2.K/W over 20 years of use.
REFERENCE PCR AND VERSION NUMBER	Core PCR: EN 15804:2012+A2:2019 PCR: PEP-PCR-ed4-EN-2021 09 06
DESCRIPTION OF PRODUCT APPLICATION/USE	Underfloor insulation and heat reflector
PRODUCT RSL DESCRIPTION (IF APPL.)	20 years
MARKETS OF APPLICABILITY	Europe
DATE OF ISSUE	April 21, 2025
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific
RANGE OF DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-grave
YEAR(S) OF REPORTED PRIMARY DATA	2023
LCA SOFTWARE & VERSION NUMBER	LCA For Experts 10.8
LCI DATABASE(S) & VERSION NUMBER	Sphera MLC 2024.2
LCIA METHODOLOGY & VERSION NUMBER	EF 3.1 (as per EN 15804+A2)

The PCR review was conducted by:	PepEcoPassport PCR Review Panel contact@pep-ecopassport.org
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Cooper McCollum, UL Solutions
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Peter Yeon, H.I.P. Pathway

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

1. Product Definition and Information

1.1. Description of Company/Organization

Chemelex is a global leader in electric thermal and sensing solutions, protecting the world's critical processes, places and people. With over 50 years of innovation and a commitment to excellence, we develop solutions that ensure safety, reliability, and efficiency in diverse environments – from industrial plants and data centers to people's homes. Chemelex delivers future-ready technologies, advanced engineering capabilities and local expertise backed by global standards. Our offering includes a leading portfolio from our trusted brands: Raychem, Tracer, Nuheat and Pyrotenax.

1.2. Product Description

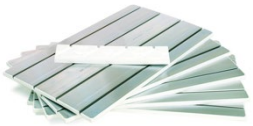

Figure 1: Reflecta Product Image

The reference product for the Chemelex RAYCHEM Reflecta is R-RF-3M2. The Reflecta is an insulation board designed to be used in conjunction with T2Red cables as part of a self-regulating floor heating system for perfect heat spreading. Suitable for new build and renovation, they can be applied under any type of floor surface without risk of overheating.

Table 1: Products covered in the EPD

CATALOG NUMBER	ITEM NAME	ACCESSORY TYPE
241662-000	U-RF-6E	End Plates Insulation Board
450052-000	R-RF-3M2	Insulation and Heat Spreading Board
6012-8946251	R-RF-1M2	Insulation and Heat Spreading Board

1.3. Application

The Reflecta is designed to be used with Chemelex's T2Red self-regulating floor heating cables. Ideal for wooden and engineered wooden floors but also applicable for natural stone and ceramic tiles.

1.4. Technical Requirements

The technical requirements are available on the Chemelex product page under engineering specifications:
https://www.nvent.com/en-gb/raychem/products/reflecta-underfloor-insulation-and-heat-spreading-board-0

1.5. Properties of Declared Product as Delivered

The product is packaged in a cardboard box.

1.6. Material Composition

Table 2: Material composition, per unit

MATERIAL	Weight [%]
ALUMINUM	67
PLASTIC	33
TOTAL	**100**

1.7. Manufacturing

The process begins with a continuous strip of coil material, which is formed into a complex profile. After forming, the profile is ink-jet marked with date and batch information, then cut to the desired length. The plate is then flipped, heated for optimal gluing temperature, and glue is applied using nozzles. Polystyrene (EPS) is centered and pressed onto the plate. Finally, the product undergoes packing and quality control before completion.

This product is made using renewable electricity in the form of Renewable Energy Certificates (RECs). The facility producing Reflecta purchases RECs to cover the totality of the electricity used at the contract manufacturing facility in Anderslöv, Sweden.

1.8. Packaging

The product packaging is a cardboard box that is 100% recyclable, which contains 3 square meters of Reflecta insulation plate.

1.9. Transportation

The Reflecta is manufactured in Sweden and shipped to Chemelex's EU distribution center in Leuven, Belgium, by truck. From Leuven, it is shipped by truck to customers in Sweden and all over Europe.

1.10. Product Installation

Installation only requires the use of hand tools. No maintainance is required after installation.

1.11. Use

Once installed the Reflecta plates are not consuming energy, they are distributing the heat and insulating the subfloor. They can be considered as insulation plates reducing the enregy needed for the heating of the floor.

1.12. Reference Service Life

The reference service life (RSL) of the product is 20 years.

1.13. Reuse, Recycling, and Energy Recovery

The end-of-life disposal rates (recycling, energy recovery, and disposal) used in the study were based on EN 50639:2019 – Product category rules for life cycle assessments of electronic and electrical products and systems, Table G.4.

1.14. Disposal

After separation of aluminum and EPS, aluminum can be recycled, EPS can be disposed as construction waste.

2. Life Cycle Assessment Background Information

2.1. Functional Unit

The functional unit is 1 square meter (1 m^2) of Reflecta insulation board providing an R-value of 0.429 $m^2 \cdot K/W$ over 20 years of use.

The reference flow associated with this functional unit is a mass of 2.05 kg of Reflecta plate.

2.2. System Boundary

This EPD is a Cradle-to-Grave study.

2.3. Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The primary data was collected as annual totals for electricity usage and production volume. The utility usage information was divided by the production to find a utility consumption per kilometer of cable produced.

2.4. Cut-off Criteria

Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit.

2.5. Data Sources

Primary data were collected by facility personnel and from utility bills and was used for all manufacturing processes. Whenever available, supplier data was used for raw materials used in the production process. When primary data did

not exist, secondary data for raw material production was utilized from Sphera Managed LCA Content Database 2024.2.

2.6. Data Quality

The geographical scope of the manufacturing portion of all life cycle modules is North America. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered good. Time coverage of this data is considered good. Primary data provided by the manufacturer is specific to the technology used in manufacturing their product. It is site-specific and considered of good quality. Data necessary to model cradle-to-gate unit processes was sourced from Sphera Managed LCA Content LCI datasets.

2.7. Period under Review

The period under review is the full calendar year 2023.

2.8. Allocation

General principles of allocation were based on ISO 14040/44. To derive a per-unit value for manufacturing inputs such as electricity, thermal energy and water, allocation based on total production by mass was adopted. As a default, secondary Sphera Managed LCA datasets use a physical basis for allocation.

3. Life Cycle Assessment Scenarios

It is assumed that all raw materials are delivered to the manufacturing facility via truck to an European construction site. Distances were calculated using the supplier location and the location of manufacturing.

Table 3. Transport to the building site (A4)

NAME	UNIT	TRUCK
Vehicle type		Truck-trailer, Euro 1, 34 - 40t gross weight / 27t payload capacity
Fuel efficiency for full vehicle	L/100km	42
Capacity utilization (including empty runs, mass based	%	85
Transport distance	km	1.25E+03
Gross density of products transported	kg/m^3	n/a
Weight of products transported (if gross density not reported)	kg	2.13E+00
Volume of products transported (if gross density not reported)	m^3	n/a

Table 4. Installation into the building (A5)

NAME	VALUE	UNIT
Ancillary materials	0.00E+00	kg
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	0.00E+00	m^3
Other resources	0.00E+00	kg
Electricity consumption	0.00E+00	MJ
Other energy carriers	0.00E+00	MJ
Product loss per functional unit	1.02E-01	kg
Waste materials at the construction site before waste processing, generated by product installation	1.82E-01	kg
Output materials resulting from on-site waste processing (specified by route; e.g. for recycling, energy recovery and/or disposal)	0.00E+00	kg
Biogenic carbon contained in packaging	3.42E-02	kg C
Direct emissions to ambient air, soil and water	0.00E+00	kg
VOC content	0.00E+00	$\mu g/m^3$

Table 5. Reference Service Life

NAME	VALUE	UNIT
RSL	20	years
Declared product properties (at the gate) and finishes, etc.	Sold packaged in 1 m^2 and 3 m^2 packs.	Units as appropriate
Design application parameters	EPS according to DIN 4102 (classified B1)	
An assumed quality of work, when installed in accordance with the manufacturer's instructions	12-year total care when installed according to instructions. 20-year total care when installed by Certified PRO	
Outdoor environment	Reflecta should not be used outdoors	
Indoor environment: installation temperature	+15°C to 30°C	°C
Use conditions: long term pressure capability	140 kPa (14000 kg/m²)	kPa
Maintenance, e.g. required frequency, type and quality of replacement components	No replacements are necessary.	Units as appropriate

Table 6. Operational energy use (B6)

NAME	VALUE	UNIT
Lifetime of product	20	years
Power consumption over lifetime	n/a	MJ

Table 7. End of life (C1-C4)

NAME		VALUE	UNIT
Recovery (specified by type)	Reuse	0.00E+00	kg
	Recycling	9.60E-01	kg
	Landfill	7.50E-01	kg
	Incineration	3.37E-01	kg
	Incineration with energy recovery	0.00E+00	kg

NAME		VALUE	UNIT
Disposal (landfill)	Product or material for final deposition	9.60E-01	kg
Removals of biogenic carbon (excluding packaging)		0.00E+00	kg CO_2

Table 8. Reuse, recovery and/or recycling potentials (D), relevant scenario information

NAME	VALUE	UNIT
Net energy benefit from energy recovery from waste treatment declared as exported energy in C3 (R>0.6)	0.00E+00	MJ
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4 (R<0.6)	2.75E+00	MJ
Net energy benefit from material flow declared in C3 for energy recovery	0.00E+00	MJ

4. Life Cycle Assessment Results

Table 9. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
Cradle to Grave	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Modules B1-B5, B7 and C1 to be reported were all zero following the calculation, hence have not been included in the results tables for an easier reading experience.

4.1 Life Cycle Impact Assessment Results

Table 10. EF 3.1 Impact Assessment Results, per m²

EF 3.1	A1 – A3	A4	A5	B6	C2	C3	C4	D
GWP_{total} [kg CO_2 eq]	7.49E+00	2.21E-01	6.71E-01	0.00E+00	1.36E-01	8.44E-01	1.85E-02	-8.07E+00
GWP_{fossil} [kg CO_2 eq]	8.36E+00	2.17E-01	5.92E-02	0.00E+00	1.33E-01	8.44E-01	1.85E-02	-8.06E+00
$GWP_{biogenic}$ [kg CO_2 eq]	-8.71E-01	5.23E-04	6.11E-01	0.00E+00	3.21E-04	5.80E-06	-6.09E-05	-1.80E-03
$GWP_{land\ use}$ [kg CO_2 eq]	6.10E-03	3.68E-03	7.21E-04	0.00E+00	2.26E-03	4.00E-05	7.39E-05	-1.09E-03
ODP [kg CFC-11 eq]	7.52E-12	3.23E-14	4.29E-14	0.00E+00	1.98E-14	1.79E-13	5.94E-14	-5.81E-12
AP [kg SO_2 eq]	2.86E-02	2.34E-03	5.31E-04	0.00E+00	1.43E-03	1.06E-04	1.13E-04	-4.47E-02
$EP_{freshwater}$ [kg N eq]	1.85E-05	9.36E-07	2.12E-06	0.00E+00	5.74E-07	4.36E-08	5.72E-06	-2.91E-06
EP_{marine} [kg N eq]	5.78E-03	1.18E-03	2.73E-04	0.00E+00	7.22E-04	2.93E-05	2.57E-05	-4.89E-03
$EP_{terrestrial}$ [kg N eq]	6.25E-02	1.30E-02	2.75E-03	0.00E+00	7.96E-03	4.90E-04	2.83E-04	-5.31E-02
POCP [kg O_3 eq]	3.26E-02	2.23E-03	6.08E-04	0.00E+00	1.37E-03	8.45E-05	8.16E-05	-1.51E-02
$ADP_{element}$ [kg Sb-eq]	2.10E-06	1.91E-08	4.34E-09	0.00E+00	1.17E-08	1.86E-09	1.23E-09	-1.33E-06
ADP_{fossil} [MJ, LHV]	1.36E+02	2.89E+00	8.07E-01	0.00E+00	1.77E+00	3.69E-01	3.10E-01	-7.67E+01
WDP [m^3]	1.37E+00	3.39E-03	2.07E-03	0.00E+00	2.08E-03	8.02E-02	2.33E-03	-1.66E+00

Table 11. Resource Use Indicators, per m²

PARAMETER	A1 – A3	A4	A5	B6	C2	C3	C4	D
PERE [MJ]	4.38E+01	2.49E-01	7.52E-02	0.00E+00	1.53E-01	9.80E-02	4.65E-02	-5.29E+01
PERM [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
PERT [MJ]	4.38E+01	2.49E-01	7.52E-02	0.00E+00	1.53E-01	9.80E-02	4.65E-02	-5.29E+01
PENRE [MJ]	1.10E+02	2.89E+00	8.07E-01	0.00E+00	1.77E+00	3.69E-01	3.10E-01	-7.67E+01
PENRM [MJ]	2.62E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT [MJ]	1.36E+02	2.89E+00	8.07E-01	0.00E+00	1.77E+00	3.69E-01	3.10E-01	-7.67E+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
FW [m^3]	8.95E-02	2.77E-04	9.47E-05	0.00E+00	1.70E-04	1.91E-03	7.01E-05	-1.67E-01

Table 12. Output Flows and Waste Categories, per m²

PARAMETER	A1 – A3	A4	A5	B6	C2	C3	C4	D
HWD [kg]	2.67E-07	1.11E-10	6.93E-11	0.00E+00	6.79E-11	2.11E-10	7.53E-11	-4.95E-08
NHWD [kg]	1.42E+00	4.72E-04	2.82E-01	0.00E+00	2.89E-04	7.67E-02	7.48E-01	-3.04E+00
RWD [kg]	2.16E-03	5.26E-06	4.25E-06	0.00E+00	3.23E-06	1.24E-05	4.30E-06	-7.39E-04
CRU [kg]	6.14E-02	0.00E+00	2.43E-01	0.00E+00	0.00E+00	9.59E-01	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	0.00E+00	0.00E+00

PARAMETER	A1 – A3	A4	A5	B6	C2	C3	C4	D
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E+00
EET [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

Table 13. Additional Indicators, per m^2

PARAMETER	A1 – A3	A4	A5	B6	C2	C3	C4	D
PM [disease incidence]	4.93E-07	2.28E-08	5.21E-09	0.00E+00	1.40E-08	1.30E-09	1.23E-09	-7.14E-07
IRP [kBq U235 eq]	2.22E-01	7.63E-04	6.22E-04	0.00E+00	4.68E-04	1.71E-03	5.89E-04	-7.30E-02
ETP [CTUe]	9.18E+01	2.14E+00	5.92E-01	0.00E+00	1.32E+00	2.48E-01	4.50E-01	-1.16E+02
HTCE [CTUh]	3.11E-09	4.37E-11	1.26E-11	0.00E+00	2.68E-11	1.22E-11	7.28E-12	-4.67E-09
HTnCE [CTUh}	1.24E-07	1.95E-09	8.53E-10	0.00E+00	1.20E-09	9.78E-10	1.80E-10	-2.03E-07
LU [Pt]	1.00E+02	1.42E+00	2.94E-01	0.00E+00	8.72E-01	9.70E-02	5.46E-02	-3.26E+00

5. LCA Interpretation

The manufacturing stage (A1-A3) contributes to the majority of impacts across the life cycle stages, and across all indicators, as shown in Figure 2. As the Reflecta plates are used as an insulation layer in the floor (EPS) and as heat distribution layer (aluminum), the product also benefits from the material recovery for recycling, as seen in the credits at end-of-life (D).

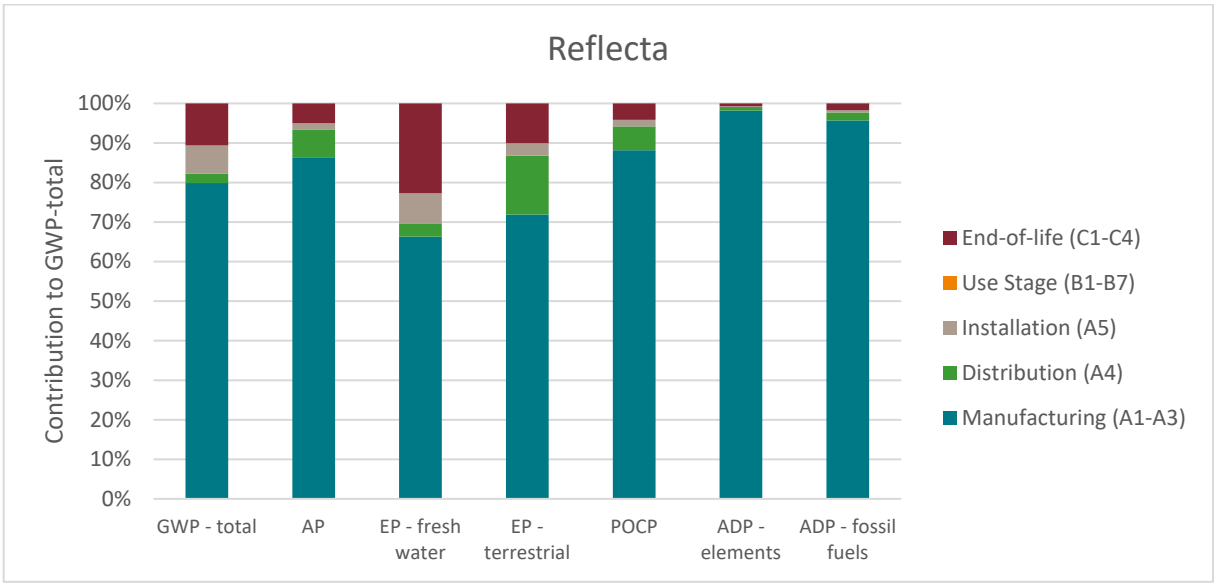

Figure 2: LCA Results for Reflecta, by life cycle stage

6. Additional Environmental Information

6.1 Scenario Analysis – T2Red Energy Savings

A scenario analysis was performed to identify potential energy savings associated with the use of the Reflecta with a T2Red cable system. This scenario aims to compare a floor construction with the T2Red cable embedded in the Reflecta versus the T2Red cable embedded in a screed (an alternative floor construction).

Based on a power consumption simulation, the difference in heat up time between the T2Red and Reflecta and a standard installation with only T2Red is shared in Figure 3. The Reflecta installation is heating up much faster (up to 25 times faster) which gives it an extreme advantage when well controlled, as the standard installation in a screed, would not make it possible to regulate with different temperatures based on the predicted occupancy of the room while the Reflecta installation does.

The table 14 below lists out the temperatures selected from Figure 3 to support the energy saving calculations between the two systems. The T2Blue power consumption is used as a proxy for the T2Red cable for the purpose of the calculation.

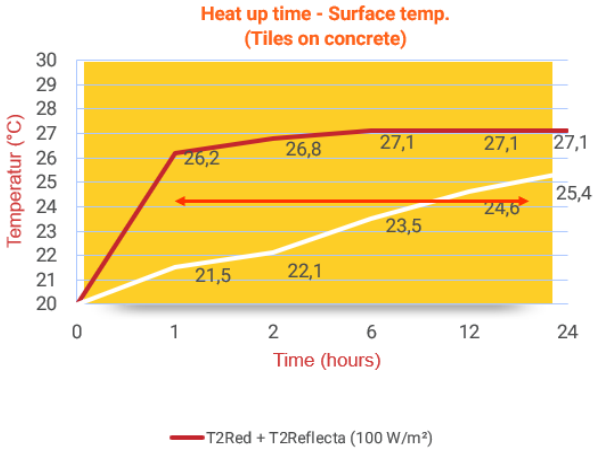

Figure 3: Heat up time scenarios

Table 14: T2Red scenario calculations

	T2RED ONLY	T2RED + REFLECTA
Heat up time to reach 21.5˚C (in hours)	1	0.2
Heat up time to reach 25.4˚C (in hours)	24	0.8
T2Red power consumption (in kW/m^2 of floor construction)	0.104	0.104

The Figure 4 below displays a comparison of the power consumption required to reach the same temperature for both systems, as well as the estimated global warming potential difference between the two. The system that contains the Reflecta heats up much faster and then requires less energy to reach the set temperature, which is directly proportional to the global warming potential (GWP-total) associated with the use stage.

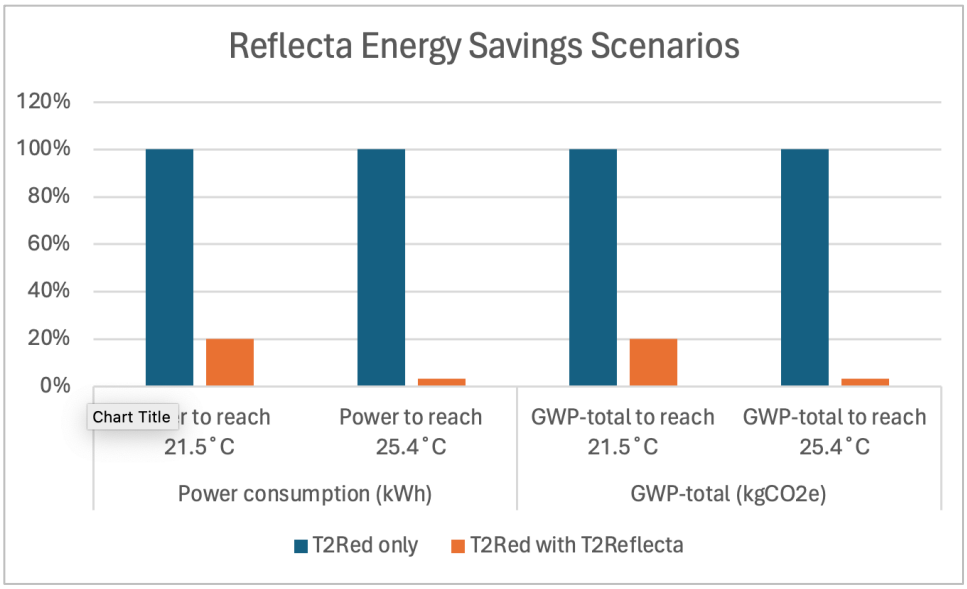

Figure 4: Power consumption and GWP comparison between T2Red floor heating systems

6.2 Environment and Health During Installation

Further information about the product installation can be found on the Chemelex RAYCHEM website product page: https://www.nvent.com/en-gb/raychem/products/reflecta-underfloor-insulation-and-heat-spreading-board-0

6.3 Environmental Activities and Certifications

The manufacturing site in Sweden holds the following certifications:

- ISO 9001
- ISO 14001
- ISO 45001

The carbon emissions of these products associated with their raw materials and manufacturing processes (cradle-to-gate) are offset using RECs that support renewable energy to help reduce the product environmental impact.

6.4 Further Information

Further information about the product can be found on the Chemelex RAYCHEM website product page: https://www.nvent.com/en-gb/raychem/products/reflecta-underfloor-insulation-and-heat-spreading-board-0.

7. References

CEN. (2019). *EN 15804+A2: Sustainability of construction works – Environmental product declarations – Core rules for* the product category of construction products. European Committee for Standardization.

EN 50639:2019 – Product category rules for life cycle assessments of electronic and electrical products and systems.

ISO. (2006). *ISO 14040/Amd 1:2020: Environmental management - Life cycle assessment - Principles and framework.* Geneva: International Organization for Standardization.

ISO. (2006). *ISO 14044/Amd 1:2017/Amd 2:2020: Environmental Management - Life cycle assessment - Requirements and Guidelines.* Geneva: International Organization for Standardization.

P.E.P. Association. (2021). PEP ecopassport® Program: Product Category Rules for Electrical, Electronic and HVAC-R Products. PCR-ed4-EN-2021 09 06.