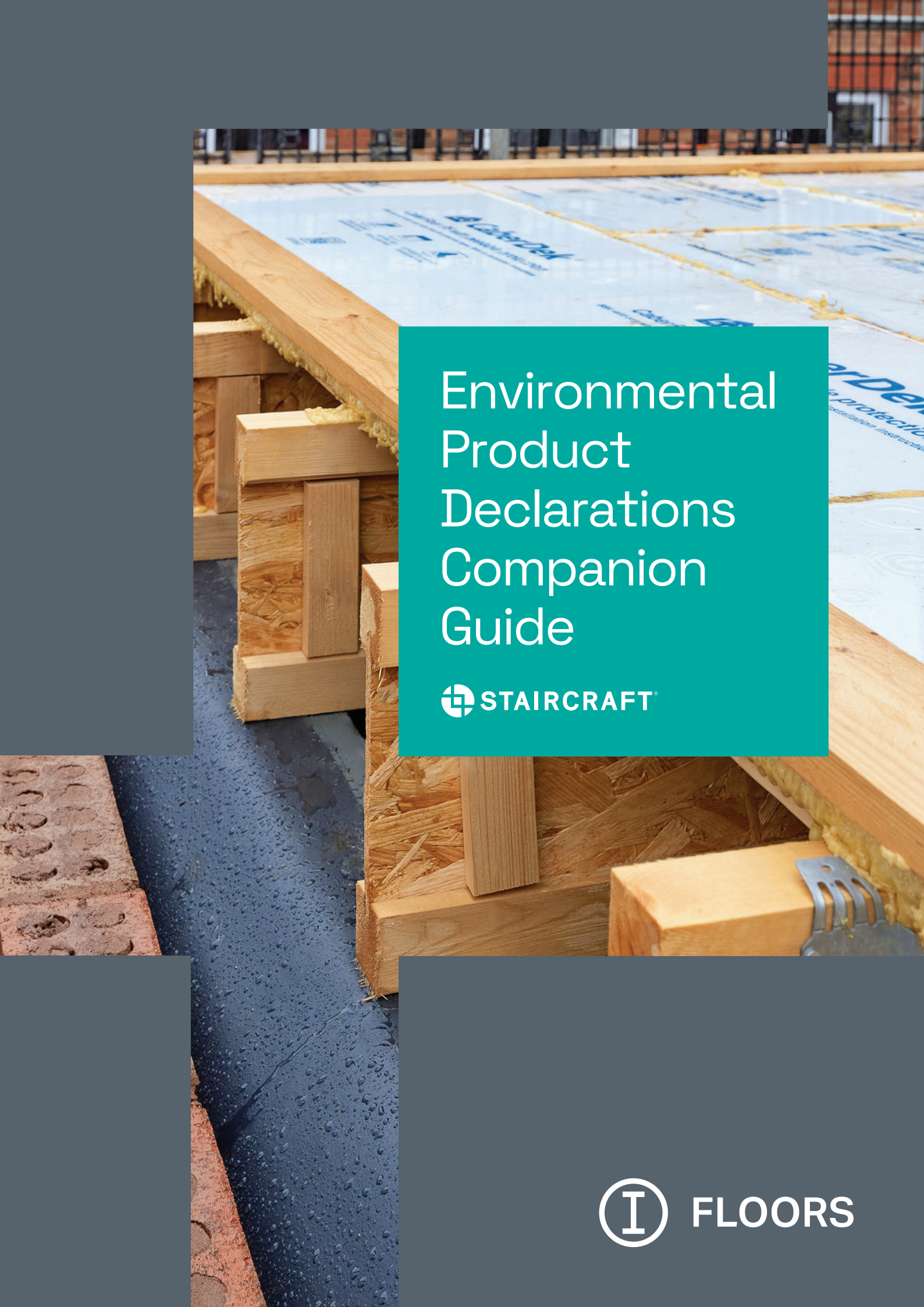
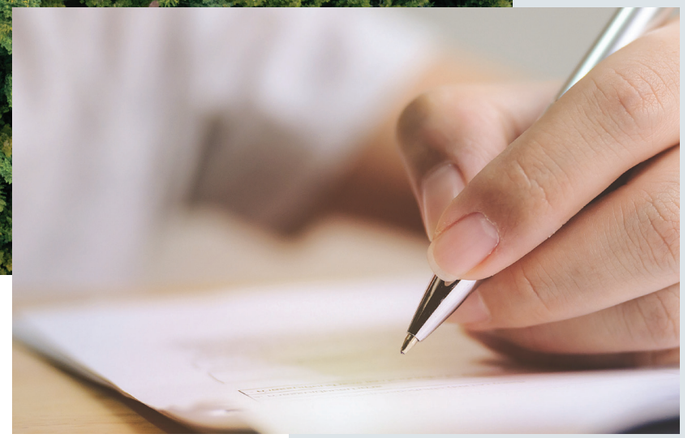


Environmental Product Declarations Companion Guide

STAIRCRAFT®

FLOORS

Staircraft has recently published two EPDs which provide detailed information on the environmental impacts of our I-joist timber floors and chipboard floor decking. Together, they are intended to provide everything needed to calculate the environmental impact that using our floors will have in your building. The purpose of this guide is to act as a companion document to these EPDs – explaining the background, terminology, contents and how to use the information provided.



Key points to remember:

Beware of unverified EPDs

Verified EPDs have been checked by an independent expert LCA assessor, so can be relied upon as a true, unbiased reflection of the environmental impacts that the product is likely to have. Conversely, unverified EPDs have not been subject to an independent 3rd party review so these may be subject to error, misinterpretation, or bias.

Be careful when interpreting EPD results

Even for verified EPDs, there are a number of reasons why the results for similar construction products may not be comparable. Simple changes to the choice of assumptions made, methods selected, or databases used can have profound effects on the results (by up to ±400%).

The industry is on a journey to develop EPDs across entire product ranges. It is a costly and time consuming process which requires qualified LCA analysts and verifiers. Staircraft are proud to be to be at the forefront in developing EPDs for all of the products we supply.

Environmental and EPD Terminology Explained

Greenhouse gas emission categories

To help differentiate between the different kinds of emissions a company creates in its own operations and in its wider 'value chain' (its suppliers and customers) the Greenhouse Gas Protocol (which is the world's most widely used greenhouse gas accounting standard) classifies greenhouse gas emissions into 3 categories or 'scopes' :

- **Scope 1 emissions** - covers emissions from sources that the company controls directly – for example from burning fuel in the vehicles it runs.
- **Scope 2 emissions** - emissions that the company indirectly causes from where the energy it uses is produced - for example the emissions caused when generating the electricity we use in our offices or factories.
- **Scope 3 emissions** – all other emissions that are not within scope 1 or 2 but for which it is indirectly responsible – for example when we buy, use and dispose of products from suppliers.

These categories are useful in helping companies (or organisations) to quantify and articulate their greenhouse gas emissions to stakeholders. These are company level metrics of the overall carbon footprint of their business – not of the individual products they may produce.

EPDs on the other hand focus on products, and include metrics from all 3 of these categories to characterise the product's carbon footprint - expressed as a 'Global Warming Potential'.

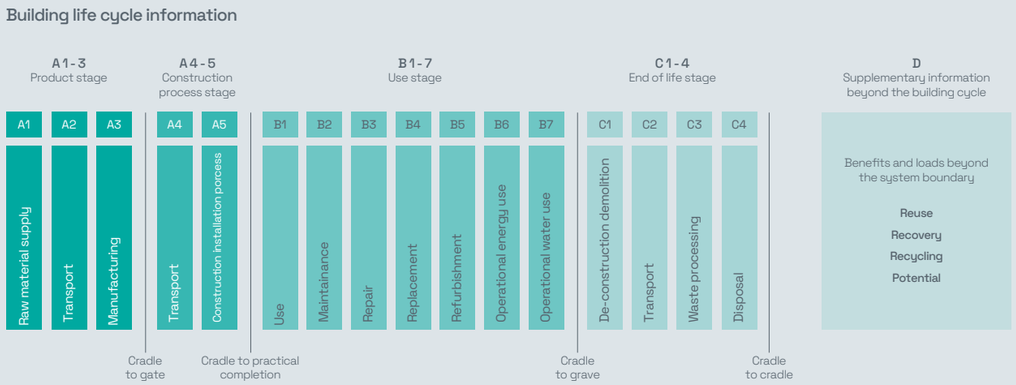
Product Performance Declarations and Eco-Labelling

EPDs are one of 3 types of Eco-labelling that are defined in ISO 14025 to help differentiate between environmental initiatives, declarations and schemes of various types, as follows:

- **Type I Eco-labels** – independently verified third-party labelling schemes eg PEFC labelling for sustainably sourced timber.
- **Type II Eco-labels** – self declarations where no independent third party certification exists eg: 'Dolphin safe'
- **Type III Environmental Declarations** – EPD declarations which have been independently verified.

EPD Life-Cycles Stages and their Significance

EPDs split the product life cycle into 5 different stages, and these are broken down into separate modules as summarised in the table below:



- **Stages A1-A3** - cover the environmental impacts in extracting and transporting the raw materials used in the product, and in its subsequent manufacture.
- **Stages A4-A5** - cover the impacts of the transportation and installation of the product on site.
- **Stages B1-B7** - cover the impacts of the use of the product during its service life
- **Stages C1-C4** - cover the end-of-life stages involved in removing and disposing of the product.
- **Stage D** – covers any reuse or recycling of the product which may be possible.

EPD Life-Cycles Stages and their Significance

In our EPDs, we have declared the environmental impacts of our products for stages A1-A3; A4-A5 and C & D. Environmental impacts for stages B1-B5 are not declared in our (and most other) construction product EPDs as they are difficult to quantify reliably and are beyond our control. Because the end-of-life process for demolition and waste removal/recycling is unclear or unknown, we have assumed a worst-case scenario for product stages C & D whereby the products are sent to landfill at the end-of-life. Any possible recycling or reuse would therefore lower the environmental impacts we are declaring for these stages.

What is an Environmental Product Declaration and what is it used for?

What is an EPD?

EPD stands for ‘Environmental Product Declaration’. It is a document that demonstrates the environmental impacts of a product in a quantifiable way. EPDs are produced using a Life Cycle Assessment (LCA) performed according to standardised Product Category Rules (PCR’s) specified in EN 15804 (the European Standard for the generation of EPD’s for construction products), ISO 14025, and other international standards. This ensures the approach taken to the quantification of environmental impacts is consistent with accepted methods. The Life Cycle Assessment that underpins an EPD is a desktop analysis of information pertaining to the product’s material consumption, as well as the energy, water and waste generated during the product’s production over a full production year.

What does it cover?

It covers the whole life cycle of the product, including:

- Raw material extraction
- Manufacturing
- Distribution
- Installation & use
- Disposal at the end of life

It then calculates the environmental footprint of the product in 15+ impact outcomes including global warming potential, smog creation, ozone depletion and water and pollution.

What is it used for?

The resulting data contained in EPDs can feed into whole building assessment schemes to enable comparisons between alternative products and to assess design options that could improve a building's environmental performance. They can also help manufacturers to improve product composition or manufacturing processes, to reduce their overall environmental impact.

Key Considerations when Comparing EPD results

When comparing the EPD data for products, please bear in mind that results may differ due to the following reasons:

The Environmental Product Declarations standard against which the data was prepared

The latest version of the European Standard for EPD production is EN 15804+A2 which was published in 2019 and became mandatory in 2022. This differs significantly from the previous version of this Standard (EN 15804+A1) published in 2012, in that the latest version explicitly accounts for any biogenic sequestration of C02 within products, whereas the previous version did not. The results declared for materials like timber will therefore look very different depending upon whether they are based on the rules set out in EN15804+A1 or EN15804+A2. It is important to understand that an EPD from one manufacturer may not be comparable with that of its competitor if they are produced under different versions of EN 15804.

The choice of emissions factors

EN 15804 does not dictate which emissions factor database must be used (i.e. ICE, Ecoinvent, etc) so manufacturers of the same product could use different databases and select different emissions factors, even though they are using the same materials. The choice of database and emission factors can have a profound effect on the results obtained - up to ±400% in some instances. This lack of comparability due to emissions factor selection is something that groups of manufacturers of the same product ranges should ideally address together, selecting the same factors so that the final EPD data is more comparable.

The choice of estimation methodology

Where certain lifecycle stages do not have accurate or comprehensive information. One manufacturer may take a 'worst case / conservative' estimate, whereas another may consider a 'best case / optimist' estimate.

All modules of the EPD have been declared

It's possible that one manufacturer may have opted to estimate 'site installation' impacts (i.e. A5 impacts have been declared), whilst another has opted to exclude it (i.e. MND = module not declared). The whole life impact of the two EPDs will therefore not be comparable.

The choice of Functional Unit

When comparing data make sure you've brought the figures into a common unit of measure. Against which the data is reported (i.e. manufacturer 1 may have presented data 'per meter of product', whereas manufacturer 2 may have presented data 'per kg of product').

The EPD was published

Unverified EPD's have not been subject to an independent 3rd party review of the claims they contain, these may be subject to error, misinterpretation or bias so they must be treated with caution. Conversely, EPDs that have been verified can be relied upon as a true, unbiased reflection of the environmental impacts that the product is likely to have.

The validity period of the EPD

EPDs are valid for 5 years unless manufacturers wish to update them beforehand to reflect changes in the impacts of material composition or manufacturing process etc. EPDs can be extended for a further 5 years, providing the manufacturer can provide evidence that no significant changes have occurred to the product composition or manufacturing process.

EPD Environmental Impact Indicators

An EPD measures and declares environmental impacts in a number of different ways – primarily in terms of either:

GWP = Global Warming Potential

A measure of the greenhouse gas emissions arising from the products manufacture, use and subsequent disposal. As greenhouse gases don't all have the same impact on global warming, it measures the amount of greenhouse gases produced and compares them to an equivalent amount of C02 to cause the same effect (expressed as C02e).

This is probably the most widely used of environmental impact measures, and is further broken down into the following sub-categories:

- **GWP Fossil** – quantifies the greenhouse gas emissions that arise from the burning or use of fossil fuels in the production, use and disposal of the product.
- **GWP Biogenic** - quantifies the amount of C02 absorbed from the atmosphere during the growth of any biomass used in the product and locked up for the lifetime of the material, as well as biogenic emissions to air through oxidation or decay of biomass (e.g. combustion).
- **GWP LULUC** – quantifies the greenhouse gas emissions that arise from land use or land use change in the production, use and disposal of the product.
- **GWP Total** – is the sum total of each of the 3 GWP components listed above.

EP = Eutrophication potential

A measure of the potential to cause over-fertilisation of water and soil from nutrients such as nitrogen or phosphorus.

POCP = Photochemical ozone formation

Quantifies the relative abilities of volatile organic compounds (VOCs) to produce ground level ozone. Ozone has the greatest impact on the respiratory system, where it irritates the mucous membranes of the nose, throat and airways. In the presence of sunlight, they produce 'photochemical smog'.

ADP = Abiotic depletion potential

The removal of abiotic resources from the earth such as Sunlight, air, precipitation, minerals, or the depletion of non-living natural resources. The results of this environmental impact indicator should be used with care as the uncertainties on these results are high and there is limited experience with the indicator.

Primary Energy Resources (PER)

Measured in MJ and declared under the following categories :- PER as Energy (Renewable and Non-Renewable): quantifies the direct energy resources consumed during the production, use and disposal.

PER as Material (Renewable and Non-Renewable): quantifies the energy resources indirectly consumed by the raw materials used. It considers the energy embedded in materials and evaluates the environmental consequences of their extraction and utilisation.

In summary, these impact categories help assess the environmental implications of both the direct consumption of energy during a product's life cycle and the use of primary energy as raw materials in the production process. (Note: 1MJ = 0.28 kWh).

Waste disposal and recovery

Measured in kg and declared under the following four categories:

- Non-hazardous waste disposed
- Hazardous waste disposed
- Radioactive waste disposed
- Materials for energy recovery

Key Outcomes from Our Timber Floor EPDs

The findings from our LCA assessment demonstrates the following key findings for the 'Cradle to Installation' (A1-A5) production of a standard rectangular 4m x 8m domestic timber floor:

Global Warming Potential

As regards the global warming potential:

- A typical Staircraft TFSi-joist Floor Kit weighing 366 kg locks up in its wood fibres the equivalent of 456 kg of CO2 equivalent. The amount of CO2 trapped in the structural floor system (-456 kg) is superior to the emissions related to the manufacturing of the components (157.5 kgCO2e), thus resulting in a global CO2 sink of 298.5 kg of CO2 equivalent for each floor (A1-A5). This compensates the equivalent emissions of greenhouse gases of approx, 2296 km by car(1), or is equal to the CO2 that is locked up annually by 149 standing trees(2) .
- A typical Staircraft Factory Cut chipboard flooring pack weighing 533.7 kg, locks up in its wood fibres the equivalent of 811.2 kg of CO2 equivalent. The amount of CO2 trapped in the chipboard flooring (-811.2 kgCO2e) is superior to the emissions related to the manufacturing of the components (162.8 kgCO2e), thus resulting in a global CO2 sink of 648.4 kgCO2e of CO2 equivalent for each floor. This compensates the equivalent emissions of greenhouse gases of approx, 4987 km by car(1), or is equal to the CO2 that is locked up annually by 324 standing trees(2) .
- With its total timber joist and flooring production, Staircraft helps annually to lock up more than 16,000 tonnes of CO2, which is equal to what is locked up annually by 8 million trees(2).

(1) Average new European car = 130 gr CO2 /passenger /km
(2) Average UK tree locks up = 2 kg of CO2 /year according to the UK Forestry Commission

Calculating the Carbon Footprint of your TFSi-joist Floor and Decking

Staircraft has recently published 2 EDPs providing all the information necessary for us to provide you with an accurate carbon footprint for any of the TFSi-joist floor and chipboard decking kits we manufacture and supply. These are both published by the EPD Hub with the following references:

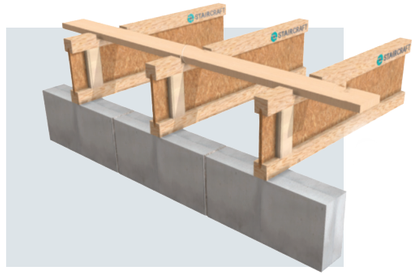
Staircraft Group Ltd	TFSi-joist Timber Floors	EPD number HUB-0927	Dated 18/12/2023
Staircraft Group Ltd	Chipboard Timber Flooring	EPD number HUB-0940	Dated 15/12/2023

The first of these deals with the primary structural TFSi-joist floor and any associated timber components or metalwork necessary to build the floor structure. The accompanying chipboard flooring which is laid on top to form the walking surface is covered in a separate EPD because this can be supplied in one of 2 ways depending upon our customers preference – either as a loose pack of boards to be cut on site, or as a factory pre-cut pack of boards which are laid on site in accordance with a pre-designed flooring layout plan – and these have different environmental impacts.

To avoid a situation whereby the results in the EPD pertained only to the reference floor upon which they were benchmarked, both EPDs publish their LCA parameters on a per kg basis of installed product, enabling the results to be scaled to suit floors of alternative sizes or configurations, simply by knowing the weight of the floor joist pack supplied, the floor area for which chipboard flooring has been supplied, and whether the flooring has been supplied to be site cut or is factory pre-cut.

In practical application, this scalability is achieved by reference to the Annexes in both EPDs, which define the types of floor and chipboard supply options for which this extensibility is valid, and provide the appropriate alternative LCA parameters that apply in each case. For convenience these are reproduced below along with a working example of how we calculate the carbon footprint of any particular floor and decking kit we might supply to you:

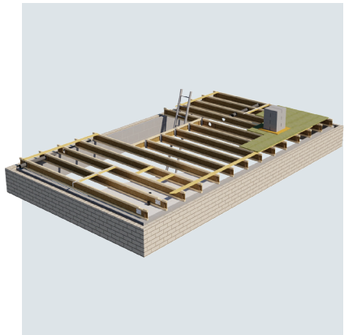
Joists and Framing



GWP-Total (kg CO_2e per kg)			GWP-Fossil (kg CO_2e per kg)
Cradle to Gate A1 - A3	Cradle to Installation A1 - A5	Cradle to Grave A1 - C4	Cradle to Gate A1 - A3
-0.892	-0.811	0.473	0.424

Chipboard Flooring

	GWP-Total (kg CO_2e per kg)			GWP-Fossil (kg CO_2e per kg)
	Cradle to Gate A1 - A3	Cradle to Installation A1 - A5	Cradle to Grave A1 - C4	A1 - A3
Site cut	-1.64	-1.16	0.376	0.331
Factory cut	-1.23	-1.21	0.319	0.281



As an example, by reference to the above table, the carbon footprint of a floor with 4m x 8m internal dimensions between walls, and floor components weighting a total of 255kg can be calculated as follows:

- **For Stages A1-A3** (Cradle to Grate)
  GWP Total = -0.892 x 255kg = -227.5 kgCO2e
- **For Stages A1-A5** (Cradle to Installation)
  GWP Total = -0.811 x 255kg = -206.8 kgCO2e
- **For Stages A1-C4** (Cradle to Grave)
  GWP Total = 0.473 x 255kg = 120.6 kgCO2e

Chipboard Flooring

To calculate the carbon footprint of the chipboard flooring we must first calculate the total weight of flooring required in the finished floor. The total weight of installed flooring = Internal floor area x floor thickness x chipboard density, so assuming the chipboard is 22mm thick, with a density of 700kg/m3 then:

22mm thick chipboard flooring weight (installed) = internal floor area x 15.4 ..... (kg)
18mm thick chipboard flooring weight (installed) = internal floor area x 12.6 ..... (kg)

For our example floor, with an internal floor area of 4m x 8m = 32m2 this then requires 32 x 15.4 = 492.8kg of chipboard in the finished floor. The carbon footprint of this flooring will then depend upon whether it has been supplied as a site cut floor pack, or as a factory cut floor pack, as follows:

If supplied for site cutting

- **For Stages A1-A3** (Cradle to Gate)
  GWP Total = -1.64 x 492.8kg = -808.2 kgCO2e
- **For Stages A1-A5** (Cradle to Installation)
  GWP Total = -1.16 x 492.8kg = -571.6 kgCO2e
- **For Stages A1-C4** (Cradle to Grave)
  GWP Total = 0.376 x 492.8kg = 185.3 kgCO2e

If supplied with factory pre-cut decking

- **For Stages A1-A3** (Cradle to Gate)
  GWP Total = -1.23 x 492.8g = -606.1 kgCO2e
- **For Stages A1-A5** (Cradle to Installation)
  GWP Total = -1.21 x 492.8kg = -596.3 kgCO2e
- **For Stages A1-C4** (Cradle to Grave)
  GWP Total = 0.319 x 492.8kg = 157.2 kgCO2e

Notice that when leaving our factory (A1-A3) the site cut decking option has a superior carbon footprint as it weighs more (because it has site waste offcuts included), but when installed on site (A1-A5) or at the end-of-life, factory precut decking has a superior carbon footprint.

Taking these joist and flooring examples together as a combined supply package, their combined carbon footprint would be:

For site cut decking

- **For Stages A1-A3** (Cradle to Gate)
  GWP Total = -227.5 + -808.2 = -1035.7 kgCO2e
- **For Stages A1-A5** (Cradle to Installation)
  GWP Total = -206.8 + -571.6 = -778.4 kgCO2e
- **For Stages A1-C4** (Cradle to Grave)
  GWP Total = 120.6 + 185.3 = 305.9 kgCO2e

For factory cut decking

- **For Stages A1-A3** (Cradle to Gate)
  GWP Total = -227.5 + -606.1 = -833.6 kgCO2e
- **For Stages A1-A5** (Cradle to Installation)
  GWP Total = -206.8 + -596.3 = -803.1 kgCO2e
- **For Stages A1-C4** (Cradle to Grave)
  GWP Total = 120.6 + 157.2 = 277.8 kgCO2e

Summary and Conclusions

Staircraft are the first timber floor kit manufacturer to produce an EPD for domestic timber floors constructed with timber i-Joists. Our new EPDs have been independently 3rd party verified so the figures they contain can be absolutely relied upon as being accurate and truthful.

Our new timber joist EPD is also now supplemented by a separate EPD covering the chipboard flooring which is laid on top. Although product EPDs exist from the chipboard manufacturers themselves, these do not cover any subsequent processing or transport which may be involved in their supply to construction sites as a flooring pack, so once again this EPD is uniquely aimed at the use of such flooring boards on completed timber floors. Taken together these EPDs enable us to calculate the carbon footprint of the entire timber joist and flooring package that we supply you.

These EPDs are published by the EPD Hub, are produced in accordance with EN 15804+A2:2019. The data they contain has been verified and signed-off by an independent professional expert in accordance to ISO 14025. Beware of unverified EPDs because the accuracy of the data they have used, and the results they contain, has not been signed-off by anybody other than the manufacturer. This can cause errors, inconsistencies, and ultimately may mean the figures cannot be relied upon. ISO 14025 does not recognise unverified EPDs as a Type III Environmental Declaration.

Be careful when comparing results between different EPDs, there are many reasons why results may differ considerably between similar products, depending upon the choice of assumptions made, methods selected or databases used. These are further explained earlier in this Guide.

From Cradle to Site Installation (A1-A5), both our timber floor and chipboard decking supply have been verified as having a negative Total Global Warming Potential – meaning that if you use our floor system you can legitimately offset any positive carbon emissions from other components in your build.

As an example, from Cradle to Site Installation a typical TFSi floor and decking kit supplied by Staircraft will offset between 700 - 1000kg of C02e in your building - equivalent to the amount of C02 which is locked up annually in a stand of 350-500 trees. As a company, our total timber floor output will be offsetting a massive 16,000 tonnes of C02 each year – equivalent to that which is locked up annually by 8 million trees.

Staircraft's commitment to sustainability is unwavering, and the publication of these particular EPDs will soon be followed by further independently verified EPDs which cover all other products we supply into the construction industry. These will enable our customers to evidence significant reductions in cradle-to-installation carbon emissions in their buildings. Look out for further information and guidance from us on the significance and application of our other EPDs, and the ways in which they can help you with your own carbon challenges.