

Life-Cycle Assessment

BASF PUR Flooring Systems

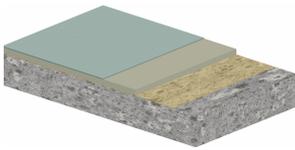
Mastertop 1324, 1325, 1326



PUR (Polyurethane)

BASF Mastertop Flooring Systems 1324, 1325, and 1326 are PUR based and are used for applications in hospitals and schools for rooms or corridors. PUR comprises resins, hardener components as well as fillers. PUR flooring systems are applied seamlessly.

Composition and Layers



BASF Mastertop flooring systems are basically made of 3 layers (primer, body coat and top coat) and consist of about 60% of PUR components (thereof 10% based on renewable raw materials), 30% of fillers such as silica sand and 10% of other materials. The total weight of the initial application is about 3.5 kg/m².

Life-time of PUR Systems and Renewal

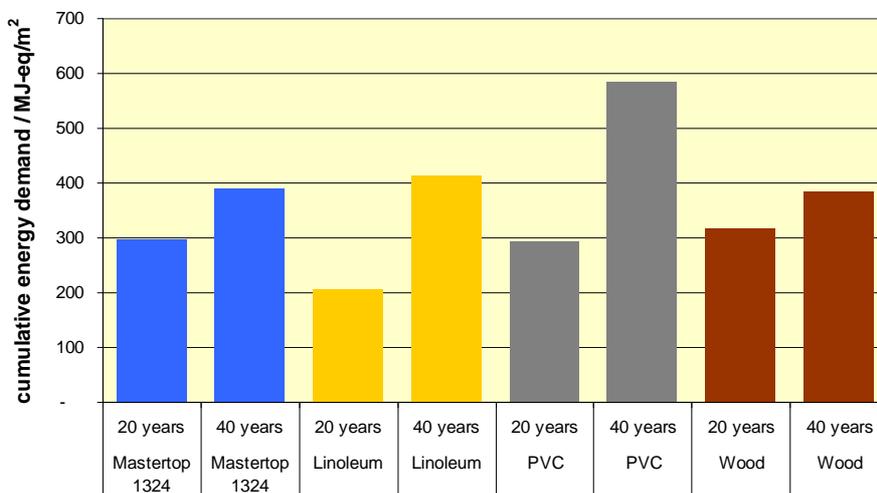
An important advantage of PUR based flooring systems is the possibility to renew the top coat without a complete removal of the flooring system – a process called “retopping”. The top coat is partially removed (grinded) and renewed typically every 10 years. The life-time of *primer* and *body coat* is about 40 to 50 years. Other flooring systems have to be removed and replaced completely when reaching the end of their life-time. Also, compared to other systems the life-time of PUR flooring systems is long. This has been documented by the durability of indoor and outdoor sport flooring applications.

BASF Mastertop Flooring Systems compared with other Flooring Systems

Comparison of BASF Mastertop systems with other flooring systems shows that BASF PUR flooring systems are especially advantageous in case of long term usages of 40 years. Within this time span most of the comparative flooring systems have to be replaced at least once.

The cumulative energy demand of a product is defined as the sum of all primary energy resources used for raw material production plus all other energy consumption during transport, production and life-time of a product. For all flooring systems the main contribution is due to the production of the materials.

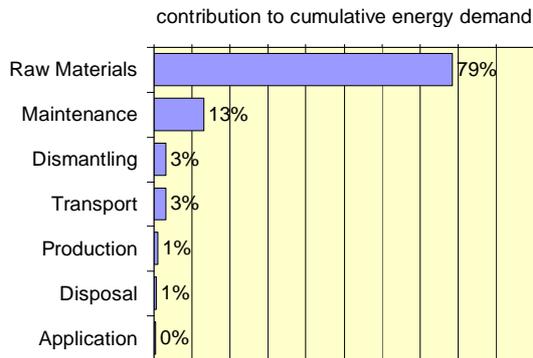
Retopping of PUR flooring systems increases the cumulative energy demand of about 3 to 5% for each retopping cycle (depending on the type of top-coat), which is much less than the complete removal and replacement of comparative systems. This effect pays off for a usage of more than 20 years. Only wooden systems are more advantageous for long term usages (see graph below). It has to be considered that wood flooring systems are not suitable for all applications, e.g. they cannot be used in a dry environment, for machine based wet cleaning, situations with heavy traffic areas, etc.



Graph: Comparison of the cumulative energy demand of the entire life cycle for different flooring systems with BASF floorings system Mastertop 1324. Calculation for 20 and 40 years of product use. PVC and Linoleum have to be replaced after 20 and 25 years, respectively. The same cleaning cycles and cleaning intensity were applied to all systems.

Life-Cycle Assessment of the BASF Mastertop Flooring Systems 1324, 1325, and 1326

For all three flooring systems the relevance in terms of the cumulative energy demand for each life-cycle step is about as follows (40 years of product use):



Two life-cycle steps define more than 90% of the total cumulative energy demand:

- Production of raw materials (including the amount used for retopping)
- Maintenance (including the energy used for retopping)

Conclusions

PUR based flooring systems are ecologically advantageous when used for long periods. Compared to Linoleum or PVC flooring, where life-times of only 20 to 25 years are achieved, the top coat of PUR based flooring systems can be reworked to extend the life time of the whole system to more than 40 years.

Due to its seamless nature PUR flooring system can be efficiently cleaned. This also can reduce the environmental burden throughout the life time of the flooring system.

Advantageous Properties of PUR Flooring Systems are

- wide range of applications, e.g. industry, offices, schools, hospitals, and even private households
- seamless application allows for efficient cleaning
- easy to repair, occasional damage can be repaired without removal of large areas of the flooring
- retopping – even with differently coloured top coater – allows for cost- and environmentally friendly renovations
- retopping also guarantees for a floor which looks like new throughout the extended life-time
- low VOC-emissions in use phase due to immediate evaporation of VOC in application phase

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Frame of the BASF Mastertop Study

What is a life-cycle assessment?

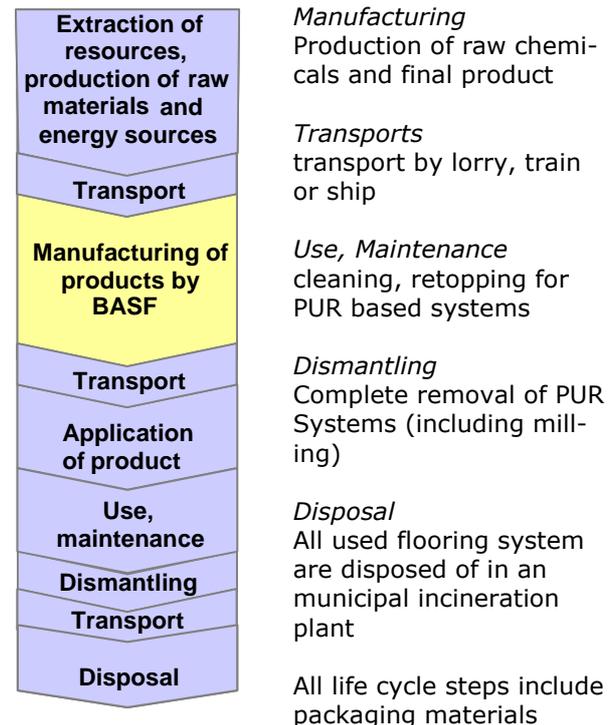
A life-cycle assessment provides information on the environmental impact of a product over the entire life-cycle from the extraction of resources to the disposal of the product.

Goal

The goal of the study was to identify the relevant environmental impacts of PUR flooring systems in order to identify improvement potentials and to compare PUR with other flooring systems.

Life-cycle steps

The study comprises of the following life-cycle steps:



Functional unit and valuation methods

A functional unit is an entity that is used to compare the life-cycle assessment of different products. In this study 1 m²/use phase (in years) of the flooring systems has been used. Applied valuation methods: cumulative energy demand (CED).

Data sources

- Production of raw materials and energy sources: ecoinvent 2.2 database.
- Production, application, maintenance, transport: BASF Schaffhausen, partners and suppliers of BASF.

Comparison with other studies

For the comparison with linoleum, PVC and wood literature data has been used. All compared flooring systems include the raw material production, the application (usage of adhesives was estimated, since no data was available), maintenance (including wet cleaning once per week and coating once a year) and disposal.