



Münster, 01.07.2020

**Report on  
“CO2 balance regarding the product system “floor  
remake“ and the replacement, production and new  
installation of a floor“**

**in accordance with**

**di-no. – procedural regulation D-20/400780**

**for the company**

**Dr. Schutz GmbH  
Holbeinstraße 17  
D – 53175 Bonn**



**Report  
of the German Institute  
for Sustainability & Economy**

<b>Client</b>	<b>Standard</b>	<b>Procedural Number</b>	<b>Type of Audit</b>
Dr. Schutz GmbH Holbeinstraße 17 D – 53175 Bonn	di-no.- procedural regulation D-20/400780	2020/06-12227	Analytical procedure

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**1.**

This report shall document the scope of the task described below, as well as its development and results/findings. In the report the scope of the task, the procedures and results will be described in a summary.

This work is based on comprehensive research, analyses, elaborations and refers to investigations and evaluations carried out at universities of applied sciences.

**1.01**

**Definition of Task:**

**Performance comparison of the carbon footprint of the product system “floor remake” compared to the replacement, production and new laying of a floor**

**1.011**

Environmental friendliness regarding: carbon footprint, optimised logistics and savings, or the avoidance of production and recycling cycles.



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**2.  
Analytical Procedure:**

At first the Institute was provided with diverse process descriptions, performance indicators and a filled-in questionnaire by the client. These and the data ascertained by the Institute are listed below with their parameters:

**Article:** **Product System „floor remake“**  
 Dimensions: The conversions were based on 10 m<sup>2</sup> area/70 μ thickness  
 Weight: 0,07 kg / m<sup>2</sup> = 0,70 kg / 10 m<sup>2</sup>  
 Provenance of Article: Germany  
 Recycling: not applicable  
 HGV Logistics: logistics within Germany of raw material suppliers up to the finished product from the working service provider  
 Small Van Logistics: delivery of service provider to final consumer, on average approx. 80 km

**CO2 Emissions**  
 Recycling: CO2 per kilometer and metric tonne does not apply  
 Manufacture: 114kg CO2 per metric tonne  
 HGV: 238,3g CO2 per kilometer and tonne of product weight  
 Small Van: 194g CO2 per kilometer and total weight  
 Service Provider Vehicle: 160g CO2 per kilometer and total weight

**Comparative Article: Installation of a new floor**, incl. removal, disposal and recycling of the old floor - here resilient floor/PVC etc., with residual adhesive.



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Article: Resilient floor with adhesive and cement filler 2 mm  
 Dimensions: 10 m<sup>2</sup> area/4mm resilient floor + adhesive  
 Weight: 4 kg / m<sup>2</sup> = 40 kg / 10m<sup>2</sup>  
 Provenance  
 of Article: Approx. 90 % parts from Europe per HGV and by train  
 Sea Route: Approx. 10% parts from overseas  
 HGV Logistics: Raw materials to the place of manufacture approx. 320 km on average  
 Delivery of raw materials for further processing - 80 km on average  
 Small Van  
 Logistics: Delivery from the manufacturer to final consumer - 80km on average

CO2 Emissions of the New Goods from Europe

Container Ship: not applicable  
 HGV: 238,3g CO2 per kilometer and metric tonne  
 Production: 195kg CO2 per tonne of resilient floor  
 Small Van: 194g CO2 per kilometer and total weight  
 Service Provider  
 Vehicle: 160g CO2 per kilometer and total weight

CO2 Emission of the Recycling Process  
and Disposal of old Materials:

Removal of floor: 121g CO2 per tonne of old materials  
 Logistics: 238,3g CO2 per kilometer and metric tonne  
 Recycling: 8,1kg CO2 per tonne of resilient floor and accompanying materials

**EPD-Data of resilient floors in accordance with ERFMI (European Resilient Flooring Manufacturers' Institute)**



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The ascertained data and values from pages 4 and 5 were adduced for further analysis. Thereby it was also taken into account that for the exchange of defective floors, removed for a new product, additional costs of disposal or diverse recycling processes will accrue. It was also borne in mind that when old floors are recycled, this takes place by dividing them into diverse usable and non-usable fractions. Non-usable materials must be disposed of properly, incurring further costs.

**2.01**

Ascertaining the CO<sub>2</sub> values per 10 m<sup>2</sup> “floor remake“ compared with the logistics, production and installation of a new product, including the disposal of old materials.

For further calculation the corresponding values were then ascertained:

One HGV emits per metric tonne and kilometer up to 238,3 grams.

Converted for the distance driven, this results in the following:

HGV:                    238,3 g CO<sub>2</sub>/ km per tonne = 76,256 kg CO<sub>2</sub> / t for 320 km  
                              238,3 g CO<sub>2</sub>/ km per tonne = 19,064 kg CO<sub>2</sub> / t for 80 km

Small Van

and Car Logistics: 194,0 g CO<sub>2</sub> / km per tonne = 15,520 kg CO<sub>2</sub> / t for 80 km

Total emissions: 110,840 kg CO<sub>2</sub> per tonne. Transported from the place of extraction of raw materials via the production of finished goods to the place of use in Germany.

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**Review of the logistics expense and energy with regard to shipping the finished product of resilient floors from the far east.**

Calculation of pure CO<sub>2</sub> – emissions from transport by sea route:

Transport route: Shanghai to Hamburg  
 Distance: 10.778 nautical miles = 19.961 km  
 Means of transport: Container ship 8.000 containers and more  
 Speed: Average  $V_{md}$  22 knots = 40,74 km/h  
 $\Rightarrow EV_{md} = 5,3g / tkm$  (tonnes per kilometer)  
 Normal  $V_{nor}$  23,3 knots = 43,15 km/h  
 Fuel: Heavy fuel oil: CO<sub>2</sub>- factor of 3,114g/g  
 (CO<sub>2</sub>/ heavy fuel oil)  
 Shipment weight: 7 t in one 20-foot container

Formula 1:  $EV_{md} = 5,3 \times (22/23,3)^2 = 4,7 g \text{ heavy fuel oil per tkm (tonnes per kilometer)}$

Formula 2:  $CO_2\text{- emissions} = 4,7 \times 3,114 = 14,6 g \text{ CO}_2 \text{ per tkm}$

Multiplying the 14,6 grams CO<sub>2</sub> per tonnes per kilometer (tkm) by the 19.961 km and the 7t results in a CO<sub>2</sub>-emission for the transport of the container, from Shanghai to Hamburg at 22 knots average speed, of 2.040.0 kg. This results in a value of 291,4 kg CO<sub>2</sub>-emissions per product-tonne for resilient floors.

Here this is a case of purely additional emissions arising only from the sea route. All the other emissions from raw material extraction, processing and the land route logistics are in addition.



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The emissions from energy and logistics of “floor remake“, for its manufacture and installation were considered together. The result was as follows:

**Floor remake CO2-Emission: 346,40 kg CO2 / t product**

Therefore it follows that for the repair-refurbishment of **10 m<sup>2</sup> of floor** with floor remake **0,242 kg CO2** emissions result.

Calculation of the CO2 emissions for the removal, disposal and recycling of the old floor and the manufacture, logistics and installation of a new floor. The result was as follows:

**Construction of new floor Emission: 314,06 kg CO2 / t product**

Therefore it follows that for the completely new construction of **10 m<sup>2</sup> old floor approx. 12,65 kg CO2 emissions** result.

This corresponds to a factor of 52,3 in relation to “floor remake“ and means that with a floor remake renovation, compared with a new floor from Europe, 98,08 % CO2 emissions are saved.

If the new floor comes from overseas, then an additional 291,4kg CO2-emissions per tonne new floor must be added to the calculation. The total pollution-debit per t new floor rises to 605,46kg CO2/t product. On 10m<sup>2</sup> of an old floor 24,22kg CO2-emissions accrue.

This corresponds to a factor of 100,1 with regard to floor remake and means that with a floor remake renovation, compared with a new floor from overseas, even 99,00% CO2-emissions can be saved.





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2.11

**Summary / Conclusion:**

If the CO2 comparative calculations are taken into account, the client saves considerable CO2 emissions by renovating the old floor with the floor remake System. With a new floor the emissions ensuing from internal logistics routes in Germany alone account for more than the total emissions from such a refurbishment !

**An Overview of the CO2-Emissions:**

**New floor from Europe: 12,65kg CO2**  
**New floor from overseas: 24,22kg CO2**  
**Renovation with floor remake: 0,242kg CO2**

**The saving of CO2 emissions of floor remake compared with a new floor:**

**From Europe: 98,08%**  
**From overseas: 99,00 %**

There is little demand for the different fractions of old floor materials by the recycling industry. Numerous processes must take place, residues (adhesive, lacquer) must be treated as hazardous waste and the earnings on recycled screed concrete are low.

Münster, 01.07.2020  
Signed by Institute Director Stefan Dissel