Press release

BIBKO® INFRA*TEC* - Recycling of waste

Regulation on substitute building materials - opportunity for pipe and sewer technology companies?

With the entry into force of the Regulation of substitute building materials (ErsatzbaustoffV) on 1 August 2023, uniform national regulations for the production, testing and installation of substitute building materials will apply for the first time.
From this date, the placing on the market of mineral substitute building materials, as well as of unprocessed soil material and dredged material, and their use in technical structures, is only permitted if these substitute building materials can be assigned to one of the material classes defined in the Regulation of substitute building materials.

Sand fraction from recycled sewer flushing material

Substitute building material
A substitute building material is defined as:

- Mineral building material that is produced as waste or as a by-product in recycling plants or that is generated during construction work (deconstruction, demolition, new construction, etc.).
- Mineral building material that is suitable and intended for use in technical structures either directly or after processing.

Technical structures
Technical structures are defined as any facility or installation connected to the ground, in particular:

- Roads, paths and car parks
- Construction site roads
- Rail transport routes
- Storage, parking and other paved surfaces
- Cable trenches, construction pits, backfills and construction measures (noise barriers)
- Fillings for stabilising slopes

Attachment 2 of the ErsatzbaustoffV shows the installation options for the individual mineral substitute building materials in 27 tables. Tables 1-3 apply to recycled construction materials of Classes 1 (RC-1), 2 (RC-2) and 3 (RC-3). The installation tables distinguish between the configurations of the groundwater cover layers, categorising them as 'unfavourable', 'favourable sand' and 'favourable clay, silt, loam'. The following table shows an extract from Table 1 - Installation options for class 1 recycled construction materials (RC-1).

Method of use		Groundwater cover properties		
		outside WSG		
		un-favourable	favourable	
			Sand	Loam, Silt, Clay
		1	2	3
4	Backfilling of construction pits and cable trenches under bonded cover layer	+	+	+
11	Sand bedding under paving or under slab flooring	+	+	+

Extract: Method of use for construction material RC-1 (WSG: water protection area)

The '+' symbol indicates that the corresponding use is permissible.

From Z-values to RC-values

The ErsatzbaustoffV also introduces new designations for mineral substitute building materials. These replace the previously used Z-values of the Bund-/Länderarbeitsgemeinschaft Abfall (LAGA). Instead of the Z-values, RC-values (RC-1, RC-2 and RC-3) now apply to processed recycled building materials.

- RC-1 Material class with very stringent requirements in terms of material values - approved for all types of use
- RC-2 Material class with stringent requirements in terms of material values - approved for most types of use
- RC-3 Material class approved for most non-permeated installation methods and some partially permeated installation methods. No longer approved for permeated installation methods.

Due to the modified testing procedures, it is no longer possible to directly assign the Z-values to the material classes according to ErsatzbaustoffV. However, the following table can be used for orientation.

Designation	Assignment values (LAGA)	Abbrevation material class (ErsatzbaustoffV)
Recycling building material class 1	Z1.1	RC-1
Recycling building material class 2	Z1.2	RC-2
Recycling building material class 3	Z2	RC-3

Comparison of Z-values and RC-values

Quality control

The operator of a recycling plant in which mineral replacement building materials are produced is obliged to carry out quality control. This consists of the following points:

- Proof of suitability
  The proof of suitability must be provided by a monitoring body.
- Factory production control
  The factory production control includes the set-up, continuous monitoring and documentation of the production.
- External monitoring
  Like the proof of suitability, the external monitoring must also be carried out by a monitoring body.

ErsatzbaustoffV and its significance for pipe and sewer technology companies

There are two basic ways of processing waste:

- Disposal and storage of the waste in accordance with the Landfill regulation (DepV)
- Production of recycled building materials in accordance with the Regulation of substitute building materials (ErsatzbaustoffV).

<u>Disposal and storage</u>

When waste is disposed of and stored, it is assigned to different landfill classes. A total of five landfill classes are distinguished, ranging from DK 0 for unpolluted waste to DK IV for hazardous waste.
The disposal costs are based on the assignment of the waste to the landfill classes DK 0 to DK IV.

Recycled building material class 1 (RC-1)

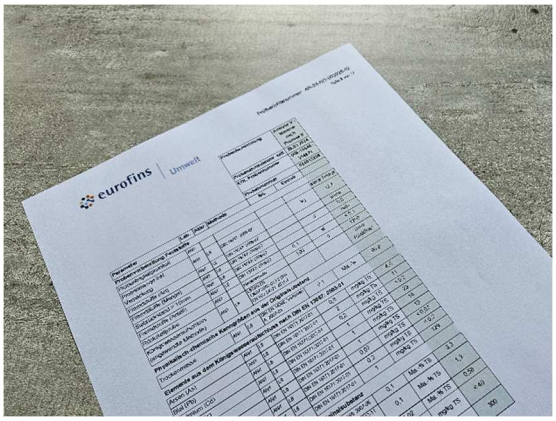
If the properties of the waste are improved by a recycling system before disposal, resulting in allocation to a lower landfill class, this alone can lead to savings in disposal costs.

Revenue instead of costs

The alternative to waste disposal and storage is to recycle the waste in a recycling system. If the material is available as recycled building material after the recycling process, it is ideally possible to find customers for it.

This generates sales and thus increases the company's added value. Disposal costs are avoided.

Certain limit values must be adhered to in order for the recycled material to be classified as recycled building material of classes 1...3 (RC-1...3). These limit values include, for example, organic (TOC), hydrocarbon and heavy metal content, as well as other physical and chemical parameters. The tests according to the ErsatzbaustoffV are carried out in a corresponding laboratory (monitoring body).



Analysis result

Recycling of waste - Two examples

The following two examples show how class 1 recycled building materials (RC-1) are produced from waste. The following types of waste are considered:

- Example 1:
  Waste from road sweeping
  AVV 20 03 03

- Example 2:
  Waste from sand traps
  AVV 19 08 02

Recycling process: Description

First, some of the (coarse) organic material is separated out using a sieve. The wet-mechanical recycling process then takes place in two stages in the BIBKO® INFRA*TEC*-Recycling system:

Stage 1: Pre-washing chamber

First, the material enters the pre-washing chamber. This contains a water bath. A rotating spiral conveys the material through the water bath, thereby separating it. At the same time, water flows through the chamber in the opposite direction. The minerals contained in the material ≤250 µm are washed out and drained out of the system together with the excess process water.

Recycled building material from drilling fluid

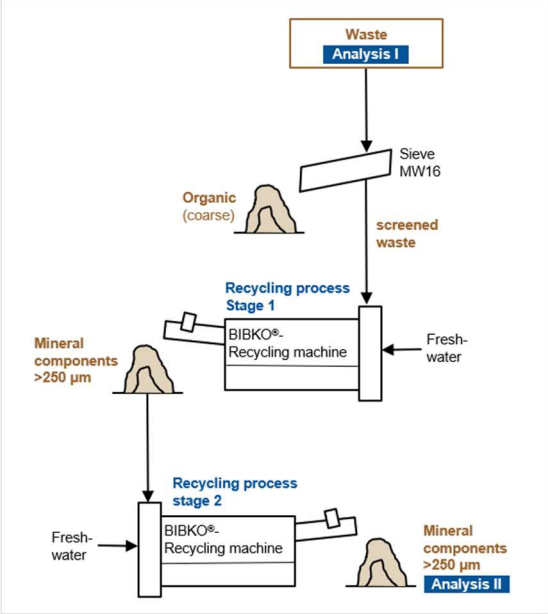
Stage 2: Main washing chamber

The pre-washed minerals >250 µm then enter the main washing chamber. Similar to the pre-washing chamber, the main washing process takes place in the main washing chamber, in which the minerals are again mechanically conveyed through a water bath. To achieve an optimal washing result, water also flows through this chamber in a counter-current direction. A bucket conveyor removes the washed minerals and feeds them to the discharge system.

The discharged process water can be further treated in a subsequent process step using a chamber filter press or a centrifuge. However, this process step is not considered further in this press release.

Recycling process: Schematic

The following figure shows a schematic of the recycling process.



Schematic recycling process

Example 1: Waste from road sweeping

The following table shows the values for some of the parameters selected from the overall analysis before and after the process.

Sweeper

Before the recycling process, some of the parameters are above the target values according to Appendix 4 - Table 2.2 ErsatzbaustoffV. This means that they cannot be used as substitute building materials.

After the recycling process, all parameters are within a range that allows them to be used as class 1 recycled building materials (RC-1).

Selected parameters from original substance	Unit	Analysis I	Analysis II
Total organic content	Ma.-% DS	6,8	1,3
Extractable lipophilic substances	Ma.-% DS	0,99	0,58
Hydrocarbons C10-C22	mg/kg DS	77	<40
Hydrocarbons C10-C40	mg/kg DS	680	300
Sum BTEX + styrene + cumene	mg/kg DS	0,13	n.d.
Sum 15 PAK without naphtalene	mg/kg DS	15,7	3,61

Selected parameters from eluate	Unit	Analysis I	Analysis II
Total content of dissolved solids	mg/l	360	<150
Dissolved organic carbon	mg/l	8,7	2,5

Selected parameters - before/ after recycling process
(Analysis I before/ analysis II after recycling process/ n.d. = not detectable)

Example 2: Waste from sand traps

The table also shows values for some parameters selected from the overall analysis before and after the process.

Selected parameters from original substance	Unit	Analysis I	Analysis II
Total organic content	Ma.-% DS	6,5	1,5
Extractable lipophilic substances	Ma.-% DS	0,62	0,19
Hydrocarbons C10-C22	mg/kg DS	96	<40
Hydrocarbons C10-C40	mg/kg DS	300	130
Sum BTEX + styrene + cumene	mg/kg DS	2,3	0,75
Sum 15 PAK without naphtalene	mg/kg DS	22,4	1,43

Selected parameters from eluate	Unit	Analysis I	Analysis II
Total content of dissolved solids	mg/l	330	<150
Dissolved organic carbon	mg/l	95	6,6

Selected parameters - before/ after recycling process
(Analysis I before/ analysis II after recycling process)

As in example 1, some of the parameters before the recycling process are above the determination values according to Appendix 4 - Table 2.2 ErsatzbaustoffV. Use as a substitute building material is therefore not possible here either.
After the recycling process, all parameters are within a range that allows use as recycled building material of class 1 (RC-1).

Ersatzbaustoffverordnung - an opportunity for pipe and sewer technology companies?

Both examples show that the quality of the material could be significantly improved by using a BIBKO® INFRA*TEC*-Recycling system.

Waste that exceeded the target values and could not be recycled was turned into recycled building material that met the requirements for class 1 (RC-1).

On the basis of the above results, the ErsatzbaustoffV can certainly also represent an opportunity for pipe and sewer technology companies. The following benefits can be gained by using a BIBKO® INFRA*TEC*-Recycling system:

- Avoiding or reducing of disposal costs
- Generating sales - increasing added value

Both these points make the use of the recycling system a profitable investment in terms of economy and environmental protection. The key factor here is to find a market for the recycled building materials.

Recycling system – even for small quantities

If the effort required to produce substitute building materials seems too great due to the relatively small quantities available, the use of a BIBKO® INFRA*TEC*-Recycling system still offers a significant advantage, even if the material is disposed of:

- The material is dewatered. This reduces the quantity to be disposed of.
- The improvement in the properties means that it can be assigned to a lower landfill class. This results in lower disposal costs. The resulting savings contribute to the company's profitability.

Erzeugung von Ersatzbaustoff in der Praxis

A customer in northern Germany is already successfully producing recycled building materials (secondary raw materials).

The BIBKO® INFRA*TEC* - YouTube channel can be opened using the QR code below for information about this customer project and for more information.

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