



Life Cycle Assessment Drainage pipes for buildings

Geberit Building Drainage Systems





Framework of the Life Cycle Assessment

Different drainage pipes are used in buildings. They vary by pipe and fitting material and type of installation. The main areas of application are building automation and industry. The environmental impact of the pipes is evaluated and the pipes are compared with each other in the Life Cycle Assessment (LCA).

Objects of investigation

The following drainage pipes were assessed:

- PVC pipe
- PP pipe
- PE-HD pipe (Geberit PE)
- PE-S2 pipe (Geberit SilentDB20)¹
- cast iron pipe¹
- stainless steel pipe²

Functional unit

A one-meter pipe with an inner diameter of 100mm was assessed as a functional unit. It is assumed that the lifetime of all pipes is identical (at least 50 years).

¹ for increased noise protection requirements

² for increased hygienic and fire protection requirements

Scope

The assessment covers the extraction of raw materials and energy carriers, the production of pipes and, finally, the disposal of used pipes. The assembly, assembly materials, fittings and supplies as well as the usage and removal of pipes are not taken into account.

Assumptions plastic pipes

All plastic pipes are produced from 100% new material. To enhance noise protection features, barium sulphate is added in the case of PE-S2 pipes (compound material). Used plastic pipes may be recycled as pure quality material. This recycling material is of a lesser quality than new material and thus, as a rule, may only be used for less sophisticated products. In many cases, pipes are not recycled but thermally reused. It is assumed that waste is 100% disposed of at a waste incineration plant.

Assumptions cast iron and stainless steel pipes

The production of cast iron pipes is represented with the aid of the cupola (hot-blast cupola furnace) and subsequent spin casting process. A 100% scrap portion is assumed.

With respect to stainless steel pipes (chromium 17%, nickel 12% and molybdenum 2%), a 87% scrap portion is assumed.

It is assumed that metal pipes are 100% recycled. Therefore, no environmental impact is attributed to the disposal of the pipes.

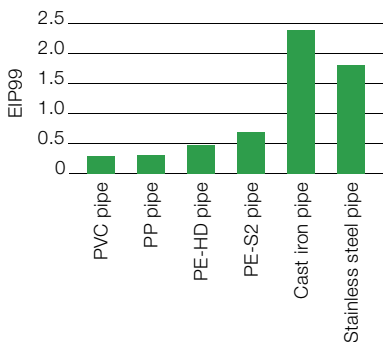


Result of the Life Cycle Assessment

From an ecological point of view, plastic pipes (pure and compound materials) have markedly better results than pipes made of pure metal. All pure plastic pipes have about the same environmental impact. The PE-S2 pipe (SilentDB20), which is comparable to the cast iron pipe in terms of noise protection requirements, has significantly better results than the cast iron pipe. The stainless steel pipe has about the same results as the cast iron pipe.

Analysis of result

The environmental impact of the various pipes is shown in the form of Eco-indicator points in the diagram (EIP99).



The smelting of scrap in the cupola (temperatures of more than 1000°C) and the markedly higher weight of the material make a crucial contribution to the environmental impact of cast iron pipes.

If the scrap portion amounts to 100 % instead of 50 % the overall impact is only slightly improved.

The production of alloying elements and high processing temperatures significantly affect the relatively strong environmental impact of stainless steel pipes.

An assessment of the environmental impact of the pipes by lifecycle phases arrives at the following results:

With respect to all types of pipes, except for cast iron pipes, the extraction of raw materials has the strongest environmental impact while the actual pipe manufacturing process is of minor importance.

The disposal of plastic pipes at a waste incineration plant has a lesser environmental impact than their disposal at a mixed waste landfill. Complete recycling is, of course, even better.

An assessment of drainage pipes according to the UBP97 method generally results in the same findings.

Recommendations

Used plastic pipes should be collected and recycled separately, if possible. The European Plastic Pipes and Fittings Association (www.teppfa.com) offers a corresponding collection system. If no recycling is possible, pipes should be disposed of at a waste incineration plant or thermally reused as an alternative combustible at a cement plant.

Metal pipes should be collected and recycled separately.

PE-S2 pipes should be used to meet increased noise protection requirements.

Geberit and Sustainability

Geberit is a market leader in the sanitary industry, has been active in environmental protection for many years and is among the pioneers in the environmental area.

One of the core competences has been the preparation of Life Cycle Assessments (LCA) for Geberit production sites and products since 1993. LCAs help Geberit make safely based decisions for the development of eco-friendly products which are inter alia distinguished by their longevity, unproblematic materials, good reusability and minor environmental impact during their lifecycle. In addition, Geberit has been integrating the sustainability principle into its corporate strategy for many years.

More details are available in the Geberit Group's Sustainability Report or on the Internet.

Impact assessment methods

The environmental impact of a product over its entire lifecycle is summed up and weighted in the LCAs – from the extraction of raw materials to disposal. In the process, Geberit uses two recognized impact assessment methods:

- Swiss method of ecological scarcity – 1997
Measuring unit: Eco-points (UBP97)
- Dutch Eco-indicator – 1999
Measuring unit: Eco-indicator points (EIP99)

Both methods permit to fully aggregate the result, i.e. the environmental impact is expressed in a single score. The smaller the number of points, the lesser the environmental impact. The environmental impact scores have to differ by two or more for a product to be clearly better than another from an ecological point of view.

Detailed report

At your request, we will be happy to provide you with the detailed LCA report (as of December 2004, only available in German). Please contact your local distribution company or the Environmental and Sustainability Division of the Geberit Group.

Geberit AG
Schachenstrasse 77
CH-8645 Jona

T +41 55 221 63 00
F +41 55 212 67 47
sustainability@geberit.com
www.geberit.com