

Environmental position of HDPE Pipes

Production of HDPE

High Density Polyethylene (HDPE) is produced by polymerisation of ethylene typically with another 1-alkene comonomer. Ethylene is produced predominantly by steam cracking of naphtha or lighter feed like ethane.

HDPE is used in a variety of applications including: the production of pipes, plastic containers, crates, bottles, caps & closures, industrial wrapping and films.

Plastics Europe has recently updated the Environmental Product Declaration (EPD) of HDPE (1).

With regard to environmental impact data a direct comparison of different materials is meaningless without taking the specific application into consideration. It is therefore necessary to consider the full life cycle of an application including: production stage, processing stage, utilization and eventually the end of life phase (see following sections).

Production of HDPE Pipes

The use of ready-to-use compounds guarantees that PE and all additives fully conform to health and environment regulations. The production of HDPE pipes does not generate any waste because scraps and off-spec products can be re-introduced into the same process or used in less demanding applications.

A full EPD is available (2) covering the production steps of HDPE pipes. This EPD shows for example that the CO₂ footprint for the production of HDPE pipes is seven times smaller compared to an equivalent metal pipe.

Utilization of HDPE Pipes

A comparative study (3) has been carried out on the below ground transportation of drinking water. It considers a typical public European PE pipe water distribution system over a distance of 100 m (from the exit of the water treatment plant to

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the water meter of the building), over its complete life cycle of 100 years, calculated per year. The result, from an independent institute and audited by a third party, demonstrates a lower environmental impact for plastic pipes in the two pipe sizes assessed (i.e. external diameter 400 mm and 800 mm) vs. equivalent in diameter metal pipes.

Water efficiency

Installed HDPE piping systems are known to be ideally suited for the transport of drinking water as PE is inert, has a high purity and good taste and odour properties. Correctly installed HDPE pipe systems give the lowest rate of leakages (4) and the highest guarantee of preservation of drinking water quality, while reducing the possibility of leakage of waste water into the environment.

Expected lifetime

HDPE pipes have a useful service life of at least 100 years (5), with no need for excavation during service. This makes them not attractive for recycling in collection schemes designed for post-industrial or post-consumer products.

End of life of HDPE pipes

Nevertheless, at the end of service life they can be either left safely in the ground or recycled several times in alternative plastic applications; with only a washing and grinding process required. After recycling at the very end of their lifetime HDPE articles may be recovered as a source of energy: one kg of HDPE pipes can provide a calorific value of up to 2 kg of coal (6).

02/04/2015

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References:

- 1) Plastics Europe EPD PE
- 2) TEPPFA EPD study
- 3) PE100+ Vito study
- 4) Leakages statistics : Aarhus Denmark 2003, Kobe Japan 2005, UK 1990-2000
- 5) ISO/EN standards
- 6) Plastics Europe

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