

RESPECTING THE ENVIRONMENT

DESIGN CRITERIA



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EXPANDED PERLITE INSULATION BOARDS - AN ECOLOGICALLY RESPONSIBLE APPROACH TO THE PROTECTION OF THE ENVIRONMENT

Introduction

- Saving energy, limiting atmospheric and soil pollution, recycling product waste have become more and more important issues in ensuring sustainable development.
- A widely recognised advantage of thermal insulation materials is their ability to decrease the energy required for the heating of buildings which conserves energy and contributes to the reduction of CO2 emissions.
- Materials should consist of appropriate substances and should be installed in such a way so as not to harm people, animals or plants but rather protect them and provide a safe and healthy environment in which to live.
- The balance between the advantages of the products and their method of production on the one hand, and their application and ease of replacement or disposal on the other, should be globally positive.

Perlite-based insulation products meet such requirements.

- They are not dangerous, nor do they present a pollution risk from radiation, smoke or dust emissions.
- Moreover, thanks to their composition, method of production and their physical properties, expanded perlite insulation boards have additional advantages with regard to the Environment which are developed in the following chapters.



1. Perlite – a natural product

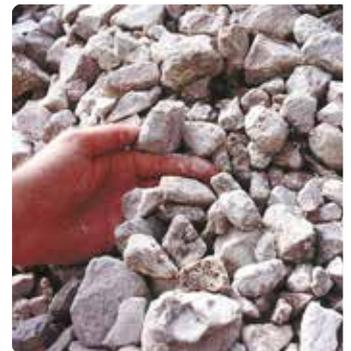
Perlite rock is a naturally occurring raw material formed on cooling when molten magma comes into contact with water. It is available in large deposits around the world and the open-cast mining method (consisting of extraction, crushing and calibration of the rock) needs little investment. Resources are more than sufficient in relation to requirements.

After being crushed and then expanded, perlite has the following characteristics:

- incombustibility
- thermal insulation
- chemically neutral
- rot proof

Expanded perlite is used principally for:

- the filtration of liquids (water, wine, beer, etc)
- thermal insulation for the building industry



Expanded perlite boards consist mainly of perlite, binders and fibres which, in turn, have been produced from recycled material, thus avoiding the use of land-fill disposal sites.



Expanded perlite insulation boards are chemically neutral.

A significant part of the raw materials used in production comes from by-products from external production processes:

- cellulose fibres from recycled paper
- mineral fibres from off-cuts and waste during fibre production

Recycling fibres reduces the quantity of waste produced by the mineral fibre and paper recycling industries, and helps to avoid using cellulose fibre from wood; further examples of the protection of the Environment and the conservation of natural resources.

2. AN ECOLOGICAL MANUFACTURING PROCESS

The Thermal Ceramics factory in Wissembourg (F) has been awarded the "Prix Technologie Propre" by the French Environment Ministry. This award recognises the work undertaken to obtain a clean production process, for the reduction of energy consumption and the use of recycled raw materials.

Many hundreds of tons of cellulose fibres are recovered every year from recycled paper by straining out hot water and without the use of any chemicals.

Mineral fibres⁽¹⁾ and the expanded perlite are added to the cellulose fibres to obtain rigid, compression resistant insulation boards after drying.



3. PROTECTION OF THE ENVIRONMENT



The Wissembourg factory, situated on the German border near the spa towns of Bad Bergzabern and Schweigen, is judged on very high standards of air quality in the region.

The principal ways in which the factory meets its targets for the environment are:

- **Closed-circuit water system**

The production process is based on a slurry and the water used during production is systematically recycled. Additional water is only required to make up for the part lost in evaporation during the drying process.

- **In-house energy production**

Two gas turbines provide the factory with most of its requirements for electricity. With an output of between 80% and 95% the optimisation of energy is clearly demonstrated.

- **Recycling of thermal energy**

The specially designed heat exchangers provide an optimisation of energy recycling, contributing to a decrease in consumption.

- **Reduction of smoke emissions**

A modern installation reduces emissions to the minimum. The Institute for the Protection of the Environment and Safety at Work, in Mainz (D), has not observed any increase in toxic substances in the area around the factory.

- **100% recyclable**

Rejects and off-cuts produced during fabrication are recycled 100% in the production process.

- **Optimisation and recycling of rejects**

Any waste produced from expanded perlite boards can be eliminated in normal land-fill sites(2). Nevertheless, it is preferable to recycle any such waste in the manufacturing process. Waste (perlite boards) removed during installation or refurbishment work can be recycled in production. In this way raw materials are economised and land-fill sites are not congested.

(1) Artificial glass mineral fibres (silicate) exonerated from the carcinogen classification following the Note Q of the Directive no. 97/69/CE.y

(2) European Council decision n° 2003/33/CE





4. POSITIVE EXTERNAL IMPACT



- **Insulation protects the environment**

Effective insulation helps reduce energy consumption and the emission of pollutants linked to heating systems e.g. CO₂ emissions.

- **No pollutant emissions or toxic waste**

Expanded perlite insulation boards contain no pollutants or other harmful constituents, and have zero ODP (Ozone Depletion Potential), nor do they emit dangerous substances or toxic gases during production, installation or use.

Studies carried out in accordance with the health requirements laid down both by the distributors of drinking water and also by the Timber Protection Agency, confirm that Fesco expanded perlite insulation boards can be used in buildings without any particular restrictions.

- **Radioactivity**

Neither natural perlite nor expanded perlite insulation boards possess elevated, or harmful, intrinsic radiation levels.

- **Permeability to air and water vapour**

Expanded perlite insulation boards are of an open cell construction. Moisture which has entered the insulation material can easily evaporate.

- **Fire prevention saves lives and protects the environment**

Construction materials should provide protection against fire and must offer specific fire resistance characteristics. The incombustible nature of perlite particles in the insulation boards contributes to their ability to resist high temperatures without burning or melting. For this reason these insulation boards are widely used in applications where fire safety is paramount.

Metal	Results for Fesco mg/l	Limit for drinking water mg/l	Limit for Rheinland-Pfalz mg/l	Limit for Hessen mg/l	Limit for E.U.	
					Dangerous waste mg/l	Inert waste mg/l
Arsenic	< 0,05	0,01	0,1	0,1	0,2 - 1,0	< 0,1
Lead	< 0,025	0,04	0,1	0,1	0,4 - 2,0	< 5
Cadmium	< 0,002	0,005	0,02	0,004	0,1 - 0,5	< 5
Chrome	0,011	0,05	0,1	0,1	0,1 - 0,5	< 5
Copper	< 0,002	-	0,3	0,1	2 - 10	< 5
Nickel	0,012	0,05	0,1	0,1	0,4 - 2,0	< 5
Mercury	< 0,001	0,001	0,005	0,001	0,02 - 0,1	< 5
Zinc	0,05	-	0,5	0,5	2 - 10	< 5
Antimony	< 0,05	0,01	-	-	-	-
Cobalt	< 0,003	-	-	-	-	-
Iron	1,839	-	-	-	-	-
Manganese	0,654	-	-	-	-	-
Selenium	< 0,05	0,01	-	-	-	-
Thallium	< 0,05	-	-	-	-	-

Comparison of heavy metals content with accepted limits for drinking water.

- **Resistance to ageing**

The inorganic basis of expanded perlite insulation boards increases their longevity and that also of the construction into which they have been incorporated. Due to their superior mechanical properties these boards are the preferred choice for refurbishment projects.

- **Rot and rodent resistant**

Expanded perlite insulation boards resist attack from rodents, insects and mould growth.

- **Capillary water absorption**

Expanded perlite insulation boards do not contribute to capillary water absorption.

- **Dimensional stability**

Fesco insulation boards have a linear expansion coefficient of only 10-5 m/m.K, which renders them particularly stable. The joints between each insulation board remain tightly closed ensuring effective and long-lasting thermal insulation.

Conclusion

Environment-friendly insulation should not be judged solely on thermal performance but also on ecological criteria, e.g.

- available resources of raw materials
- the requirements of the manufacturing process
- health considerations
- ease of recycling
- durability

The protection of the environment is a constant concern in the production, application, elimination and recycling of boards.

Expanded perlite insulation boards are a tried and tested, officially approved and quality controlled construction material that has been used for over fifty years in buildings where not only thermal and acoustic insulation is required, but also where the protection of the environment is an important consideration.

Expanded perlite insulation can be integrated into a strategy of sustainable development with the aim of reducing the impact of Society on the environment.



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