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Introduction to unique and exclusive opportunity for room acoustics.



REAPOR

**THE SOUND ABSORBER FOR
CHALLENGING ENVIRONMENTS**

Reapor History

Ilmenau is a small German town, glass has roots three centuries ago, in the year 1675, glassmakers founded the first glass works in Ilmenau.

The Thuringian Forest's wood and the rich silica sand deposits provided the ideal conditions for establishing a glass-melting furnace. From the early 18th century, Ilmenau's glassmakers specialized in producing technical instruments. Ilmenau was founded in the 13th century; it was first named in 1273 Ilmenau is a town located in the district of Ilm-Kreis, Thuringia, Germany.

The region around Ilmenau is considered the cradle of technical glass. Here, the first German liquid thermometer, the first light bulb in Germany, the first for a thermos vacuum flask, and the first X-ray tubes were manufactured. Also Otto Schott worked here in the development of fire-resistant glass.

Today in Ilmenau, produced by Liaver using a patented process, the foam glass granulate acoustic panel REAPOR is produced.

Liaver produces its raw material from foam glass granulate which is produced from recycled glass. The chemically resistant granules characterized by a very low weight with high mechanical strength.

The raw material for the acoustic panel is Liaver-expanded glass granules. This is sintered in a patented process to produce a panel without the use of binders, the resulting structure is the basis for the exceptional acoustic performance.



Reapor Granuale





Panel has chamfered or square edge



Limited to 625mm wide due to production method



Full panel sizes
625 x 625 x 50mm
 1200 x 625 x 50mm
 600 x 600 x 25mm
 1200 x 625 x 50mm
 Red shows panel held in stock

Room Acoustics Introduction (How Reapor fits)

Room acoustics is a term often used to describe the noise levels and their effect on music, speech or communication within a space. The noise problem occurs when there are not enough absorbent materials in an area to reduce the reflected noise energy. The acoustic term for this is reverberation speed. Expressed in second's reverberation speed is simply the time it takes for a sound wave to decay after it is generated. In an area where there is not enough absorbent material the sound energy literally bounces around creating a confused noise field, disrupting communication, audio quality or for industrial acoustics a workspace hazard or external noise nuisance.

This problem in the past has been addressed by the use of foams, polyesters, and fabrics and in some cases fibreglass. The issue with all of these traditional products is that they present some limitations, the greatest of which is their fire hazard potential or the effect of weather, moisture or contamination on the on going performance of the product.

The last 10 years have seen fire codes around the world toughen to try and reduce products that present either hazards or contribute to the passage and strength of fire. This became the motivation for the search for a product that would retain good acoustical performance and yet remove the fire hazards presented by so many products commonly used today. Through a series of investigations a product with these two key elements (Good acoustic performance and high fire resistance) was found. In addition by nature of its composition and construction the product is also weather and moisture resistance. Reapor is an invention of Liaver a small Germany company who developed the raw material and manufacturing process in conjunction with the Franhooffe Instute in Stuggart.

Understanding Reapor

To understand the full potential of Reapor as a product it is useful to understand its manufacturing process.

An increased demand of industry for non-fibrous absorber materials for noise control motivated the development of new open porous materials.

In the last few years, a method was developed by means of which non-combustible inorganic foams can be produced with a defined adjustable micro- and macro-porous structure, whose characteristics may be adjusted to various requirements (see Picture 1 and Picture 2).



Picture 1

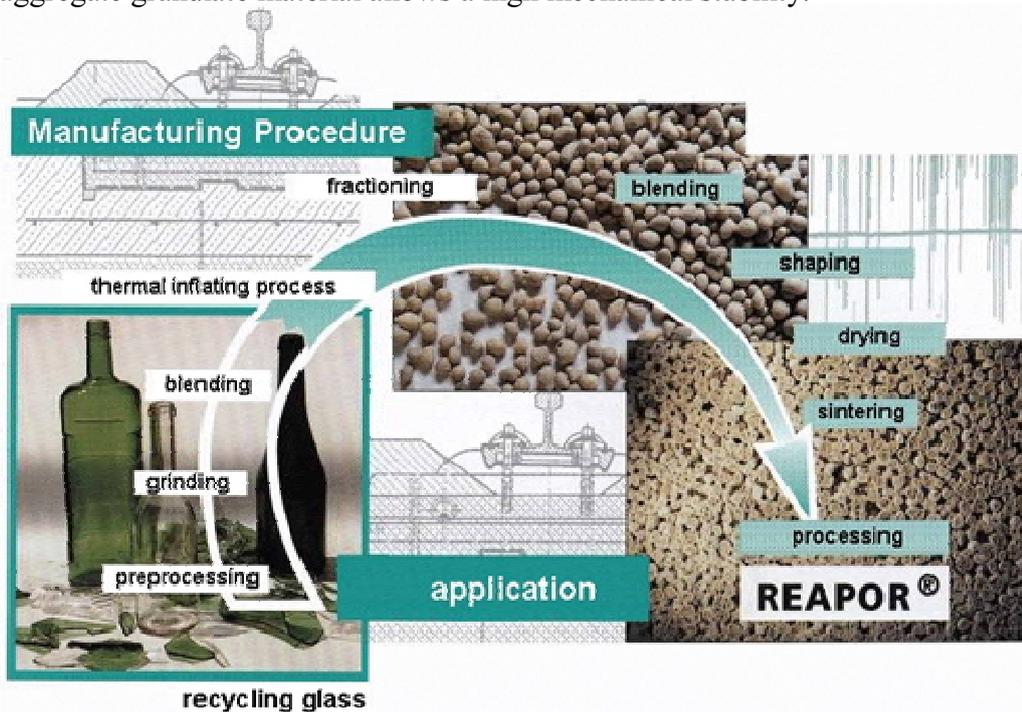


Picture 2

These light materials are mechanically loadable, non-combustible and adjusted to recycling processes. They have a high sound absorption quality, a low thermal conductivity, good chemical resistance, and they are easy to handle. The design of the **REAPOR** porous structure, gives an excellent broadband sound absorbers.

From old bottles to modern new products

Low-cost silicious light aggregates, i.e. inflated glass granulate material of recycled glass, are coated with hydrous sinter additives during the manufacturing process (see picture 3). By means of conventional shaping methods (compression moulding etc.), moulded panels can be made of this mouldable compound. The light aggregates are sintered by liquid phase sintering after drying, so that compared to conventional sintering processes the microscopic as well as the macroscopic porous structure of the green body is maintained. The formation of cavities between the light aggregate granulate material allows a high mechanical stability.



Picture 3

There have been several issues raised which I will now cover that explains why Reapor is the future of acoustic products and will replace a wide range of other products currently used.

Product Features

As a result of the method and base raw material used Reapor has some natural benefits.

Acoustics

Reapor panels construction being from granules that are porous in their own right, combined together to form a complete panel which gives Reapor a very high acoustic rating as this unique mechanism works with each individual granulate acting as an absorber as well as the sum of the whole panel. The product is supported by several laboratory and in situ tests.

Reapor is an acoustics absorber it removes reflected noise energy by acting reducing the noise energy through the frictional resistance or flow resistance of the noise energy. It acts well as a noise absorber in conjunction with noise barriers to control reflected noise that may affect others, so for

partial enclosure fences Reapor is ideal to reduce neighbourhood noise problems, control of traffic noise or acoustics in an outdoor music venue.

A range of case studies is available for Germany some with before and after acoustics testing With a NRC of .90 @ 50mm, .70 @25mm it is performing at the top end of acoustic products. Giving results better than products of the same thickness, however as Reapor requires no surface protection it outperforms all comers fibreglass, polyester and foam.

Recycle

Reapor starts its life as old glass bottles, which come in from, recycle. The glass is processed as already described giving a resulting product that can also be recycled if necessary. This gives Reapor the highest European green rating called Blue Angel.

The Blue Angel – Eco-Label with Brand Character

The Blue Angel is the first and oldest environment-related label for products and services in the world. It was created in 1978 on the initiative of the Federal Minister of the Interior and approved by the Ministers of the Environment of the federal government and the federal states. It considers itself as a market-conform instrument of environmental policy designed to distinguish the positive environmental features of products and services on a voluntary basis.



Thus, it fits in well with the competition for the best possible ecological properties of products (except for foods) and services. The Blue Angel definitely helps to speed up the structural change of the economy towards a sustainable development. And it does so with growing success:

Building Materials made primarily from Waste Glass
Benefits to Environment and Health

- resource-conserving use of waste glass
- no hazardous substances
- compliance with all conditions imposed by the building supervisory board

Why is it good to produce products from waste glass?

Various building materials and auxiliary building materials can be manufactured from waste glass in an environmentally sound way. Apart from light-weight concrete and plaster these are, above all, glass wool mats for purposes of sound and heat insulation. The use of recycled products helps to reduce the environmental impact of construction work. There is no need to extract new raw materials from nature and wastes used to produce new products need not be disposed of.

Weather, moisture and contamination

Reapor is made from glass and as such has glasses natural resistance to moisture water and most chemicals. This creates a panel that is able to maintain its performance in weather and moisture affected environments. This means that in outdoor applications the product requires no protection from the elements or from moisture that might be generated from process or situation. This is one of

the major selling points of the material as any other system made from traditional materials will need protection from the elements and ongoing maintenance. This protection will often add huge cost to the project and may also create weight issues for structures and building already in place where as Reapor is light weight and fitted without the need for extra weather or mechanical protection.

Water Up Take

During heavy rain the panel will take on extra weight which will need to be allowed for in the structure and fixing method in fact a panel 625mm x 625mm when squirted with continues water doubled its weight from 6 kg up to 12 kg. The panel did of course drain as soon as the water source was removed. The use of water repellent coating can be used to limit this problem without affecting the acoustic performance of the panel greatly.

Reapor suits a wide range of outdoor noise applications, cooling towers, compressor, plant enclosures, outdoor music areas, smoking areas, site noise..... and for a range of wet areas Spas, pools, carwashes spa pumps, pool pumps, outdoor generators

Fire Properties



Demonstration conducted in Sydney showed the panel did not burn even under extreme conditions



Reapor is classified as non-combustible (DIN 4102 A1) The relevance of the A1 rating is that it is classified as 100% non-combustible) This rating is good for all areas of use that require high fire performance building, automotive, marine, and industrial.

Australia Only

How will this fit into the building code in Australia? Fire Code C1.10a

It is important to read the building code definitions on page 156 Section 3 part (c) “A material used as a finish, surface, lining or attachment to a wall or ceiling must be a Group 1 Group 2 or Group3.....

This definition means it applies to all the materials in our current range and all of our competitors’ products. While some products may still get Group 3 the use of them is now greatly restricted. Most certainly any polyurethane or polyester based products will not be allowed. Which restricts 90% of the current products of that type?

In other countries greater or lesser degree of the same building codes apply however as the product is NON COMBUSTABLE it can be used in any location.

The areas where Reapor performs so well are of course the target areas to market into.

Healthcare, patient care, general intuitions, prisons, theatres, halls, auditorium, schools classrooms, aged care, lift cars, Pubs, clubs, bars outdoor smoking areas and will apply to all buildings in areas of public assembly (which includes restaurants and bars), corridors, fire exits, stair wells, plant rooms, control rooms.

As Reapor has a non-combustible rating it can be used as a bulkhead or engine liner in mil spec and survey vessels of all classes.

Cutting and shaping

Reapor can be worked with normal woodwork equipment for larger commercial jobs industrial tools may be required. The manufacturers MSDS sheet advises the dust is no more harmful than normal woodworking dust. A simple dust mask is all that is required when cutting. Please refer to the MSDS sheet for specific projects.



Pictures show hand cutting with handsaw. Next picture shows back of panel routed out to allow for conduit to be hidden.

Fixing

BASF have completed and produce an adhesive system already for Reapor, the adhesive has passed fire and weather testing . BASF have also developed tested and produced.

Adhesive fixing

Refer to the information supplied from BASF on PCI Nanolight there is also a video showing how to correctly install.

Complete fixing in high fire rated areas

Refer to the information supplied from BASF on PCI Nanolight



Use only low shrinkage adhesive PCI Nanolight to maintain fire rating,

If fire Rating is not require then a low e modulus adhesive can be used (low e modulus means low shrinkage as it dries).

Mechanical Fixing

Mechanical fixing can be achieved pre drilling the panel and then fixing with a washer facing fixing method will depend on the sub straight. We have made contact with fischer fixing systems www.fischerfixings.com.au who will support us for all mechanical installs



Mechanical fixing for a wide range of surfaces and applications



Cleaning

Reapor can be protected with a range of finishes in extreme environments. Graffiti guard, weather protection for extreme storm areas, paint, self-cleaning paint.

Reapor is porous and as such over time dust and dirt may build up in the tiles this can be solved in by cleaning using high-pressure air to blow dust and dirt out.

Finishes



A render finish can be used on the panel for a joint less finish the special acoustic render will drop the NRC to .70



Apart from the render finish a range of treatments is possible

Painting, Graffiti guard, self-cleaning paint, paint colours,

We have also had talks with a fabric supplier and by selecting a wool fabric we can fabric wrap panels for a unique finish with a good fire rating

MSDS

Reapor has a clean MSDS report with no known hazards with normal care to be taken for dust when cutting.

Green Product

Reapor is made from recycled glass and as such fulfils the requirements for green building certification. Reapor is also VOC free, Voc free means that it has no volatile organic compounds used in its construction, this is important in areas that require clean air, hospitals, medical areas, and clean air living or office requirements.

Weather

Reapor is not affected by weather UV ageing or water damage.

Brittle Breakage

Reapor is robust and fracture resistant as its cellular construction prevents line fractures. It is however brittle and gains its full strength once bonded or fixed to a substrate. It has been tested by German rail and passes the stone tests which simulates a stone being flicked by a wheel at the panel.

Other testing

There have been several other tests conducted on the product

Density

Compressive strength

Flexural strength

Freeze-thaw resistance

Elastic modulus

Water vapour diffusion

Thermal conductivity

Fire resistance

Flow resistivity

Alternatives

This is a hard topic as it depends on the application and type of building, in some cases there is no practical alternative. I should stress it is through the unique combination of features and benefits Reapor will find its market, a number of applications currently have no solution or as is the case with many panel absorbers are now precluded from use due to the new fire regulations.



Features and Benefits in summary

1. Fully weather resistant
2. UV resistant
3. Impact and split resistant
4. Non – combustible (Fire Pass for all applications)
5. Easy to install simply system
6. Satisfied green building requirements
7. Full recycled and recyclable
8. Easy to work with normal tools
9. No specialist trades needed
10. Top end acoustics performance
11. Can be decorated further with paint, fabric or sculpting
12. Complete acoustics in situ testing
13. Safe MSDS sheet
14. Exclusive distribution
15. Proven track record

Projects that included Reapor are:

Snowy Hydro inside generator lining

Brisbane By-Pass vent shafts for the new tunnel

Dept for Environment lunchroom lined as no suspended ceiling used

RMIT media room as no suspended ceiling used

Sydney Bar out door smoking deck used under deck to control reflected noise

Outdoor compressor fence built to reduce neighbourhood nuisance

Pumping Station to reduce noise to neighbourhood

Summary

Reapor is a unique product invention that solves many acoustic problems and installation conditions.

REAPOR

Distributed by:



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