Pyrotek®

REAPOR® | VITEROLITE® 900

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With ISO 9001 quality system certification, our global engineering team design highly specialised products to every specification and performance requirement. Our products are independently certified, time tested and supported by proven results.

COMPANY PROFILE

Pyrotek® is a global engineering leader and innovator of performance-improving technical solutions, integrated systems design and consulting services for customers in the aluminium industry. We are also investing and growing rapidly in areas such as glass, noise control and advanced materials.

We have global resources and dependable local support in more than 35 countries with over 80 locations. Our products and solutions are in use around the world in automotive, aerospace, rail transportation and high-tech manufacturing.

Privately-owned since 1956, our deep-rooted values of integrity and collaborative problem-solving uphold our mission to improve customer performance.

WHO WE ARE

- A global engineering innovator and supplier of complete end-to-end, performance improving technical solutions
- Our Noise Control division began in Australia, bringing over 30 years experience
- We supply complete turn-key solutions for many industries with over 300 Pyrotek application engineers, worldwide

WHY CHOOSE US

- Strong R&D Laboratory Team - ceramic, acoustic & chemical engineers help maximise product performance
- Extensive data analysis and noise predictions
- Design capabilities using CAD and 3D modelling
- Global test laboratories for fire, acoustic and vibration

OUR INDUSTRIES

Building | Industrial | Transportation | Marine | Oil & Gas

SUSTAINABILITY POLICY

Pyrotek is committed to ethical corporate citizenship and to promote sustainability in its activities and environmental responsibility. We will treat the environment as a valued legacy for our grandchildren. While Pyrotek recognizes that its business activities have environmental and social implications, Pyrotek is committed to mitigate any environmental or social impact its business activities may have through the adoption of best practices and policies. Pyrotek will contribute to the development of a sustainable future through the following principles.

PRINCIPLES

1. Practice responsible corporate conduct through adoption of workplace policies and best practices that meet or exceed regulatory and statutory requirements and that develop and maintain an entrepreneurial and collegial environment.
2. Manage risks, including those related to environmental, social and governance aspects.
3. Identify opportunities to contribute to the development of society and future generations.
4. Provide a safe, healthy and enriching working environment for Pyrotek employees.
5. Be a fair and responsible member of the communities in which Pyrotek operates.
6. As employees and as a company, be ethical and responsible citizens.
7. Be a responsible steward of resources.
8. Adhere to Pyrotek's Environmental Policy to limit its carbon footprint.
9. Pyrotek encourages the adoption of similar principles by its supply chain and business partners.

Pyrotek reserves the right to amend this policy at any time.

ENVIRONMENTAL PRODUCT STATEMENT

OUR COMMITMENT TO SAFETY, QUALITY AND ENVIRONMENT

Pyrotek is committed to safely produce quality products and services, on-time and at a competitive cost. This enables Pyrotek to build a sustainable business for the benefit of our customers, employees and stakeholders. Our focus is dedicated to developing systems with new, more considered operations and materials, as well as committing to improved technologies to further support long-term goals of safety, quality and environment.

Environmental Consideration

We acknowledge the need for consideration for our manufacturing activities to contribute to the mitigation of global warning via energy savings. We locally commit to reducing environmental impact by the prevention of pollution, minimization of waste and reduction of energy and water we use.

Ozone Depleting Potential

Pyrotek has undertaken an audit of its raw materials supplied and manufactured products barrier referencing to the US EPA List of Ozone Depleting Substances (Class 1 and Class 2). To the best of our knowledge, no ozone depleting substances are involved in either the manufacture or composition of these products.

Volatile Organic Compounds (VOC)

Products supplied by Pyrotek do not contain any significant Volatile Organic Compounds (VOCs) content when evaluated to the differing definitions as applied under the Australia National Pollutant Inventory, The Council of the European Union, Council Directive 1999/13/EC or the USA EPA Regulation 40 CFR 51.100(s). We also test to ASTM D5116 showing low VOC release.

Asbestos free manufacturing

Asbestos is not used during the manufacture of, and not added during any process of during the processing of our products. Please contact Pyrotek for available test reports to AS4964.

Global Warming Potential

Pyrotek's acoustic product range is designed with a reduced carbon footprint in mind, using locally sourced and environmentally-certified materials where possible. We use no CFCs, HCFCs or known high-GWP gases in our manufacturing process.

Recycle and emission care

During the process of manufacture, every care is taken to recycle and reuse material and where possible our plant and equipment has emission cleaners fitted.

Pyrotek has active and ongoing research investment to develop products that reduce environmental impact.

CODE OF BUSINESS ETHICS

POLICY

This Code of Business Conduct and Ethics (the "Code") represents the commitment of Pyrotek Inc. (which, together with all subsidiaries, is referred to as the "Company") to conduct its business with integrity, in accordance with all applicable laws, rules and regulations and with high ethical standards. All employees, officers and general managers of the Company are expected to adhere to the principals and procedures set forth in the Code. However, no code can govern all possible situations. Therefore, those individuals governed by the Code must apply the spirit, as well as the letter, of this Code and request guidance from those identified below in the event of any question of interpretation. In all instances, each individual should strive to uphold the integrity and credibility of the Company. This Code is also supplemented by the rules of business conduct and ethics contained in the Company's other policies and procedures.

Note: This Code is subject to review and modification. The form of the Code made available on the Policies and Procedures Database of the Company supersedes any prior expression of the policy to the extent of any inconsistency.
The following sections highlight key scenarios where the Code will govern individual behavior.

PROCEDURE

CONFLICT OF INTEREST

A "conflict of interest" occurs when an individual's private interests interfere, or appears to interfere, in any way with the interests of the Company. A conflict of interest can arise when an employee, officer or director takes actions or has a personal or non-Company related business interest that may make it difficult to perform his or her Company work objectively and effectively. Conflicts of interest also arise when an employee, officer or director, or a member of his or her family, receives improper personal benefits as a result of his or her position in the Company. Loans to or guarantees of obligations of such persons are of special concern as conflicts of interest. Service to the Company should never be subordinated to personal gain and advantage.

All conflicts of interest as described above are prohibited. Each employee, officer and director should be careful to avoid a conflict of interest by avoiding actions or relationships that may either make it difficult to perform Company work objectively and effectively or affect personal judgment regarding what is in the Company's best interest.

Any individual who has any questions or concerns regarding this policy, or any specific situations, actions or omissions which may relate to or be prohibited by this policy, is encouraged to discuss such questions or concerns with any of the following individuals: the Company's (1) President, (2) Chief Financial Officer or (3) Corporate Counsel.

CORPORATE OBLIGATION

Employees, officers and general managers owe a duty to the Company to advance its legitimate interests when the opportunity to do so arises. Each employee, officer and director is prohibited from:

1. Taking for themselves personal opportunities that are discovered through the use of Company property, information or position;
2. Using Company property, information or position for personal gain; or
3. Competing with the Company.

CONFIDENTIALITY

Employees, officers and general managers should maintain the confidentiality of confidential and proprietary information entrusted to them by the Company and its guests and customers, except when disclosure is authorized or legally mandated. Confidential information includes all nonpublic information that might be of use to competitors of the Company, or harmful to the Company or its guests or customers if disclosed.

Employees, officers and general managers are encouraged to consult the CFO, prior to making any disclosure, with any questions regarding whether a legal obligation to disclose confidential information exists. The obligation to maintain confidentiality extends indefinitely after a person's association with the Company as an employee, officer and director has ended.

FAIR DEALINGS

Each employee, officer and director should endeavor to deal fairly with the Company's customers, suppliers, competitors and employees. No employee, officer or director should take unfair advantage of anyone through manipulation, concealment, abuse of privileged information, misrepresentation of material facts or any other unfair dealing practice. Nothing contained in this paragraph shall in any way alter any existing legal rights and obligations of the Company or its employees, officers or general managers.

PROTECTION AND PROPER USE OF COMPANY ASSETS

Company employees, officers and general managers should protect the Company's assets and ensure their efficient use. Each employee, officer and director should endeavor to prevent misuse, loss, damage, sabotage or theft of Company assets. All Company assets should be used for legitimate business purposes only.

COMPLIANCE WITH LAWS, RULES AND REGULATIONS; REPORTING ILLEGAL OR UNETHICAL BEHAVIOR

The Company is committed to complying with all laws, rules and regulations applicable to it, including, but not limited to, those impacting the obligation of the Company to present all financial information to the public in conformance with generally accepted accounting principles based upon information which accurately reflects all relevant facts.

COMPLIANCE AND REPORTING

Employees, officers and general managers should strive to identify and raise potential issued before they lead to problems, and should ask about application of this Code whenever in doubt. Any employee, officer or general manager who becomes aware of any existing or potential violation of this Code should promptly notify the individual responsible for enforcement identified in the Section entitled "Policies and Procedures for Interpretation and Enforcement of the Code".

POLICIES AND PROCEDURES FOR INTERPRETATION AND ENFORCEMENT OF THE CODE

The President, General Counsel and Chief Financial Officer are responsible for applying this Code to specific situations relating to violations of the Code by general managers and executive officers and to specific situations relating to violations of the Code by other employees which have a material adverse effect on the Company's overall operations or financial position.

Company management will handle violations of the Code by individuals other than general managers or executive officers in the same manner that other violations of Company policies are handled and it is expected that most violations occurring in the ordinary course of the Company's business will not be sufficiently material to require report to the Shareholders of the Company or the President.

WAIVERS

From time to time, the Company may waive certain provisions of this Code. Any employee, officer or general manager who believes that a waiver may be appropriate should discuss the matter with the President.

1 | REAPOR®

Reapor® is constructed from small aerated granules made from recycled glass. The granules are fused together through a patented high temperature sintering process to form a hard, lightweight, fibre-free, non-combustible stone-like panel that can be used indoors and outdoors. The unique material is highly porous, absorbing noise both between and within the granules.

REAPOR®

Reapor® panels are simple and easy to install using recommended adhesives (refer to the Reapor® Installation Guide for details). The panels can be cut, drilled and routered using standard wood working tools, enabling easy installation around obstacles.

The panels are suitable for use outdoors. Wet panels will drain freely and dry in the sun.

Reapor® is a registered trademark of Liaver used with permission by Pyrotek as distributors.

NRC	0.95

50 mm thick panel

Features

- Non-combustible
- Lightweight and fibre free
- Easy to cut, drill and rout using standard wood working tools
- Resistant to weather, water and UV exposure over an extended period of time
- Natural 'stone-like' appearance to suit indoor and outdoor designs

Application

- Rail and motorway tunnels, vent shafts and noise barriers
- Industrial noise enclosures
- Plant rooms or elevator shafts
- Exhaust stack internal lining

Standard size:
25 x 625 x 625 mm
25 x 625 x 1200 mm
50 x 625 x 625 mm
50 x 625 x 1250 mm

Custom sizes available depending on MOQ, including 65 mm thick Reapor®. 25 mm thick Reapor® does not feature chamfered edges.

VOC STATEMENT

Reapor® does not contain any Volatile Organic Compounds (VOC) when evaluated to the differing definitions as applied under the Australia National Pollutant Inventory, the EU Council Directive 1999/13/EC or the USA EPA Regulation 40CFR 51.100(s). This product can be classed as low VOC-emitting. The material emissions are less than the threshold of 0.5 mg/m^2/hr as specified in Green Building Council of Australia 'Green Star' credit IEQ-13. Formaldehyde compound emission rate is less than the threshold of 0.1 mg/m^2/hr as specified in 'Green Star' credit IEQ-14.

PYROTEK® CB ADHESIVE

Pyrotek® CB Adhesive is a high performance, flexible polymer adhesive suitable for installation of concrete panels onto masonry substrates.

Developed for high strength bonds with Reapor® and Viterolite, it has excellent working properties for installation of vertical panels. The chemical cure is suitable to large size panels that are exposed to outdoor conditions.

REAPOR® TECHNICAL DETAILS

No.	Property	Method	Specification
1	Density	-	Maximum density 300 kg/m^3
2	Electrical conductivity	"AS/NZS 3000 (tested with 5kV insulation tester)"	Non-conductive
3	Service life \ Design life	--	Documentation asserting a minimum design life of 30 years
4	Acoustic performance	ISO 354, ISO 11654	"Requires a minimum αw = 0.90 (at 50 mm thickness)"
5	Non-combustibility	AS 1530.1 / ISO 1182	Shall be deemed non-combustible
6	Flammability testing – Cone calorimeter	AS 5637.1	Minimum Group 1 rating
7	Flammability testing & smoke density – fire tests on building materials	AS1530.3	Ignitability, 0
			Spread of flame, 0
			Heat evolved, 0
			Some developed, ≤ 1
8	Compressive strength	DIN 196-1	> 1 MPa
9	Flexural strength	DIN 196-1	> 0.35 MPa
10	Tensile strength	DIN 1607	> 0.1 MPa
11	Thermal conductivity	DIN 52612	< 0.09 W/mK
12	Non-hazardous material	Classification according to EU Regulation EC 1272/2008 (GHS)	All materials shall be classified as not being Hazardous
13	Volatile organic compound (VOC)	ASTM D5116	Total VOC < 0.5 mg/m^2/hr
14	Ozone depleting potential (ODP)	--	Zero ODP, no materials with ODP added, used or generated during manufacture

Technical Datasheet

REAPOR®

eco-friendly sound absorber for challenging environments

Reapor® acoustic panels are high performance noise absorbers that look like cut stone.

It is constructed from small aerated granules made from recycled glass. The granules are fused together through a patented high temperature sintering process to form a hard, lightweight, fibre-free, non-combustible stone-look panel that can be used indoors and outdoors. The unique material is highly porous, absorbing noise both between and within the granules.

Reapor® panels are simple and easy to install using recommended adhesives *(refer to the Reapor® Installation Guide for details)*. The panels can be cut, drilled and routered using standard wood working tools, enabling easy installation around obstacles.

The panels are suitable for use outdoors. Wet panels will drain freely and dry in the sun, however, this may result in efflorescence where crystalline salts are deposited on the surface of the panel. Efflorescence will not affect acoustic performance. If efflorescence does occur, the salts may be removed using commercial efflorescence cleaners. *(Refer to the Reapor® Installation Guide for more information).*

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VOC STATEMENT

Reapor® does not contain any Volatile Organic Compounds (VOC) when evaluated to the differing definitions as applied under the Australia National Pollutant Inventory, the EU Council Directive 1999/13/EC or the USA EPA Regulation 40CFR 51.100(s). This product can be classed as low VOC-emitting. The material emissions are less than the threshold of 0.5 mg/m^2/hr as specified in Green Building Council of Australia 'Green Star' credit IEQ-13. Formaldehyde compound emission rate is less than the threshold of 0.1 mg/m^2/hr as specified in 'Green Star' credit IEQ-14.

SPECIFICATIONS

Colour	Light grey
Available	25 x 625 x 625 mm 25 x 625 x 1200 mm
	50 x 625 x 625 mm 50 x 625 x 1250 mm

Custom sizes available depending on MOQ, including 65 mm thick Reapor®. 25 mm thick Reapor® does not feature chamfered edges.

applications

- Rail and motorway tunnels, vent shafts and noise barriers
- Outdoor cafes, bars and restaurants
- Interior walls and ceilings of offices, retail spaces, hospitals, schools and aged care facilities
- Fire exits and stairwells
- HVAC and genset plant rooms
- Industrial noise enclosures
- Shooting ranges

features

- Resists weather, water and UV exposure over an extended period of time
- Non-combustible
- Exceptionally high NRC of 0.95 (50 mm thick panel)
- Easy to cut, drill and rout using standard wood working tools
- Natural 'stone-like' appearance to suit indoor and outdoor designs
- Made from recycled glass
- Lightweight
- Fibre free

PRODUCT SPECIFICATIONS

Product name	Thickness (mm)	Panel size			Density kg/m³
		Length (mm)	Width (mm)	Approximate weight (kg)	
Reapor® 25/625625	25	625	625	2.6	270
Reapor® 25/1200625		1200		5.1	
Reapor® 50/625625	50	625		5.3	
Reapor® 50/1250625		1250		10.5	

Tolerances: Dimensions ±1 mm, Density: ±10%

MATERIAL PROPERTIES

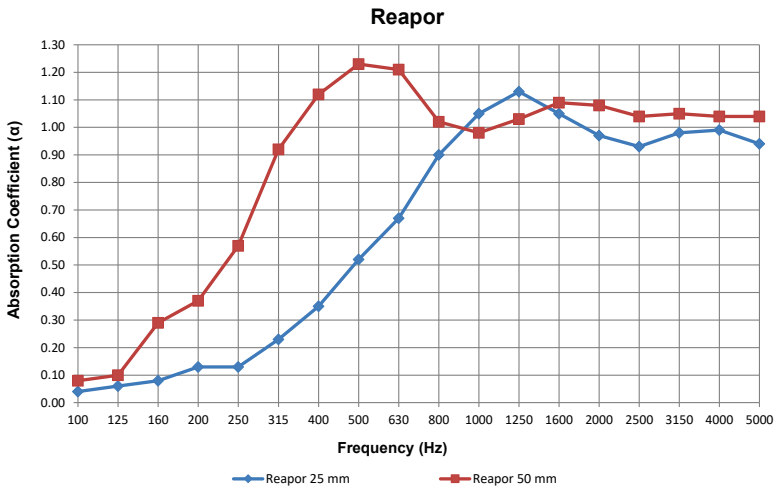
Test method	Property	Report	Results	
DIN 196-1	Compressive strength	B 12.16.103.01	1.46 N/mm² (±10%)	
	Flexural strength		0.53 N/mm² (±10%)	
DIN 1607	Tensile strength		0.14 N/mm² (±10%)	
DIN 1048	Dynamic modulus of elasticity		833 N/mm² (±10%)	
DIN 52612	Thermal conductivity	1254P41/P	0.077 W/mK	
AS/NZS 3000	Electrical conductivity	9765	Non-conductive	
EN 13501-1	Fire classification of construction products and building materials	KB 3.1/11-121-3	Non-combustible	
DIN 4102	Fire resistance	16-900 9171 002-1		
AS 1530.1 / ISO 1182	Fire resistance	FNC11639		
	Fire resistance (as a system with Pyrotek CB Adhesive)	FNC11641		
AS 1530.3	Method for fire tests on building materials, components and structures	16-000832	Ignitability	0
			Spread of flame	0
			Heat evolved	0
			Smoke developed	1
ISO 5660 / AS/NZS 3837	Building code compliance	FH 5964-TT	NCC	1
			NZBC	1-S
ASTM D5116	Total volatile organic compound emission rate	CV130829	0.026 mg/m²/hr	
	Formaldehyde compound emission rate		<0.005 mg/m²/hr	

ACOUSTIC PERFORMANCE

Frequency (Hz)	Reapor 25 mm	Reapor 50 mm
100	0.04	0.08
125	0.06	0.10
160	0.08	0.29
200	0.13	0.37
250	0.13	0.57
315	0.23	0.92
400	0.35	1.12
500	0.52	1.23
630	0.67	1.21
800	0.90	1.02
1000	1.05	0.98
1250	1.13	1.03
1600	1.05	1.09
2000	0.97	1.08
2500	0.93	1.04
3150	0.98	1.05
4000	0.99	1.04
5000	0.94	1.04
NRC	0.65	0.95
SAA	0.67	0.97
α_w	0.45 (MH)	0.90

Tested to ISO 354:2003 at Vienna Experimental and Research Institute (Austria) & CSIRO (Australia)

Report Numbers: MA 39-VFA 2007-1277.01 & AC186-01-1



Caveats: Specifications are subject to change without notice. The data in this document is typical of average values based on tests by independent laboratories or by the manufacturer and are indicative only. Materials must be tested under intended service conditions to determine their suitability for purpose. The conclusions drawn from acoustic test results are as interpreted by qualified independent testing authorities. Nothing here releases the purchaser/user from responsibility to determine the suitability of the product for their project needs. Always seek the opinion of your acoustic, mechanical and fire engineer on data presented by the manufacturer. Due to the wide variety of individual projects, Pyrotek is not responsible for differing outcomes from using their products. Pyrotek disclaims any liability for damages or consequential loss as a result of reliance solely on the information presented. No warranty is made that the use of this information or of the products, processes or equipment to which this Information Page refers will not infringe any third party's patents or rights.
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Installation Guide

REAPOR®

This Installation Guide provides recommendations to maximise the service life in outdoor wall applications.

KEY INSTALLATION REQUIREMENTS

To maximise the service life, acoustic performance and aesthetics in outdoor applications, Pyrotek recommends that Reapor® panels should be installed using Pyrotek CB Adhesive in accordance with AS 3958.1 External Wall Tiling to structurally sound masonry substrates (concrete, block walls, brick walls or compressed fibre cement board).

AS 3958.1 requires 90% adhesive coverage for outdoor applications. This coverage can usually be achieved by applying adhesive using a 6 mm notched trowel to back-butter the acoustic panels and a 10 mm notched trowel for the substrate.

A thicker adhesive layer may be required depending upon the roughness of the substrate surface. Alternatively, a render or grinding of the surface should be considered in order to prepare rough surfaces.

DESIGN DETAIL

- Panels should be installed on dry walls. Panels are not recommended for installation on retaining walls or below damp courses.
- To prevent rainwater migration to the rear of the panels, the panels should be installed with either:
  - Flashing/capping installed over the top panels/wall (eg. COLORBOND® steel); or,
  - Recessing the panels into the pre-cast concrete walls. The recommended recess is 70 mm-80 mm to cater for the panel, adhesive layer and ~25 mm soffit/drip edge above the top acoustic panel.
- The bottom panels should be installed with a free drip edge to enable panels to drain freely and avoid wicking water up from pavements etc.

In outdoor applications, Reapor® panels are quickly and easily installed to vertical surfaces using Pyrotek CB Adhesive.

WORKING WITH PYROTEK CB ADHESIVE

Pyrotek CB Adhesive is a cementitious-based, flexible polymer adhesive, with excellent working characteristics.

At ambient temperatures of 23 °C and above, a light spray of water can be applied to porous substrates, such as concrete to allow time for the correct application of the adhesive. This will prevent Pyrotek CB Adhesive curing too quickly.

applications

- Interior walls and ceilings of offices, retail space, hospitals, schools and aged care facilities
- Walls of railway and motorway tunnels, vent shafts and exits
- Applications requiring high fire ratings
- Airports, stations, and carparks
- Machinery or industrial enclosures
- HVAC, plant rooms, and substations
- Exit ways, smoking areas, stairwells and drive-through areas
- Road barriers, exterior plant fences and sound barriers

Please refer to our website pyroteknc.com for latest information

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Ensure proper installation and professional finishing in outdoor commercial applications. Reapor® should always be bonded to surfaces that are relatively flat, clean, dry and free of contaminants.

INSTALLATION

- Adhesive must be mixed according to recommendations on the package.
- All substrates must be clean and free from laitance, curing compounds, dirt, dust, grease, oil and any other contaminants that may inhibit bond. All substrates should be washed with clean water just prior to the application of the adhesive. Care must be taken in the preparation of concrete tilt panel to ensure all traces of release agents and curing compounds are removed, if in doubt prepare the substrate using a pressure washer to expose the fine aggregates in the matrix of the concrete as this will ensure a clean substrate.
- Consideration should be given to the transfer of load on vertical installations. The panels must not bridge expansion joints.
- Straight edge support should be used to support the bottom row of panels until adhesive cures.
- The 90% adhesive coverage required can be usually be achieved using a 10 mm notched trowel for the substrate and 6 mm notched trowel to back-butter the acoustic panels. However, a thicker adhesive layer may be required depending upon the roughness of the substrate surface.
- Recommended panel spacing ~2 mm apart using tile spacers.
- If a flat or flush finish is required, flip panels over and adhere the side with chamfered edge to the substrate (Reapor is consistent with no preferred face).

If adhesive does fall on the front surface of Reapor, it should be allowed to dry and be removed by sanding.

DETAILING

CUTTING, ROUTING & REBATING

- Reapor® panels can be easily processed, routed, rebated or hand sawn to any shape or to create grooves and channels. For larger projects and cutting, a circular saw fitted with a continuous rim, diamond tipped masonry blade may be used. Consideration should always be made for proper dust control and ensure suitable PPE.

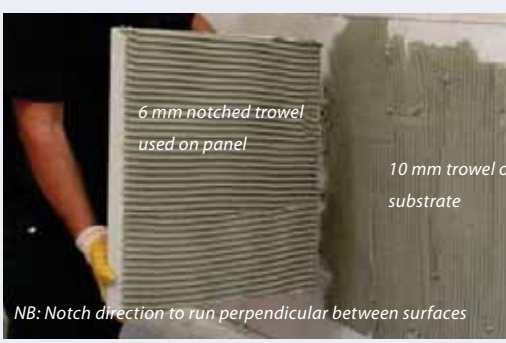
  (Please refer to the Reapor® SDS for further information).

TREATMENT OF PERFORATIONS

- When Reapor® panels are drilled through for cabling and pipe access, adequate flashing should be incorporated to discourage and deflect water away from these areas.


Reapor routed to allow cable access (and bottom)


Adhesive 'back buttered' using 6 mm notched trowel



NB: Notch direction to run perpendicular between surfaces


Press to obtain bond and alignment

GENERAL MAINTENANCE

WEATHERING

Reapor® is a porous stone-like material with a consistent colour and texture through the tile. Reapor® will weather and age naturally in the elements in a similar way to soft natural stones.

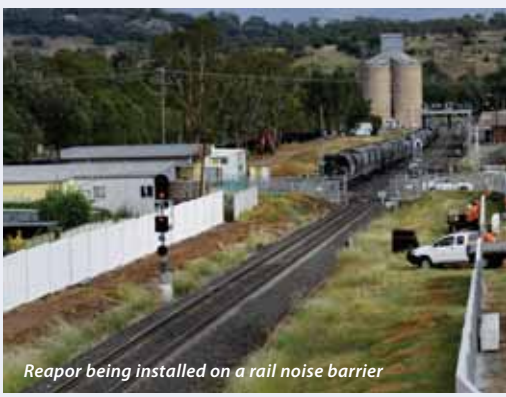
In outdoor applications, Reapor® may show signs of efflorescence, a temporary condition which can be removed by brushing or rinsing with a hose. In most cases, over time rainwater steadily removes the deposit leaving the original colour of the panel unharmed.

Efflorescence does not affect the quality, acoustic performance or functionality of Reapor.

CARE, REPAIR & MAINTENANCE

- Replace any cracked or broken panels.
- Clean any debris to maintain the free drip edge and ensure the damp course is not breached.
- Regularly inspect flashing to ensure it remains functional.
- Clean off any efflorescence by first dry brushing off build up of deposits with brush or tools. The surface can also be sanded to remove surface stains or other marks. (You can even use a piece of Reapor® as a sanding block! - ie Reapor on Reapor).
- If further staining is visible, consider hosing down, or using mild soapy water to rinse. Efflorescence remover is recommended only for very stubborn areas.

Regularly inspect flashing for functionality



Reapor being installed on a rail noise barrier

Decorative front of noise barrier wall (Reapor applied to reverse)

Please contact Pyrotek® for further information or detailed advice on your specific application.

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Handling Guide

REAPOR TRANSHIPPING AND HANDLING GUIDE

This guide is design to give advice and direction for the devanning of containers and general transhipping and storage of Reapor acoustic tiles. This is a general guide only and all normal health and safety procedures should be followed and site conditions taken into account to complete a thorough risk assessment.

BEFORE INSTALL REAPOR IS BREAKABLE WHEN HANDLING AVOID DAMAGE

Shipping Containers

Reapor is shipped around the world in 20 or 40' containers it is packed with great care and airbags are used to secure the load to prevent movement and transit damage.

The container will have airbags at the front that need to be released as well as side airbags to prevent transit movement, simply puncture to release the air.

Unpacking a container

1. To remove the pallets, use either a forklift ramp and container forklift and adjust the tines, to accommodate the narrower pallet base.
2. If a container forklift and ramp are not available use a European pallet jack to move each pallet to the edge of the container, then fork lift out.The standard pallet jack is too wide for the pallets which are stacked end on.

Lifting the Reapor pallet

1. When adjust the tines on the forklift to accommodate the narrow pallets make sure the tine is not over the fitting notch as this can cause the pallet to topple.
2. The product is packed on pallets which are not rigid. Avoid sudden bumps or dropping of the pallet as this may cause the bottom tiles to crack.
3. Lift from the end until out of container. Then lift sideways across slats to ensure a stable load.

Handling and unpacking summary

1. Lift sideways with tines across slats
2. Tilt tines back and tie/strap panels to mast to ensure the tiles don't topple over when moving
3. Handle with care and avoid impact.
4. Avoid sudden drops when moving via forklift
5. Avoid bumps when travelling with pallets on forklift.
6. Keep area around forklift clear, suggest
    a. 3m exclusion zone. Spotter should remain clear of the forklift, at a safe distance.
7. Move only with forklift or pallet jack

Storage

1. Do not stack pallets on top of each other or stack anything on top
2. Protect from any mechanical damage (Bumps or knocks)
3. Make sure pallets are stored on level ground, placed gently down not shunted into place with tines of forklift
4. Pallets should be covered to prevent moisture ingress
5. When covered ensure also adequate ventilation of the covering to prevent sweating and condensation build up

Safety Data Sheet

Safety Data Sheet
Reapor®

Revision Date: *2017-06-29*
Revision *4*

Classification Symbol(s)	Personal Protective Equipment (PPE)	Transport Symbols
		

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Commodity code 17207 REAPOR

Product Name Reapor®

Product description Sound absorption and insulation material.

Product use Sound absorption panel for ceilings, mobile partitions, walls, sound protection walls, light-weight core in sandwich panels.

Details of the supplier
Pyrotek Pty. Ltd.
147-149 Magowar Road
Girraween
NSW 2145
Australia

Pyrotek (61) (0)2 9631 1333
Fax: (61) (0)2 9631-0233
Email: SDS@pyrotek-inc.comREACH email: REACH@pyrotek-inc.com

Emergency Telephone Number CHEMTREC 1800 752 022 (24 hrs), Pyrotek Australia 1800 679 422

2. Hazards Identification

Classification according to EU Regulation EC 1272/2008 (GHS)

The product is an article and is not subject of Directive EC 1272/2008

Classification according to EU Directives 67/548/EEC or 1999/45/EC [Australian NOHSC: 1008 (2004)]

Australian Hazard text Not classified as hazardous according to criteria of NOHSC:1008 (SWA/ASCC).

Poison Schedule Number No information available

3. Composition/information on Ingredients

Chemical name	CAS No	EC No	Weight-%	Classification according to EU Regulation EC 1272/2008 (GHS)	Australia - NOHSC Labelling
glass, oxide, chemicals	65997-17-3		> 60%	Article - not classified	

All other ingredients determined not to be hazardous according to NOHSC / GHS criteria

4. First Aid Measures

General advice No information available.

Inhalation Remove to fresh air. If symptoms persist, call a physician.

Skin Contact Wash off with soap and water.

Eye Contact Rinse thoroughly with plenty of water, also under the eyelids. Consult a physician.

Ingestion Not a normal route of exposure.

Aggravated Medical Conditions No information available.

Notes to Physician No information available.

For advice, contact Poisons Information Centre
In Australia, call Tel: 13 1126
In New Zealand, call Tel: 034747000

5. Fire-Fighting Measures

Flammable properties None known.

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding fire

Unsuitable Extinguishing Media None known.

Special exposure hazards in a fire No information available.

Specific hazards arising from the chemical None known.

Protective equipment and precautions for firefighters As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Australian Hazchem Code None known

6. Accidental Release Measures

Personal precautions Avoid dust formation. Use personal protective equipment.

Environmental Precautions Avoid dust formation. Do not allow undiluted product or large quantities of it to reach ground water, water bodies or sewage system.

Methods for cleaning up Avoid dust formation. Shovel or sweep up.

Other Information Due to it's low density the product will float on water, this could block pipelines if allowed to enter drains in large qty's.

7. Handling and Storage

Handling Avoid dust formation. Handle in accordance with good industrial hygiene and safety practice. Wear personal protective equipment.

Storage Keep in a dry place.

Materials to avoid Hydrofluoric acid.

8. Exposure Controls/Personal Protection

Exposure Guidelines

Chemical name	ES-TWA	ES-STEL	ES-Peak
glass, oxide, chemicals	Inhalable fraction 10 mg/m³ (E) Respirable fraction 3 mg/m³ (A)		

Chemical name	Health Surveillance
glass, oxide, chemicals	No biological limit allocated

Occupational exposure controls

Engineering Controls Ensure adequate ventilation, especially in confined areas when mist is present.

Environmental exposure controls No information available.

Personal Protective Equipment
Considerations to aid the user in PPE assessments in line with expected use follow below. However in certain circumstances the user must determine if additional protective equipment is required.
If exposure limits are exceeded or irritation is experienced, locally approved respiratory protection should be worn.
Positive-pressure supplied air respirators may be required if high airborne contaminant concentrations as a result of the use of the product. Proper skin and eye protection should also be determined by the user and provided in accordance with current local regulations.

Eye Protection No special protective equipment required. During machining operations: Safety glasses (or) Goggles

Respiratory protection Respiratory protection is not necessary for normal handling of material which does not release dust. Use the indicated respiratory protection if the occupational exposure limit is exceeded and/or in case of product release (dust): Dust mask EN149 - P3/FFP3 or (P2/FFP2) under dusty conditions.

Skin Protection Work uniform or laboratory coat.

Hand Protection Abrasive resistant gloves

General industrial hygiene practice Avoid dust formation. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Physical state	Flakes	**Appearance**	Porous, Powder
Color	light grey	**Odor**	No information available
pH - VALUE 1	9-10 (in aqueous solution 100g/L at 20°C)	**Bulk density**	average 270 kg/m³ (± 10%)
Vapor pressure	No data available	**Vapor density**	No data available
Boiling point / boiling range	No data available	**Melting point/range**	No data available
Flash point	>=	**Autoignition temperature**	No data available
Upper explosion limit	No data available	**Lower explosion limit**	No data available
Softening point	>540°C		

10. Stability and Reactivity

Stability	Stable under normal conditions.
Conditions to Avoid	Temperatures above 1000°C.
Materials to avoid	Hydrofluoric acid.
Hazardous Decomposition Products	None known.
Possibility of Hazardous Reactions	No information available

11. Toxicological Information

Local effects	No information available.
Target organ effects	No information available.

Acute Toxicity

Potential Health Effects

Inhalation	No information available.
Eye Contact	No information available.
Skin Contact	No information available.
Ingestion	No information available.

Specific effects

Carcinogenic effects	No information available.
Mutagenic effects	No information available.
Reproductive Toxicity	No information available.

12. Ecological Information

Ecotoxicity effects	Information follows.
Persistence and degradability	Believed to persist in the environment
Mobility in Environmental Media	The product is insoluble and floats on water
biodegradation	Not inherently biodegradable
Bioaccumulation	None known

13. Disposal Considerations

Waste disposal methods	Dispose of in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport Information

Not regulated for transport.

15. Regulatory Information

International Inventories

Chemical name	EINECS	ELINCS	PICCS	ENCS	DSL	NDSL	TSCA	China	AICS	KECL
glass, oxide, chemicals	X		X	X	X		X	X	X	X

Carcinogenic substances Not Listed

EU Labeling EC Label

16. Other Information

Revision Date: 2017-06-29

Reason for Revision Updated to comply with the Legislative requirements for review. Converted to GHS format.

Prepared By:
Pyrotek Inc
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Ph: (509) 926-6212
Fax: (509) 927-2408
msds@pyrotek-inc.com.

Literary reference Information taken from reference works and the literature.

Key Legend Information
SWA - Safe Work Australia (formerly ASCC - Australian Safety and Compensation Council and NOHSC - National Occupational Health & Safety Commission)
SUSDP - Standard for the Uniform Scheduling of Drugs and Poisons [Aust]
TWA - Time Weighted Average [Int]
STEL - Short Term Exposure Limit [Int]
AICS - Australian Inventory of Chemical Substances [Aust]
Dangerous Goods - Initial Emergency Response Guide (SAA/SNZ HB76:2004)[Aust]
AS/NZS 1715 - Selection, use and maintenance of respiratory protective devices. [Aust/NZ]
Hazchem Code - Fire fighters designation [Aust]
IATA - International Aviation Transport Authority [Int]
IMDG - International Maritime Dangerous Goods [Int]
ADR/RID - European Road & Rail Transportation Union - [Int]
GHS - United Nations Globally Harmonized System for the classification and labelling of Chemicals [Int]
EINECS - European Inventory of Existing Commercial Chemical Substances [Int]
ELINCS - European List of Notified Chemical Substances [Int]
EU - European Union [Int]

[Aust/NZ] = Australian New Zealand
[Int] = International

End of SDS

Service Life

MAHAFFEY ASSOCIATES PTY LTD (ABN 90 001 629 036)
Incorporating BEMAC Laboratories
Unit 9 / 108-110 Percival Road (P O Box 2162), Smithfield NSW 2164
Ph (02) 9756 4003 Fax (02) 9757 4228 Email mahaffey@mahaffey.com.au

BAS/17/L02/10929

6 July 2017

Pyrotek Pty. Ltd.
147 Magowar Road
GIRRAWEEN NSW 2145

Attention: Bruce Hermes

Dear Sir,

Re: Service life Assessment of Reapor

1. Background

The report covers a review the Reapor panels with the view of providing durability and the service life assessment. The Reapor was developed about 20 years in Germany and the panels have been installed the manufacturer's site since then. In Australia, it has been installed in the Clem Jones Tunnel (North-South Bypass Tunnel) in Brisbane for a little over 6 years. Other installations in Australia are between 1 and 2 years old.

The primary use of the panels is noise control. For the current review, the panels are intended to be used for noise control in a transportation viaduct and tunnel.

2. Description of products

The products under review is the Reapor panels. The core component material of these panels is recycled glass bottles which has been processed to an expanded glass granules.

Figure 1 shows samples of the glass granules and a cross-section of granules that show porosity of the particles.

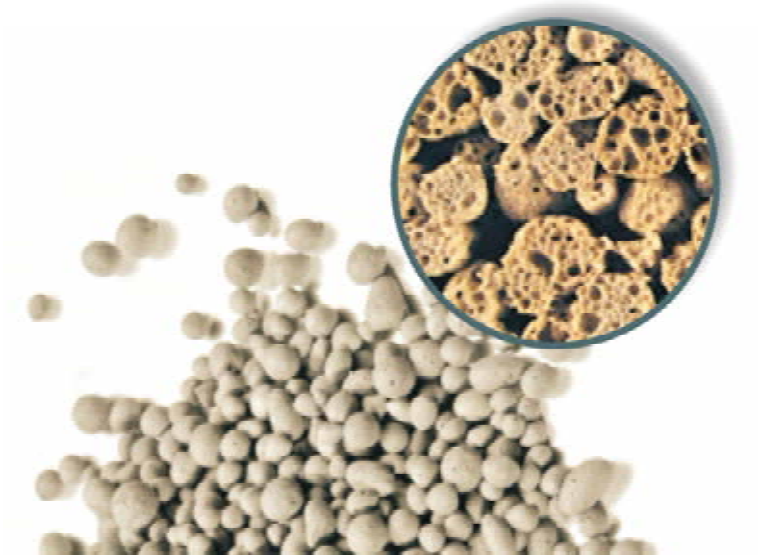


Figure 1: Expanded glass granules; close-up view of the internal structure of the granules

The manufacture of the Reapor panels involves the fusing of the glass granules through a heating process. A sodium silicate (water glass) is added to the granules before sintering. The Reapor panels are therefore, manufactured without a binder. The process is similar to sintering a process that is used in the manufacturing of metals, ceramics, plastics, and other materials. During the process, the atoms in the glass diffuse across the boundaries of the particles, fusing the granules together and creating a homogenous panel. The properties of Reapor panels in terms of exposure are similar to that of the glass.

3. Durability Assessment

The durability of a material is determined by its resistance to degradation when exposed to an aggressive environment. The resistance of a material is combination of the responses of the individual parts and the composite material acting as a whole.

Reapor by nature is similar to glass and its response to environmental exposure will not be significantly different to that of a glass. The durability of glass has been proven over centuries of use. Apart from surface weathering due to abrasion and chemical attack or damage by excessive loads, there are only few factors that damage glass. The recovery of glass fragments in archaeological digs and glass stained windows in ancient churches are testaments of the longevity of glass. Exposure of Reapor to weathering is not expected to be any different.

3.1 Environment

Durability assessment cannot be made in isolation without reference to the environment and the installation process. Figures 2 and 3, show the proposed locations of the panels in the viaduct and tunnel.

Environmental conditions in the tunnel that would affect the durability of the panels include wind (up to 40 m/s), wind-blown rain drawn into the tunnel by trains (surfaces within 150 m from tunnel portals are likely to be frequently wetted), and groundwater seepage (although minimal) containing iron oxide.

The Reapor is to be used in the lining of the parapets and underneath the walkway and walls beneath the walkways.

The locations will expose the panels to the weather in the viaduct sections. Detail descriptions of the locations and installation process is described below.

3.2 Locations and installation process

Reapor - sintered acoustic panels

Installation overview:

- Substrate prepared to Australian standards - all mould release, surface slurry removed, etc.
- Panels installed using Pyrotek CB Adhesive (cement based, flexible tile adhesive) with >90% coverage. Recommended application method is to use a 12mm notched trowel to apply adhesive to the substrate and back-butter the panel using a 6mm trowel. This provides an adhesive bed of ~5mm. Uneven surfaces will require addition adhesive.
- To prevent excessive ingress of moisture:
    - Panels to be installed on dry substrate, above damp course. We do not recommend the product for installation on damp walls, eg retaining walls.
    - Panels to be installed with flashing or rebated into wall (free drip edge above panel).

  - Panels must be installed to drain freely, i.e. Above surface of soil etc. and with a free drip edge on the bottom panel
- Recommend tile spacers used to provide 1-2mm gaps between panels

Application 1 – Reapor Exterior walls (vertical)

- Installed as above.
- Panels exposed to sun, wind and rain

Application 2 – Reapor Rail and Motorway Tunnel walls

- Installation as above, however flashing is not required as panel is not exposed to weather
- Some exposure to weather blown in at the openings of the tunnels
- Note, there are occasional fire sprinkler tests that will wet the panels

In summary, the installation process for the Reapor allows for the use of the panels in environmental conditions that will exist in the Tunnel. For exterior usage, the Reapor panels will be exposed to the weather (sun, wind, and rain).

While the application of the panels includes interior areas, for durability assessment of material usage on a projected, the worst exposure condition is adopted. Therefore, the environmental exposure for the purpose of this project shall be taken as exterior exposure.

4. Service Life Assessment

4.1 Reapor Panels

The product is considered as equivalent to glass and the performance of the panel in an exterior environment will be similar to the glass exposed to the weather. Field exposure by the manufacture has shown Reapor has performed without deterioration for nearly 20 years.

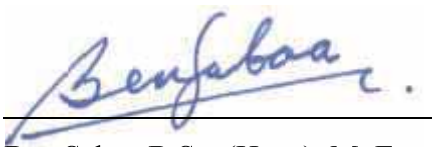
Furthermore, historic evidence from archaeological finds and ancient buildings shows glass is durable for hundreds of years. The durability of glass bottles washed ashore after many years at sea confirms the durability of glass exposed to water. The oldest bottle with a message was found in 2015 after 108 years at sea, as part of an experiment undertaken by the

Marine Biological Association of the UK.

Reapor a sintered glass panel is expected to provided service life in the proposed application more than 50 years and even more if it is not damage by mechanical stress in the installed locations.

We trust that this information is of assistance; however please do not hesitate to contact me, should you require anything further.

Yours faithfully
MAHAFFEY ASSOCIATES



Ben Sabaa B.Sc. (Hons), M. Eng. Sc., Ph. D.

Conditions of Use

This report takes into account the particular requirement of our client. It is not intended and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Electrical Conductivity

MATES
Maintaining and Testing Electrical Services

Unit 1 - 2 Sleigh Place
Wetherill Park
NSW 2164
ABN - 53 105 781 575

Ph - 02 9822 0070
Fax- 02 9757 2498
Mobile - 0419 014 090
E - mates@matesservices.com

Test Report

Customer: Pyrotek, Girraween, NSW
Date: 23/02/2016
Requested By: Alan Woods
Report No: 9765
Location: Mates Work Shop

Purpose of Test: To determine the dielectric insulation integrity

Equipment: **Reapor tile**

Test Method: The test was performed with the tile lifted from any external influences. Two screws were used at different distances apart at 25mm deep

Distance apart	5KV DC for 1 min	1KV DC for 1 min
500mm	11.6 Meg Ω	19.1 Meg Ω
450mm	2.54 Meg Ω	4.9 Meg Ω
400mm	1.17 Meg Ω	1.11 Meg Ω
350mm	0.86 Meg Ω	0.94 Meg Ω
300mm	0.73 Meg Ω	0.69 Meg Ω
250mm	0.49 Meg Ω	0.53 Meg Ω
200mm	0.47 Meg Ω	0.5 Meg Ω
150mm	0.43 Meg Ω	0.48 Meg Ω
100mm	0.36 Meg Ω	0.39 Meg Ω
50mm	0.33 Meg Ω	0.35 Meg Ω
25mm	0.23 Meg Ω	0.26 Meg Ω

Special Note / Requirement

During test there was no breakdown short, however at 300mm separation and lower the test voltage was not stable at set 1KV and 5KV.

The product under test would be considered of non-conductive materials.

Test in accordance with AS/NZS 3000-2007 -- (8.3.6)

Contact personnel details

Customer Name: Alan Woods Mobile Number: 0416 104 024

Test Electrician: Luke Mounsey Mobile Number: 0419 019 014

Electrician Signature: L Mounsey Test Equipment: BM21 Cal:15-7-16

2 | VITEROLITE® 900

Being non-conductive, Viterolite® 900 can be installed safely around electrical communication components as it does not create any electrical interference. It is vital to minimise any interference which can cause a temporary loss of signal or affect communication in mass transit systems.

VITEROLITE® 900

Viterolite® 900 is a non-combustible sound absorber ideally suited for areas which require no smoke emission, volatiles, toxic or noxious gases such as tunnels, air shafts or public areas. It is constructed using cement binding agents, ideally used in high wear, high impact and trafficable areas.

It can be custom made into any shape or size. Typical custom applications include wall panels, road barriers, air shaft linings, rail and vehicle tunnels.

Viterolite® 900 has been engineered to optimize maximum sound absorption across a broad frequency range while maintaining a natural concrete-like appearance.

NRC	0.75

Rail track tile

Features

- Non-combustible - withstands over 1150 °C
- No smoke emission, no toxic or noxious fumes generated when exposed to fire
- Non-fibrous and non-toxic: Safe to handle
- Trafficable: impact resistant from foot traffic and light vehicles
- Non-conductive
- Customizable to suit any application
- Rigid, durable and self supporting with high sound absorption
- High weather, water and UV resistance
- Free draining: porous to allow transfer of water
- Can be used in conjunction with other sound absorbing products to suit acoustic requirements
- Can be easily coated using any exterior paint
- Acoustic renders can be easily applied
- Easily cleaned using detergents or any pressure wash system

Specifications

Rail track tile design: Nominal density: 1800 kg/m^3 Thickness: 170 mm Length: 700 mm Width: 915 mm
Customized size and designs available depending on MOQ.

Application

- Rail tunnels in-between tracks
- Underground train stations
- Outdoor road barriers or exterior walls
- Trafficable flooring areas
- Plant rooms and substations
- Areas requiring high fire safety
- Transport depots

VITEROLITE® 900 TECHNICAL DETAILS

No.	Property	Method	Specification
1	Density	-	Minimum density 1500 kg/m^3
2	Electrical conductivity	"AS/NZS 3000 (tested with 5kV insulation tester)"	Non-conductive
3	Service life \ Design life	--	Documentation asserting a minimum design life of 30 years
4	Acoustic performance	ISO 354, ISO 11654	"Requires a minimum αw = 0.70 (at 170 mm to 230 mm thickness)"
5	Flow resistance	ASTM C522	$1x10^2$ to $5x10^3$ Rayls/m
6	Non-combustibility	AS 1530.1 / ISO 1182	Shall be deemed non-combustible
7	Flammability testing – Cone calorimeter	AS 5637.1	Minimum Group 1 rating
8	Flammability testing & smoke density – fire tests on building materials	AS1530.3	Ignitability, 0
			Spread of flame, 0
			Heat evolved, 0
			Some developed, ≤ 1
9	Porosity (% Void)		25 to 50%
10	Wind loading		minimum weight of product of 100kg/m^2
11	Trafficability – prevention of trip hazard	AS 1657	Height tolerance less than or equal to ±2.5mm
12	Trafficability – prevention of slip hazard	AS 1657, AS4586 Appendix A	Minimum classification of P5
		AS 1657, AS4586 Appendix B	Minimum classification of D1
13	Non-hazardous material	Classification according to EU Regulation EC 1272/2008 (GHS)	All materials shall be classified as not being Hazardous
14	Volatile organic compound (VOC)	ASTM D5116	Total VOC < 0.5 mg/m^2/hr
15	Ozone depleting potential (ODP)	--	Zero ODP, no materials with ODP added, used or generated during manufacture
16	Water resistant & water permeable to allow drainage	--	Shall be permeable and resistant to water, to allow drainage

Technical Datasheet

VITEROLITE® 900

non-combustible sound absorber

Viterolite® 900 is a non-combustible sound absorber ideally suited for areas which require no smoke emission, volatiles, toxic or noxious gases such as tunnels, air shafts or public areas. It is constructed using cement binding agents, ideally used in high wear, high impact and trafficable areas.

It can be custom made into any shape or size. Typical custom applications include wall panels, road barriers, air shaft linings, rail and vehicle tunnels.

Viterolite® 900 has been engineered to optimize maximum sound absorption across a broad frequency range while maintaining a natural concrete-like appearance.

The product design allows for drainage due to the material's porous nature. It has the strength to handle foot traffic and light vehicles making it ideal for construction of walkways.

Viterolite® 900 can also be utilised around electrical components as it is non-conductive.

For more information on the available designs, please contact your local Pyrotek representative.

Rail track tile design made out of Viterolite® 900

applications

- Rail tunnels in-between tracks
- Underground train stations
- Outdoor road barriers or exterior walls
- Trafficable flooring areas
- Plant rooms and substations
- Areas requiring high fire safety
- Transport depots

features

- Non-combustible - withstands over 1150 °C
- No smoke emission, no toxic or noxious fumes generated when exposed to fire
- Non-fibrous and non-toxic: safe to handle
- Trafficable: impact resistant from foot traffic and light vehicles
- Non-conductive
- Customizable to suit any application
- Rigid, durable and self supporting with high sound absorption
- High weather, water and UV resistance
- Free draining: porous to allow transfer of water
- Can be used in conjunction with other sound absorbing products to suit acoustic requirements
- Can be easily coated using any exterior paint
- Acoustic renders can be easily applied
- Easily cleaned using detergents or any pressure wash system

SPECIFICATIONS

Colour	Grey Cement
Available	Nominal density: 1800 kg/m^3 **Rail track tile design:** Thickness: 170 mm Length: 700 mm Width: 915 mm
	Customized size and designs available depending on MOQ

PRODUCT SPECIFICATIONS

Product name	Nominal Density (kg/m^3)	Standard Thickness (mm)	Standard Length (mm)	Standard Width (mm)	Weight (kg)
Viterolite® 900 Rail track tile design	1800	170	700	915	190

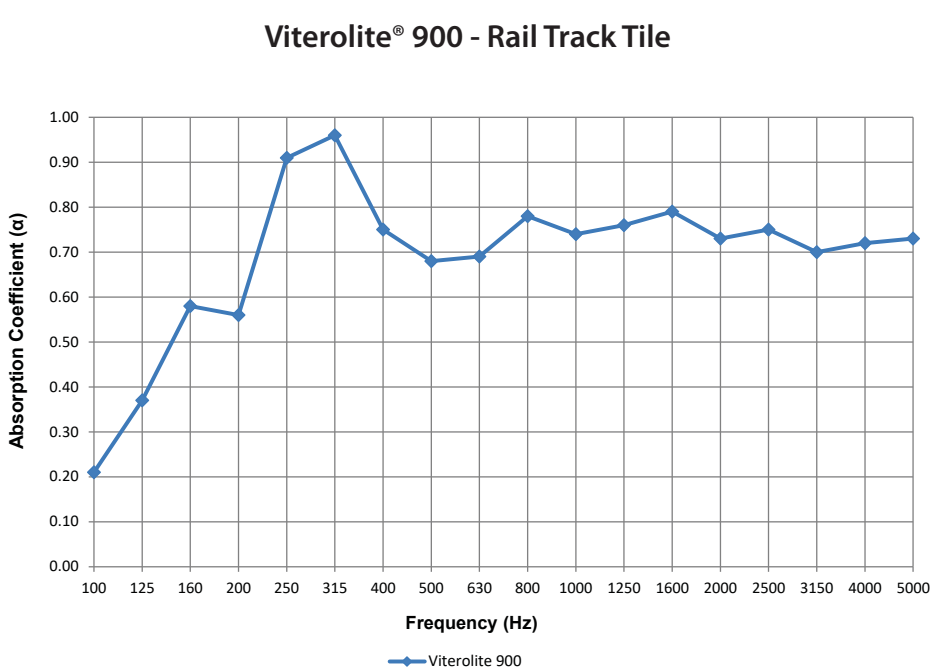
Tolerances: Length: ±5 mm, Width: ±5 mm, Thickness: ±5 mm, Weight: ±10%
Customized size and design available

MATERIAL PROPERTIES

Test method	Property	Report	Results	
AS/NZS 3000	Electrical conductivity	PYRO-TT-001	Non-conductive	
AS 1530.1 / ISO 1182	Fire resistance	FNC11917	Non-combustible	
AS 1530.3	Method for fire tests on building materials, components and structures	17-005996	Ignitability	0
			Spread of flame	0
			Heat evolved	0
			Smoke developed	0-1
AS 1657, AS 4586	Fixed platforms, walkways, stairways and ladders: Slip resistance classification of new pedestrian surface materials	R16545a	Slip resistant class P5 (Appendix A) D1 (Appendix B)	
Design Life and maintenance	Service life assessment	DRM-17-L01R-10929	30 years with proper use, installation and maintenance	

ACOUSTIC PERFORMANCE

Frequency (Hz)	Viterolite® 900 (Rail track tile)
100	0.21
125	0.37
160	0.58
200	0.56
250	0.91
315	0.96
400	0.75
500	0.68
630	0.69
800	0.78
1000	0.74
1250	0.76
1600	0.79
2000	0.73
2500	0.75
3150	0.70
4000	0.72
5000	0.73
NRC	0.75
SAA	0.76
α_w	0.75 (L)



Tested to ISO 354:2003 at CSIRO, Australia | Report Number: AC215-01-1
The above results are based on the Viterolite® 900 rail track tile design

For further information and contact details, please visit our website
pyroteknc.com

Caveats: Specifications are subject to change without notice. The data in this document is typical of average values based on tests by independent laboratories or by the manufacturer and are indicative only. Materials must be tested under intended service conditions to determine their suitability for purpose. The conclusions drawn from acoustic test results are as interpreted by qualified independent testing authorities. Nothing here releases the purchaser/user from responsibility to determine the suitability of the product for their project needs. Always seek the opinion of your acoustic, mechanical and fire engineer on data presented by the manufacturer. Due to the wide variety of individual projects, Pyrotek is not responsible for differing outcomes from using their products. Pyrotek disclaims any liability for damages or consequential loss as a result of reliance solely on the information presented. No warranty is made that the use of this information or of the products, processes or equipment to which this Information Page refers will not infringe any third party's patents or rights.
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Installation Guide

VITEROLITE® 900

This Installation Guide provides recommendations to maximise the service life in outdoor applications. Viterolite® 900 should always be installed over surfaces that are flat, clean, free of contaminants and with adequate drainage.

Rail track tile design made out of Viterolite® 900

WORKING HEALTH AND SAFETY

- Failure to follow these guidelines may result in a reduced product life, cracking or other deterioration of the panels.
- Gloves, protective goggles and any other appropriate safety equipment based on local health & safety requirements and safe work practice must be worn by applicator.

KEY INSTALLATION REQUIREMENTS

Viterolite® 900 panels should be installed on a flat level surface of rigid cement slab with suitable strength and thickness. Alignment of top surface of adjacent panels should be of consistent height, providing a smooth continuous surface to eliminate potential trip hazards between individual panels.

Viterolite® 900 was developed with the aim of providing trafficable acoustic absorber

applications

- Applications requiring high fire ratings
- Airports, stations, and carparks
- Railway and motorway tunnels

If an adhesive is used, AS 3958.1 requires 90% adhesive coverage for flooring applications.

A thicker adhesive layer may be required depending upon the roughness of the substrate surface. To level the floor in the installation area, addition of a cementitious floor levelling compound or grinding of the surface should be considered in order to prepare uneven surfaces.

Viterolite® 900 should only be installed on dry substrates and in areas with suitable drainage.

SURFACE PREPARATION

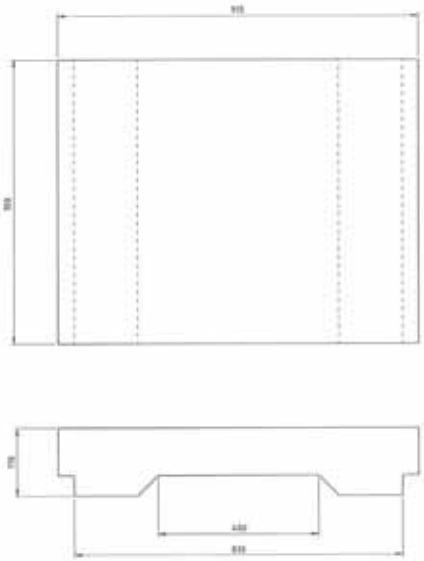
- All substrates must be clean and free from laitance, curing compounds, dirt, dust, grease, oil and any other contaminants.
- When an adhesive is used, all substrates should be washed with clean water just prior to the application of the adhesive or levelling compound. Care must be taken in the preparation of concrete to ensure all traces of release agents and curing compounds are removed, if in doubt prepare the substrate using a pressure washer to expose the fine aggregates in the matrix of the concrete as this will ensure a clean substrate.
- For rough or uneven surfaces, addition of cementitious floor levelling compound or grinding of the surface to a flat finish is required.

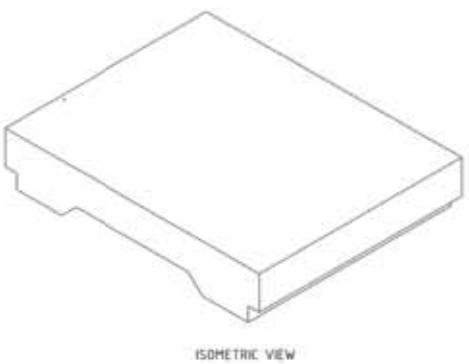
ADHESIVE APPLICATION

- When used, adhesive must be mixed according to recommendations on the package.
- Once the surface has been appropriately prepared in accordance with the instructions, apply the adhesive onto the surface with a notched trowel.
- If adhesive does fall on front surface of Viterolite, remove excess adhesive without smudging, smearing or wiping it over the surface of the panel.
- Do not allow voids to occur and ensure full coverage of adhesive.

A general recommendation to achieve the 90% required coverage of adhesive is to use a 10 mm notched trowel for the substrate and 6 mm notched trowel to back-butter the acoustic panels. However, a thicker adhesive layer may be required depending upon the roughness of the substrate surface.

DESIGN DETAIL





INSTALLATION

- Check the installation site for accessibility and appropriate installation equipment for the delivery of Viterolite® 900 panels. Viterolite® 900 is supplied vertically upright on pallets. Panels will require lifting and may require rotating 90 degrees to allow access for forklift tines for individual panel lifting. Prior to handling, conduct visual inspection of panels to confirm compliance to specification and to check for any major defects.
- Unloading point or storage area shall be a hard, level, clean, dry and well drained ground. Store panels using "First-In, First-Out" principles, on a pallet with appropriate restraints. If restraints are removed, the Viterolite® 900 panels shall be removed from pallet and stored horizontally. If delivered vertically - we delivered last panels as horizontal.
- Forklifts used to lift panels should be operated by a qualified operator, in a manner compliant with the regional legislative requirements. All other personal shall remain clear of the forklift while in operation. Viterolite® 900 panels are designed to be lifted using a forklift and tines should be carefully adjusted to ensure that they fully utilise the panel lifting points, and prevent lateral movement of the panel.
- The panels must not bridge expansion joints of substrate. Expansion joints must be provided to allow movement. Joints should not be less than 4 mm and not wider than 6 mm. Use flexible sealant where required.
- Panels should be spaced approximately 4 mm apart using tile spacers. Ensure panels are laid evenly, and that the variation in height between adjacent panels is less than 5 mm. Where panel height variation is greater than 5mm, the flooring substrate should be checked to ensure that it is clean and levelled. If required, it shall be raised with cementitious floor levelling compound or ground to correct floor levelling.

CARE, REPAIR & MAINTENANCE

- Replace any cracked or broken panels.
- Clean off any efflorescence by hosing down or using efflorescence remover.
- The porosity of the panels should not be blinded by dirt or any other contaminants.

WEATHERING

Viterolite® 900 is a porous stone-like material that may weather and age naturally in the elements in a similar way to natural stone.

In outdoor applications, Viterolite® 900 may show signs of efflorescence, a temporary condition which can be removed by rinsing with a hose or in most cases over time rainwater steadily removes the deposit leaving the original colour of the panel unharmed.

Efflorescence does not affect the quality, acoustic performance or functionality of Viterolite® 900.

Caveats: Specifications are subject to change without notice. The data in this document is typical of average values based on tests by independent laboratories or by the manufacturer and are indicative only. Materials must be tested under intended service conditions to determine their suitability for purpose. The conclusions drawn from acoustic test results are as interpreted by qualified independent testing authorities. Nothing here releases the purchaser/user from responsibility to determine the suitability of the product for their project needs. Always seek the opinion of your acoustic, mechanical and fire engineer on data presented by the manufacturer. Due to the wide variety of individual projects, Pyrotek is not responsible for differing outcomes from using their products. Pyrotek disclaims any liability for damages or consequential loss as a result of reliance solely on the information presented. No warranty is made that the use of this information or of the products, processes or equipment to which this Information Page refers will not infringe any third party's patents or rights.

Safety Data Sheet

Safety Data Sheet
VITEROLITE 900

Revision Date: *2018-01-11*
Revision *3*

Classification Symbol(s)	Personal Protective Equipment (PPE)	Transport Symbols
		

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Commodity code 17207 - VITEROLITE 900

Product Name VITEROLITE 900

Product description Sound absorption and insulation material.

Product use Sound absorbing material.

Details of the supplier
Pyrotek Pty. Ltd.
147-149 Magowar Road
Girraween
NSW 2145
Australia

Pyrotek (61) (0)2 9631 1333
Fax: (61) (0)2 9631-0233
Email: SDS@pyrotek-inc.comREACH email: REACH@pyrotek-inc.com

Emergency Telephone Number CHEMTREC 1800 752 022 (24 hrs), Pyrotek Australia 1800 679 422

2. Hazards Identification

Classification according to EU Regulation EC 1272/2008 (GHS)

The product is an article and is not subject of Directive EC 1272/2008

Classification according to EU Directives 67/548/EEC or 1999/45/EC [Australian NOHSC: 1008 (2004)]

Australian Hazard text Not classified as hazardous according to criteria of NOHSC:1008 (SWA/ASCC).

Classification Symbol(s) This product is considered an "Article" according to the "Approved Criteria for Classifying Hazardous Substances NOHSC:1008(2004)" and such is exempt from classification

Poison Schedule Number No information available

Further information Some components contained in this product can be emitted as airborne contaminants (dust) under certain processing conditions such as cutting, sawing, grinding, milling, machining, etc.

Dust from material may cause skin, eye and respiratory track irritation.
Use the indicated respiratory protection if the occupational exposure limit is exceeded and/or in case of product release (dust or vapors).

3. Composition/information on Ingredients

All other ingredients determined not to be hazardous according to NOHSC / GHS criteria

4. First Aid Measures

General advice	No information available.
Inhalation	Remove to fresh air. If symptoms persist, call a physician.
Skin Contact	Wash off with soap and water.
Eye Contact	Rinse thoroughly with plenty of water, also under the eyelids. Consult a physician.
Ingestion	Not a normal route of exposure.
Aggravated Medical Conditions	No information available.
Notes to Physician	No information available.

For advice, contact Poisons Information Centre
In Australia, call Tel: 13 1126
In New Zealand, call Tel: 034747000

5. Fire-Fighting Measures

Flammable properties	None known.
Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding fire
Unsuitable Extinguishing Media	None known.
Special exposure hazards in a fire	None known.
Specific hazards arising from the chemical	None known.
Protective equipment and precautions for firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
Australian Hazchem Code	None known

6. Accidental Release Measures

Personal precautions	Avoid dust formation. Use personal protective equipment.
Environmental Precautions	.?. Avoid dust formation.
Methods for cleaning up	Avoid dust formation. Shovel or sweep up.
Other Information	Due to it's low density the product will float on water, this could block pipelines if allowed to enter drains in large qty's.

7. Handling and Storage

Handling	Avoid dust formation. Handle in accordance with good industrial hygiene and safety practice. Wear personal protective equipment.
Storage	Keep in a dry place.
Materials to avoid	Strong acids; Oxidizing agent.

8. Exposure Controls/Personal Protection

Exposure Guidelines

Occupational exposure controls

Engineering Controls	Only if the materials are being handled extremely vigorously or subjected to harsh abrasion are dust levels likely to rise above the exposure limit. In such circumstances, the provision of local exhaust ventilation should be considered, or if this is not practicable, dust masks should be worn approved for use against irritant dust Avoid breathing dust Provide appropriate exhaust ventilation at places where dust is formed
Environmental exposure controls	No information available.

Personal Protective Equipment
Considerations to aid the user in PPE assessments in line with expected use follow below. However in certain circumstances the user must determine if additional protective equipment is required.
If exposure limits are exceeded or irritation is experienced, locally approved respiratory protection should be worn.
Positive-pressure supplied air respirators may be required if high airborne contaminant concentrations as a result of the use of the product. Proper skin and eye protection should also be determined by the user and provided in accordance with current local regulations.

Eye Protection	No special protective equipment required. During machining operations: Safety glasses (or) Goggles
Respiratory protection	Respiratory protection is not necessary for normal handling of material which does not release dust. Wear respirator with dust filter during machining of slab. Respirator must be worn if exposed to dust.
Skin Protection	Thick fabric gloves. Work uniform or laboratory coat.
General industrial hygiene practice	Avoid dust formation. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Physical state	Flakes	**Appearance**	Porous, Flakes
Color	Grey	**Odor**	No information available
pH - VALUE 1	No data available	**Liquid Density**	1400 - 2000 kg/m^3
Vapor pressure	No data available	**Vapor density**	No data available
Boiling point / boiling range	No data available	**Melting point/range**	No data available
Flash point	>=	**Autoignition temperature**	No data available
Upper explosion limit	No data available	**Lower explosion limit**	No data available

10. Stability and Reactivity

Stability	Stable under normal conditions.
Conditions to Avoid	To avoid thermal decomposition, do not overheat.
Materials to avoid	Strong acids; Oxidizing agent.

Hazardous Decomposition Products	Carbon monoxide, carbon dioxide and trace amounts of aromatic and aliphatic hydrocarbons may be released during burning.
Possibility of Hazardous Reactions	Hazardous polymerization does not occur

11. Toxicological Information

Local effects	No information available.
Target organ effects	No information available.
Acute Toxicity	No information available

Potential Health Effects

Inhalation	No information available.
Eye Contact	No information available.
Skin Contact	No information available.
Ingestion	No information available.

Specific effects

Carcinogenic effects	No information available.
Mutagenic effects	No information available.
Reproductive Toxicity	No information available.

12. Ecological Information

Ecotoxicity effects	Not expected to be an environmental hazard.
Persistence and degradability	Believed to persist in the environment
Mobility in Environmental Media	The product is insoluble and floats on water
biodegradation	Not inherently biodegradable
Bioaccumulation	None known

13. Disposal Considerations

Waste disposal methods	Dispose of in accordance with federal, state and local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.

14. Transport Information

Not regulated for transport.

15. Regulatory Information

All known constituents of this product are listed in the Australian Inventory of Chemical Substances (AICS)

Carcinogenic substances Not Listed

EU Labeling EC Label

16. Other Information

Revision Date: 2018-01-11

Reason for Revision Product name(s) updated and routine review. Converted to GHS format.

Prepared By: Pyrotek Inc
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Spokane, WA 99206 USA
Ph: (509) 926-6212
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msds@pyrotek-inc.com.

Literary reference Information taken from reference works and the literature.

Key Legend Information
SWA - Safe Work Australia (formerly ASCC - Australian Safety and Compensation Council and NOHSC - National Occupational Health & Safety Commission)
SUSDP - Standard for the Uniform Scheduling of Drugs and Poisons [Aust]
TWA - Time Weighted Average [Int]
STEL - Short Term Exposure Limit [Int]
AICS - Australian Inventory of Chemical Substances [Aust]
Dangerous Goods - Initial Emergency Response Guide (SAA/SNZ HB76:2004)[Aust]
AS/NZS 1715 - Selection, use and maintenance of respiratory protective devices. [Aust/NZ]
Hazchem Code - Fire fighters designation [Aust]
IATA - International Aviation Transport Authority [Int]
IMDG - International Maritime Dangerous Goods [Int]
ADR/RID - European Road & Rail Transportation Union - [Int]
GHS - United Nations Globally Harmonized System for the classification and labelling of Chemicals [Int]
EINECS - European Inventory of Existing Commercial Chemical Substances [Int]
ELINCS - European List of Notified Chemical Substances [Int]
EU - European Union [Int]

[Aust/NZ] = Australian New Zealand
[Int] = International

End of SDS

Service Life

MAHAFFEY ASSOCIATES PTY LTD (ABN 90 001 629 036)
Incorporating BEMAC Laboratories
Unit 9 / 108-110 Percival Road (P O Box 2162), Smithfield NSW 2164
Ph (02) 9756 4003 Fax (02) 9757 4228 Email mahaffey@mahaffey.com.au

DRM/17/L01R/10929

3 March 2017

Pyrotek Pty. Ltd.
147 Magowar Road
GIRRAWEEN NSW 2145

Attention: Bruce Hermes

Dear Sir,

Re: Service life Assessment of Viterolite 900

1. Background

The report covers a review the Viterolite 900 panels with the view of providing durability and the service life assessment.

The primary use of the panels is noise control. For the current review, the panels are intended to be used for noise control in a transportation viaduct and tunnel.

2. Description of products

The product under review is the Viterolite 900 panels. The core component material of these panels is natural coarse aggregate in a cement matrix..

The manufacture of the Viterolite 900 involves casting a mixture of the manufactured fine aggregate and Portland cement in moulds on a vibrating table. The cement acts as the binder.

After casting, the panels sit in the moulds for 24 hours. They are then removed from the mould, wetted thoroughly with water, wrapped in plastic and left for 30 days to cure. Some time after this, they are deliver to client, still wrapped in plastic.

The aggregate is Cowra C33b Washed Concrete Sand but only the fraction sitting between

the 1.18 and 4.75mm sieves is used. Details of the sand are included in Appendix A.

3. Durability Assessment

The durability of a material is determined by its resistance to degradation when exposed to an aggressive environment. The resistance of a material is a combination of the responses of the individual parts and the composite material acting as a whole.

Viterolite consists of manufactured sand in a cement-based binder. The issues that will determine the durability of this product are identified as the resistance of the composite material to thermal, moisture, and chemical exposure. In an outdoor environment, these are the main factors which act together to cause weathering.

The components of Viterolite, Portland cement and quartz manufactured, are durable materials in both indoor and outdoor situations. Their durability is not in doubt. This is particularly the case as the manufacturing process ensures that the product is kept wet for a period of 30 days after manufacture. Portland cement based materials require water in their early life to ensure that there is as close to complete hydration of the cement as possible. Wetting the product and then wrapping it in plastic is very close to full water curing and this will allow the inherent durability performance of the product to be achieved.

The interaction between the cement binder and the aggregate is an area that could affect the durability of the product, depending on the nature of the aggregate. Alkalis in cement have been known to cause a reaction with certain silicate minerals in aggregates (alkali-silica-reaction - ASR). The reaction product in the form of a gel is more voluminous than the siliceous components from which it formed (it occupies more solid space), is mobile, and under some conditions, causes localized stresses resulting in expansion and cracking.

The conditions required for ASR to occur are:

- A sufficiently high alkali content of the cement (or alkali from other sources)
- A reactive aggregate,
- Water - ASR will not occur if there is no available water in the concrete, since alkali-silica gel formation requires water

The above conditions are met in an outdoor exposure. In dry environment the product will

not be exposed to the potential for ASR because of the lack of moisture. In an outdoor condition, the potential for ASR needs to be investigated. The potential for ASR was investigated by petrography.

3.1 Environment

Durability assessment cannot be made in isolation without reference to the environment and the installation process. Figures 2 and 3, show the proposed locations of the panels in the viaduct and tunnel.

Environmental conditions in the tunnel that would affect the durability of the panels include wind (up to 40 m/s), wind-blown rain drawn into the tunnel by trains (surfaces within 150 m from tunnel portals are likely to be frequently wetted), and groundwater seepage (although minimal) containing iron oxide.

The Viterolite 900 will be used between the tracks and around the tracks (V1 and T1 in Figures 1 and 2).

The locations will expose both panels to the weather in the viaduct sections. Detail descriptions of the locations and installation process is described below.

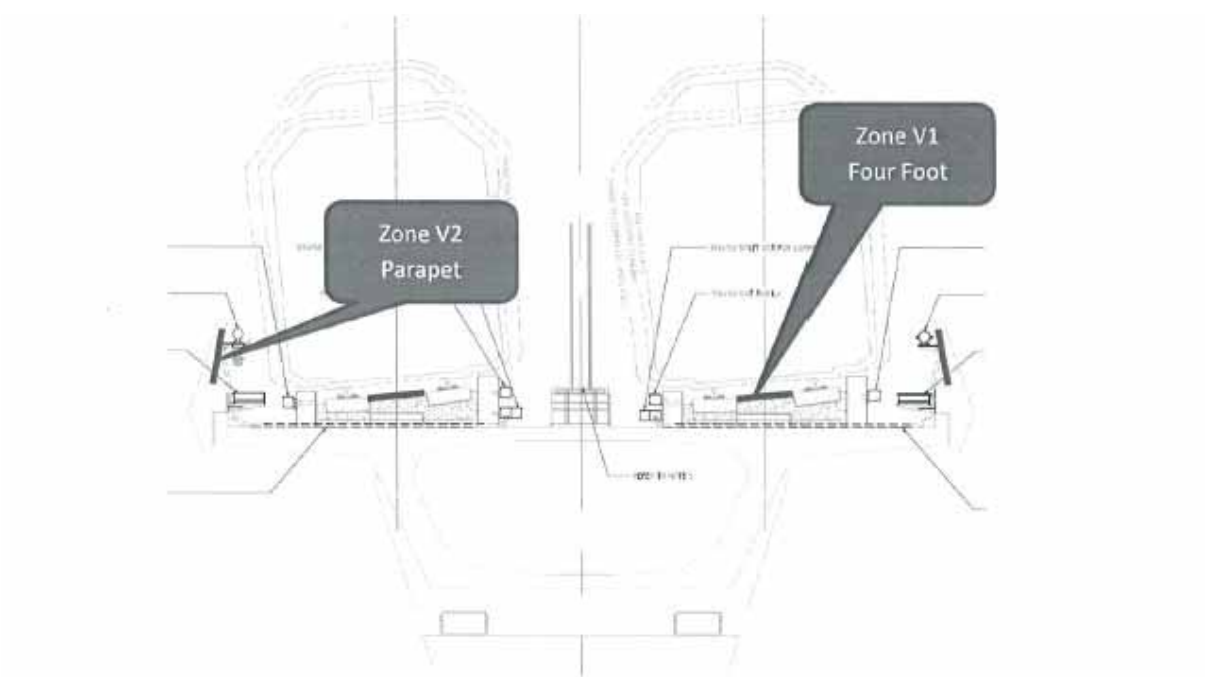


Figure 1: Typical cross-section of viaduct

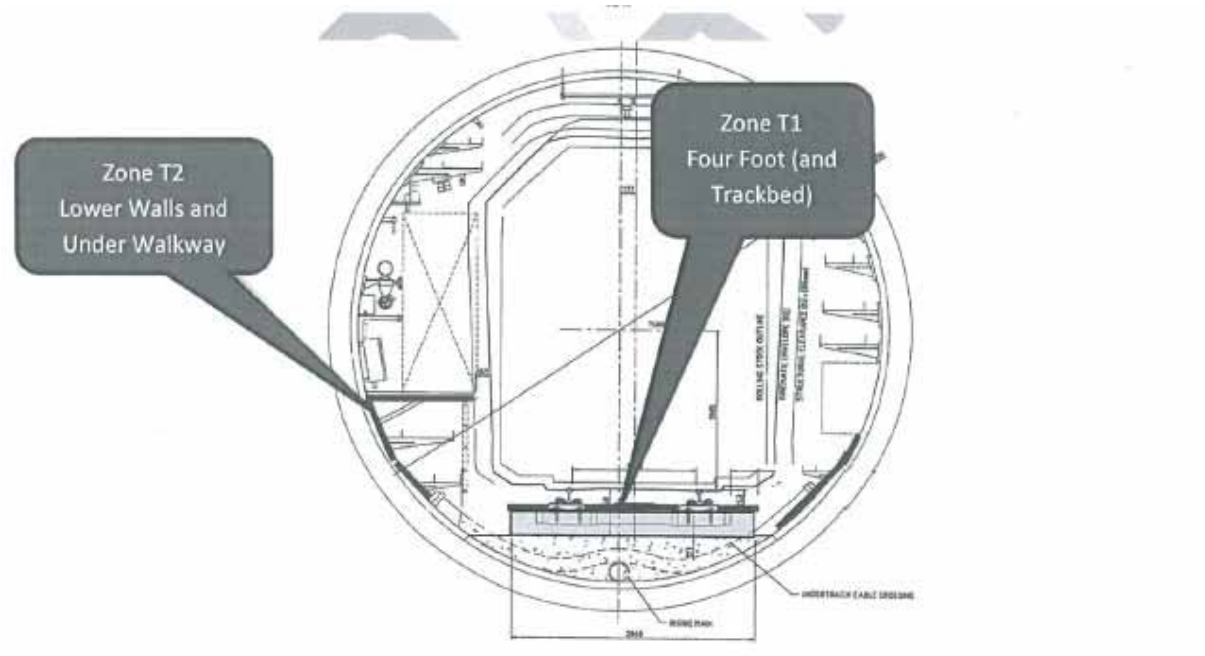


Figure 2: Typical tunnel cross-section

3.2 Locations and installation process

Viterolite 900 - cement bonded panels

Installation overview:

- Substrate prepared to Australian standards - all mould release, surface slurry removed, etc.
- Panels are hydrophobic and promote water runoff.
- Substrate to provide fall to enable drainage from top and below panel
- Panels installed using Pyrotek CB Adhesive (cement based, flexible tile adhesive) with >90% coverage. Recommended application method is to use a 12mm notched trowel to apply adhesive to the substrate and back-butter the panel using a 6mm trowel. This provides an adhesive bed of ~5mm. Uneven surfaces may require addition adhesive.

Application 3 – Viterolite 900 flooring in Rail Tunnels

- Panels installed horizontally and exposed to full weather (sun, wind, rain)
- Occasional foot traffic for maintenance crews following commissioning of the tunnel (there is an elevated walkway for access along the tunnel, foot traffic to be limited to immediate area requiring maintenance).
- Suitable for foot traffic for emergency evacuation of tunnels

Application 4 - Viterolite 900 flooring in Rail Viaducts

- Panels installed horizontally and exposed to full weather (sun, wind, rain)
- Occasional foot traffic for maintenance crews following commissioning of the tunnel. As there is no separate walkway, foot traffic may be higher than in the tunnel.
- Suitable for foot traffic for emergency evacuation of tunnels

In summary, the installation process for the Viterolite 900 will result in the panels being exposure to the weather, with no restrictions on the prevention of excessive moisture ingress.

While the application of the panels includes interior areas, for durability assessment of material usage on a projected, the worst exposure condition is adopted. Therefore, the environmental exposure for the purpose of this project shall be taken as exterior exposure.

4. Service Life Assessment

The aggregate used in the Viterolite 900 panels is a hard sound, low porosity rock. The testing included in the attached report shows that it meets the requirements of AS2758.1,"Aggregates and rock for engineering purposes – concrete aggregates". This makes it suitable for use in the manufacture of concrete or other cement based materials for use in structures with a design life of 50 years or more.

The possible risk of ASR due to silica in the manufactured sand aggregate was assessed in the petrographic examination and this indicates that the materiel has a very low risk of ASR and would meet the requirements of a range of high performance specifications for structures with design lives well in excess of 30 years.

On the basis of the petrographic analysis, it is concluded that Viterolite 900 can be considered as a mixture of Portland cement and sand.

As a compressed "sand cement" product, it will not be damaged by exposure to the weather. It is expected that the material will provide a service life significantly longer 30 years provided it is not damage by mechanical stress.

We trust that this information is of assistance; however please do not hesitate to contact me, should you require anything further.

Yours faithfully,
Mahaffey Associates Pty Ltd

D. R. Mahaffey

Conditions of Use

This report takes into account the particular requirement of our client. It is not intended and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Electrical Conductivity

VITEROLITE 900
Tile Test Report

PYROTEK
Girraween N.S.W

Vision Site Development P/L
ABN: 86114753267

PO Box 4749, Casula Mall
Casula NSW 2170

HV and LV Switchgear
Substation Maintenance

Power Factor Maintenance
Earth Testing

Infra-red Thermography
Industrial Installations.

PO Box 4749, Casula Mall
Casula NSW 2170
ABN: 86114753267
Phone: 0408 001 617
Email: visionsite@hotmail.com

Customer: PYROTEK
Site: Girraween N.S.W
Date: 24/04/2017.
Technician: Bob Woods.

Scope of Works:

Perform insulation voltage tests to determine dielectric insulation integrity of insulation tile as per AS/NZS 3000-(8.3.6)

Work Carried Out:

Various number of insulation tests between distances of 25 mm up to 1050 mm apart using voltages of 1000 volts & 5000 volts on a fully DRY Test Tile supplied.

Summary:

Test was performed with tile supported away from any external influence to prevent any disruption of results.

Recommendations:

Nil.

Vision Site Development
Electrical & Mechanical Site Services
Licence No. -
NSW-257221C
QLD-79173
ABN - 86114753267
Mobile - 0408-001617
Mobile - 0439-688873
Email - visionsite@hotmail.com

Test Report

Customer: Pyrotek Girraween N.S.W
Date: 24-04-2017
Requested By: Benjamin Dowdell
Report No: PYRO-TT-001
Location: Pyrotek Girraween N.S.W

Purpose of Test: To determine the dielectric insulation integrity

Test sample: **Viterolite 900**

Test Method: The test was performed with the tile lifted from any external influences. Two screws were used at different distances apart at 50 mm deep

Distance apart	5KV DC for 1 min	1KV DC for 1 min
500mm	304 Meg Ω	1.60 Gig Ω
450mm	141 Meg Ω	273 Meg Ω
400mm	102 Meg Ω	181 Meg Ω
350mm	86.7 Meg Ω	185 Meg Ω
300mm	81.9 Meg Ω	172 Meg Ω
250mm	39.5 Meg Ω	59.5 Meg Ω
200mm	31.6 Meg Ω	46.9 Meg Ω
150mm	15.8 Meg Ω	26.1 Meg Ω
100mm	9.00 Meg Ω	12.2 Meg Ω
50mm	9.52 Meg Ω	15.1 Meg Ω
25mm	4.70 Meg Ω	6.93 Meg Ω

Special Note / Requirement

During all tests there was no recorded breakdown short , tile appeared stable for results.

Tile Produced for testing would be considered of non-conductive materials in a d ry manner.

Test in accordance with AS/NZS 3000-2007 -- (8.3.6) Test Equipment - HT7051 5kv Insulation Tester.

Contact personnel details

Customer Name: Benjamin Dowdell Mobile Number: 02-8868-2088

Test Electrician: Bob Woods Mobile Number: 0408-001617

Electrician Signature:

Rev 1 8/12/12

Vision Site Development

Electrical & Mechanical Site Services

Licence No. -
NSW-257221C
QLD-79173
ABN - 86114753267

Mobile - 0408-001617
Mobile - 0439-688873
Email - visionsite@hotmail.com

Test Report

Customer: Pyrotek Girraween N.S.W
Date: 24-04-2017
Requested By: Benjamin Dowdell
Report No: PYRO-TT-001
Location: Pyrotek Girraween N.S.W

Purpose of Test: To determine the dielectric insulation integrity

Test Sample: **Viterolite 900**

Test Method: The test was performed with the tile lifted from any external influences. Two screws were used at different distances apart at 50 mm deep

Distance apart	5KV DC for 1 min	1KV DC for 1 min
1050mm	20.1 Gig Ω	50.6 Gig Ω
1000mm	8.40 Gig Ω	17.1 Gig Ω
950mm	3.58 Gig Ω	7.24 Gig Ω
900mm	2.48 Gig Ω	5.07 Gig Ω
850mm	1.86 GIg Ω	3.67 Gig Ω
800mm	1.52 Gig Ω	3.07 Gig Ω
750mm	855 Meg Ω	1.84 Gig Ω
700mm	773 Meg Ω	1.58 Gig Ω
650mm	464 Meg Ω	897 Meg Ω
600mm	299 Meg Ω	568 Meg Ω
550mm	334 Meg Ω	968 Meg Ω

Special Note / Requirement

During all tests there was no recorded breakdown short , tile appeared stable for results.

Tile produced for testing would be considered of non-conductive materials in a dry manner.

Test in accordance with AS/NZS 3000-2007 -- (8.3.6) Test Equipment - HT7051 5kv Insulation Tester.

Contact personnel details

Customer Name: Benjamin Dowdell Mobile Number: 02-8868-2088

Test Electrician: Bob Woods Mobile Number: 0408-001617

Electrician Signature:

Rev 1 8/12/12

3 | PYROTEK CB ADHESIVE

Pyrotek® CB Adhesive being a cement based compound - the material is easy to apply by simply trowelling onto surfaces. Once dry, the cured film is UV, water and chip resistant and exhibits low combustibility.

PYROTEK® CB ADHESIVE

Pyrotek® CB Adhesive is a high-performance, flexible polymer adhesive suitable for installation of concrete panels onto masonry substrates.

Developed for high strength bonds with Reapor® and Viterolite, it has excellent working properties for installation of vertical panels. The chemical cure is suitable to large size panels that are exposed to outdoor conditions.

Pyrotek® CB Adhesive is a cementitious-based, flexible polymer adhesive, filled with a specialised nano rated system. Due to its composition of lightweight aggregates and specialty fibres, Pyrotek® CB Adhesive has excellent working characteristics similar to a mastic but it will chemically cure to form an impressive bond.

Surface Preparation

All substrates must be clean and free from laitance, curing compounds, dirt, dust, grease, oil and any other contaminants that may inhibit bond. All substrates should be washed with clean water just prior to the application of the adhesive. Care must be taken in the preparation of concrete tilt panel to ensure all traces of release agents and curing compounds are removed, if in doubt prepare the substrate using a pressure washer to expose the fine aggregates in the matrix of the concrete as this will ensure a clean substrate.

Recommended adhesive type application for Reapor® and Viterolite® products.

Specifications

Colour: White
Packaging: Plastic lined paper sacks **Adhesive type:** Cementitious

Features

- Minimum weight, maximum performance
- Easy application and clean-up
- Non-slip or sag adhesive
- Excellent adhesion, strength
- Suitable for outdoor exposure
- Good working characteristics
- Minimal/Low shrinkage
- Ideal for weight sensitive applications - lightweight for applying panels to vertical surfaces
- Water-based

Application

- Masonry substrates
- Compressed Fibre cement and plasterboard
- Ideal for Reapor and Viterolite
- Highly suited to vertical applications
- For Interior and exterior use
- Great for flooring

Technical Datasheet

PYROTEK® CB ADHESIVE

high performance flexible adhesive

Pyrotek® CB Adhesive is a high performance, flexible polymer adhesive suitable for installation of concrete panels onto masonry substrates.

Developed for high strength bonds with Reapor® and Viterolite, it has excellent working properties for installation of vertical panels. The chemical cure is suitable to large size panels that are exposed to outdoor conditions.

Pyrotek® CB Adhesive is a cementitious-based, flexible polymer adhesive, filled with a specialised nano rated system. Due to its composition of lightweight aggregates and specialty fibres, Pyrotek® CB Adhesive has excellent working characteristics similar to a mastic but it will chemically cure to form an impressive bond.

Being a cement based compound, the material is easy to apply by simply trowelling onto surfaces. Once dry, the cured film is UV, water and chip resistant and exhibits low combustibility.

applications

- Masonry substrates
- Compressed Fibre cement and plasterboard
- Ideal for Reapor and Viterolite
- Highly suited to vertical applications
- For Interior and exterior use
- Great for flooring

SPECIFICATIONS

Colour	White
Packaging	Plastic lined paper sacks Adhesive type: Cementitious

features

- Minimum weight, maximum performance
- Easy application and clean-up
- Non-slip or sag adhesive
- Excellent adhesion, strength
- Suitable for outdoor exposure
- Good working characteristics
- Minimal/Low shrinkage
- Ideal for weight sensitive applications - lightweight for applying panels to vertical surfaces
- Water based

PRODUCT SPECIFICATIONS

Product Name	Adhesive type	Colour	Packaging	Weight	Mixing Ratio (Water to adhesive)
Pyrotek CB Adhesive	Cementitious	White	Plastic lined paper sacks	20 kg	1:3

MATERIAL PROPERTIES

Coverage m^2	Application
5 - 6	Using 12 x 12 mm trowel
10 - 12	Using 6 x 6 mm trowel

Standard AS ISO 13007	
C2	> 1.00 MPa
E	open time
T	Thixotropic
S1	> 2.5 mm deflection over 300 mm

Properties	Result
Tensile strength	> 2.0 MPa
Tensile strength, immersed material for 21 days	> 1.0 Mpa
Tensile strength, 14 days heat aged	> 1.5 MPa
Transverse Deformation	> 3.5 mm
Compressive strength	> 20 MPa
VOC content	< 1 g/L

Properties	Time
Open time	20 min
Pot life	1 hr
Initial set	6 hr
Foot traffic	24 hr
Heavy traffic	72 hr

Note: Above specification is for material at 20 °C.

Caveats: Specifications are subject to change without notice. The data in this document is typical of average values based on tests by independent laboratories or by the manufacturer and are indicative only. Materials must be tested under intended service conditions to determine their suitability for purpose. The conclusions drawn from acoustic test results are as interpreted by qualified independent testing authorities. Nothing here releases the purchaser/user from responsibility to determine the suitability of the product for their project needs. Always seek the opinion of your acoustic or mechanical engineer on data presented by the manufacturer. Due to the wide variety of individual projects, Pyrotek NC is not responsible for differing outcomes from using their products. Pyrotek disclaims any liability for damages or consequential loss as a result of reliance solely on the information presented. No warranty is made that the use of this information or of the products, processes or equipment to which this Information Page refers will not infringe any third party's patents or rights. DISCLAIMER: This document is covered by Pyrotek standard Disclaimer, Warranty and © Copyright clauses. See www.pyroteknc.com/disclaimer.

Case Study

CASE STUDY

REAPOR ALONG GUNNEDAH RAIL LINE (NSW AUSTRALIA)

BACKGROUND

The Gunnedah coal basin located in the Upper Hunter Valley of NSW Australia, provides a significant volume of high quality export coal. During 2012 it became apparent that due to system-wide congestion issues it would not be possible for the coal chain to handle the conditional volumes of coal contracted by producers. The contracted volumes by the Hunter Valley Coal Chain Coordinator (HVCCC) in conjunction with the Australian Rail Track Corporation is in excess of 150mtpa (million tons per annum) with forecasts to reach 206mtpa by 2019. Capacity constraints within the rail corridor have been a major focus with reduced rail speed through existing rural townships being a contributing factor to efficiencies.

Reapor installed on Noise Wall 1 to protect the Gunnedah community

DEVELOPING A SOLUTION

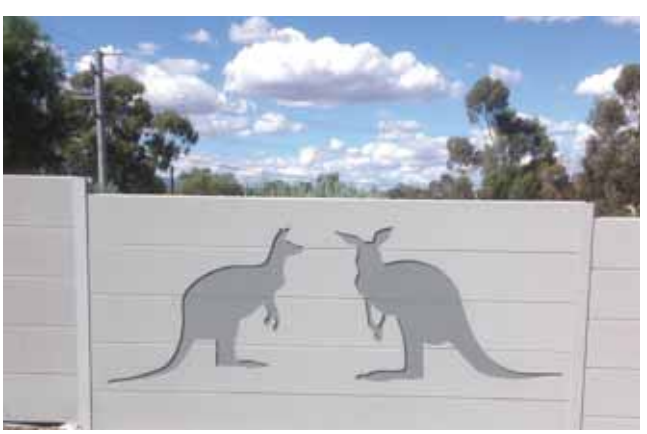
Increasing the rail speed and frequency of movements produces greater noise emissions effecting townships. This resulted in a requirement for a high performance noise mitigation strategy, incorporating Noise barrier walls. Hebel has been successfully adopted throughout the Upper Hunter freight corridor to reduce noise. The design, supply and installation of a Hebel noise wall incorporating Reapor within the corridor was undertaken, with aesthetics of the community being incorporated. Reapor was considerered the best solution for increasing the acoustic absorption function of the walls so was affixed to the rail line facing side of the walls.

Installing Reapor on site to using flexible, thixotropic adhesive.

RESULTS

Noise barrier walls were built along the Gunnedah Rail Corridor in order to minimise the impact of noise pollution from trains entering and exiting Gunnedah. Reapor acoustic panels were installed at Noise Wall 1 and 2 adjacent to the corridor. Feature panels were also incorporated into Noise Wall 3 and 4.

The installation of Reapor over Hebel was a unique solution to address high frequency noise emissions. This high performance composite wall system meant the height of the wall could be reduced, improving the aesthetics of the area. Installing Reapor was extremely fast, as it is lightweight and easy to handle. The completed project was delivered within 14 days of commencement.



The decorative front of the Noise barrier wall (Reapor applied to revese side)

SUCCESS AT NORTHWEST

CASE STUDY

BACKGROUND

Sydney Metro Northwest is the first stage of the new metro system in Sydney, Australia. It is Australia's biggest public transport project.

Northwest Rapid Transit (NRT) has been awarded the Operations, Trains and Systems contract for this project. The first stage of the project for Pyrotek is estimated at $8.3 million (AUD). It runs from Rouse Hill to Epping and includes a 4 km elevated Skytrain, a 270-metre cable-stayed bridge and twin 15 km tunnels. This is also Australia's first autonomous (driverless) rail system.

NRT contacted Pyrotek to source acoustic absorbing materials for the rail tunnel and viaduct. The designers of the tunnel and acoustic consultants had specified acoustic absorbers on both walls of the tunnel as well as in the four-foot section (between the tracks). This was done to give maximum passenger comfort and the aim was to provide very low noise levels for passengers.

As well as being excellent noise absorbers, any materials selected also needed to be fire safe. This means that non-combustibility of the materials is important as well as making sure that if the material does get hot that it does not emit smoke of toxic fumes. Many traditional absorbers such as foams and polyesters do not meet the required standards for rail tunnels so alternate materials were needed. Also, the four-foot section was designated as an emergency exit pathway so any materials in this area also need to be "trafficable", meaning that they can be walked on by pedestrians.

DEVELOPING A SOLUTION

When first approached by NRT, Pyrotek proposed two different materials. One for the tunnel floor (T1) and another for the tunnel walls (T2).

The product proposed for the walls (T2) was Reapor. This lightweight, a high absorbing material is fire safe and is produced by bonding together millions of expanded recycled glass beads. The contract for this product was awarded to Pyrotek and the product supplied from April – December 2017. The material was imported from Europe by Pyrotek and stored in Australia until required for the project. In addition to this, Pyrotek also cut to shape the majority of the product in Australia to meet NRT's requirement.

The solution for the T1 area on the tunnel floor (four foot) was less straightforward. Pyrotek proposed several materials for this application but all were rejected. The main reason for this was the strength of the product. The requirement that the product is "trafficable" was one not encountered previously, so Pyrotek's technical team stepped in and from their archives of technical knowledge developed a material with the correct properties. This material has all excellent fire safe characteristics of Reapor with the additional advantage of being very strong. With some clever use of Pyrotek's reverberation room in Sydney, the material was also tuned to give the optimum acoustic absorption at individual frequency bands. This allows the material to more specifically reduce the noise of the moving train. The T1 product is called Viterolite® 900.

Viterolite® 900 in-between the rail track with Reapor on the wall

Viterolite® 900 was presented to NRT and approved for use on the project. The contract was awarded to Pyrotek with supply from September 2017-June 2018. This allowed a 9-month manufacturing window for the product.

RESULTS

Having received the contract, Pyrotek leased a site in Sydney to manufacture the product and designed the plant and equipment to manufacture this large volume of panels.

In July 2017, it became clear that the original delivery schedule no longer met NRT's programme. Pyrotek was requested to accelerate the project and complete deliveries by the end of December 2017. This has been achieved and required the casting of over 100 tonnes of material each day working 24/7.

"Pyrotek has been a flexible and committed partner making sure we have received the acoustic materials for the Sydney Metro Northwest project on time. Being local and able to change plans as needed has been invaluable to the project and has helped with the planning of logistics and installation. Their ability to meet the revised delivery programme for the T1 panels has been critical to NRT completing this project on time."

-Simon Tibbet, NRT Area Manager

Viterolite® 900 custom design for the NRT project

Project Photos

LOCALLY AND INTERNATIONALLY PROVEN IN ROAD & RAIL SHAFTS AND TUNNELS

Due to the necessary noise protection measures, the tunnel in Dordtsche Kil plays a cutting edge role. The tunnel's walls were fitted with approximately 5,250 square meters of REAPOR.

Brisbane North West Road bypass tunnel ventilation shafts

pyroteknc.com

PYROTEK
WORLDWIDE LOCATIONS

AUSTRALIA

CANADA

CHINA

CZECH REPUBLIC

HONG KONG

INDIA

INDONESIA

JAPAN

KOREA

MALAYSIA

SINGAPORE

NEW ZEALAND

TAIWAN

THAILAND

TURKEY

UNITED ARAB EMIRATES

UNITED KINGDOM

UNITED STATES OF AMERICA

VIETNAM

CONTACT DETAILS
for further information please visit our website at pyroteknc.com

Pyrotek endorse forest sustainability and the preservation of natural environment. We procure the highest quality materials from suppliers who hold FSC (Forest Stewardship Council) Certification and PEFC (Programme for the Endorsement of Forestry Certification) amongst other certification programmes.

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