TECHNICAL INFORMATION SHEET

ENVIRONMENTAL STATEMENT

Pyrolave's lava stone comes from our quarry in Volvic, central France. The stone is extracted from lava flows within the Auvergne Volcanoes Regional Nature Park in France, with the extraction sites upon the flow being very small. All aspects of extraction are carefully monitored by Pyrolave to ensure stringent observance of environmental controls and standards.

Each extraction area is subjected to an "administrative authorisation for extraction within a classified zone" following a 2 year study of the zone. Additionally, the undertaking of regular environmental impact studies and site restoration processes after extraction are compulsory requirements.

The authorisation file includes the analysis & control of direct & indirect, temporary & permanent effects upon the environment & specifically a landscape study, a study on noise, dust & vibration analysis, and hydro-geologic & hydrologic studies. The developer must prove that there is no risk of pollution due to hydrocarbon, organic or mineral waste.

The annual extraction limit imposed by regulation is the equivalent of an area 50 sq m x 10 m high. We can guarantee a yearly yield of 10,000 - 20,000 sq m continually over a 20 year period in strict respect of the environmental rules. The lava extraction sites are situated over the flow zone of Volvic mineral waters owned by the multinational food company Groupe Danone who are equally stringent about the environmental risks.

PRODUCTION PROCESS

The randomly sized boulders of lava are lifted by crane from the flow following the natural fault lines and shrinkage cracks. The block is then sliced into scants of varying thickness by diamond-tipped saws. These rough-sized scants are then sent to the factory in Castelsarrasin, near Toulouse, where they are shaped by CNC and water-jet cutting technology. All stone-working tasks are then completed using a combination of CNC technology and manual work. The surface is refined by filling all microscopic holes, and the stone and filler are bonded together during the first kiln firing cycle.

This 8-hour firing creates enormous stress on the stone, enabling any failed stone to be identified and discarded. Those pieces that prove their strength and stability are then rigorously sanded and polished as smooth as glass to remove all surface imperfections. A glaze undercoat is then applied to the entire surface to neutralize the colour. This is left to dry naturally after which the second coating of coloured enamel is applied over the undercoat by hand.

The pieces then are returned to the computer-controlled kilns for a second and longer firing cycle at temperatures over 1000˚C. At these high temperatures, the glaze is fused to the stone. As the stone cools down, the different contracting rates cause the signature crazing to the surface. The pieces are finally grouped together for quality control inspection before being packed into rigid wooden crates with card and foam separators.

Test Procedures

Consistent with our commitment to quality standards and product assurance, Pyrolave has engaged the services of various recognized testing centres or national laboratories to carry out a range of standard tests. The results reveal that the lava tested passes all tests outright, in many cases exceeding the highest test standards.

Test	Standard	Applicable to	Testing Centre
Modulus of rupture	ISO-10545-4	Lava	Bologna, Italy
Determination of colour to light	DIN 51094	Enamel	Bologna, Italy
Determination of chemical resistance	ISO-10545-13 § 8	Enamel	Bologna, Italy
Determination of stain resistant (to white)	ISO-10545-14	Enamel	Bologna, Italy
Determination of scratch hardness according to MOHs	EN101	Enamel	Bologna, Italy
Determination of chemical resistance (glazed tile)	EN122	Enamel	Bologna, Italy
Flex resistance	NF EN12372	Lava	CEBTP, Paris France
Thermal conductivity	139-829	Lava	National Lab, Paris France
Freeze resistance *	NF EN ISO 545-12	Lava & enamel	SFDP, Paris France
Light (impact) shock resistance *	An. 7 notes 3515 CSTB	Enamel	SFDP, Paris France
Stain resistance *	NF EN ISO 10545-14	Enamel	SFDP, Paris France
Thermal shock resistance (immersion *)	NF EN ISO 10545-9	Lava & enamel	SFDP, Paris France
Thermal shock resistance (surface contact *)	NF EN 1183 method B	Enamel	SFDP, Paris France
UV light and colour fast test	DIN 51024	Enamel	SFDP, Paris France
Abrasion & anti-slip resistance testing	BSEN 1341 2000 Ann.D	Enamel	Sandberg, London UK
Impact – hard & soft body testing	BS 200:1985 Sct.7 Ap.G	Lava	Taylor Woodrow, UK
Cooking directly upon surface via induction	Practical testing	Lava & enamel	Induced Energy, UK
Anchor pull out tests	ETA-0/0266	Lava	Fischer Group Germany
EN1469 Accredited	EN1469	Lava & enamel	LERM France

*On 9 typical colours

Physical Properties

Resistant to all climatic conditions
Frost resistant
No expansion from 0 – 100 degrees
Average conductivity K (cal) over h.m.˚C = 0.42
Average density 2.2
Average porosity (unglazed) 22.4%
Compression resistance 63 MPA
Flex resistance 19 MPA
Resistant to all acids except fluorhydric
Enamels are colour fast – UV stable
Surface crazing (enameled lava)
Will not rot, crumble or delaminate

Chemical Analysis

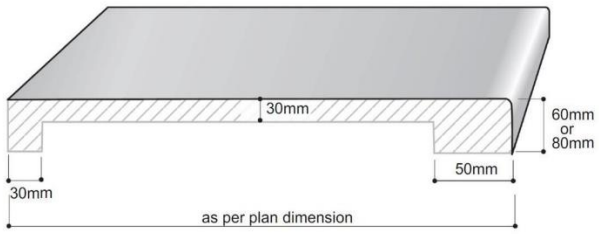
Silica (SiO_2)	57.5%
Alumina ($Al_2 O_3$)	17.4%
Titanium (Ti)	1.5%
Iron (Fe)	6.7%
Manganese (Mo)	0.3%
Calcium (Ca O)	4.2%
Magnesium Oxide (Mg O)	2.5%
Sodium ($Na_2 O$)	5.2%
Potassium ($K_2 O$)	3.0%
Sulphur Trioxide ($S O_3$)	0.4%
Phosphorus ($P_2 O_5$)	0.4%
Loss of weight if fired @ 1050˚	0%

Benefits of Pyrolave's Glazed Lava for Architecture

Colour	Any colour by matching to RAL, PANTONE scales etc
Lustre	Lustrous depth of colour
Size	Any size from mosaics up to large slabs of 2.4m
Thickness/weight	Any thickness from 8mm up to 80mm for slabs (or 160mm for Massifs)
Strength	The strength of stone with the resistance of an enamel coating
No cutting on site	Enamelled pieces need no cutting on site, preventing release of silica dust
Flexibility	Interior or exterior, wet or dry, hot or cold
Insulation	Excellent sound & heat insulation properties
Stability	Class 0 fire rating (cannot burn or emit toxic fumes)
Versatility	As one-off or as production run
Unique signature	Bespoke design with high visual impact
Aesthetic	Lustrous depth of glaze, smooth and cool to touch
Care & maintenance	Easy to clean using household cleaners

Maximum Size to Thickness & Weight

Slab thickness	10mm	15mm	25mm	30mm and 40mm	60mm and 80mm *
Max size (mm) **	300x300	600x600	1200x1000	2400x1200	2000x1000



* Tops that are more than 60mm thick are milled out to 30mm thick in the centre, leaving 50mm all round for finished edges or 30mm for non-glazed edges.

** Slabs over 2.4m long are possible but current availability needs to be confirmed at the quarry.

Slab thickness	10mm	15mm	25mm	30mm	40mm	60mm	80mm	100mm
Weight per m^2	22kg	33kg	55kg	66kg	88kg	94kg	100kg	110kg

Joint-Filling: Gelcoat User Guide

GELCOAT USER GUIDE

GELCOAT is a specially formulated epoxy filling paste and adhesive for joint filling between glazed Pyrolave stone slabs. The paste is colour-matched to the glaze supplied.

Features:

Blends easily and is non-sag.

Simple water clean-up prior to setting.

Cures in most climatic conditions – hot, cold or damp – sets within 12 hours at 25c, and is fully cured after 4 days at 25c.

Once cured, can be immersed in water or salt water for prolonged periods without degrading.

Very good chemical resistance.

Flash point over 100C.

High tensile and compressive strength.

Typical Cured Properties:

Compressive Strength: 80 MPa

Tensile Strength: 25 MPa

Tensile Bond Strength: 10 MPa

Preparation:

Mix rate: 25% Hardener; 75% filler/paste

Mixes to a smooth paste that can be worked for 30 minutes at 25c.

Minimum application temperature: 10c.

Cleaning:

Remove excess Gelcoat with clean water before it cures . After cure, any film residue on the surface of the glaze can be removed with acetone.

Precautions:

Avoid prolonged contact with skin. Wash affected areas with soap and warm water.

Care & Maintenance of Glazed Lava

Application	Frequent Cleaning	Stubborn Marks
Building cladding	Hot soapy water Climatic cycle self cleans	Bleach, paint stripper, thinners, white spirit Cement scale removers, lime scale removers, tile & glass cleaners
Bartops	Hot soapy water	Acetone, tile & glass cleaners
Kitchen worktops	Hot soapy water	Acetone, tile & glass cleaners
Vanity tops / shower trays	Hot soapy water	Acetone & lime scale remover, tile & glass cleaners
Tables	Hot soapy water	Acetone, tile & glass cleaners

Note: Never use anything abrasive on the surface (eg scrapers, wire wool, commercial scourers). Always use a soft cloth or sponge.

Repairs

Problem		Repair
Glazed Lava	Small chips (up to 2/3mm)	Cold glaze supplied by Pyrolave
	Larger chips (5mm +)	Epoxy resin filler coloured to match enamel & and finished using thinners – any supplier
	Cracks & large chunks or breakages	Irreparable
Natural Lava	Small chips (up to 2/3mm)	Grey or anthracite coloured cement – any supplier
	Larger chips (5mm +)	Epoxy resin filler coloured to match enamel & and finished using thinners – any supplier
	Cracks & large chunks or breakages	Irreparable

PYROLAVE® AUSTRALIA Pty Ltd
www.pyrolave.com.au