

## CONTINUOUS FIRFLEX

Finishing system that achieves a natural paving appearance while maintaining the mechanical performance of an asphalt wearing course.



### High-performance design paving

Firflex is a wearing course finishing system that consists of placing a high-resistance resin followed by a 1/3 mm aggregate layer on asphalt or concrete to give a natural stone finish to the surface.



### PUMA resin

Firflex resin is composed of a base of polyurethane-methacrylate (PUMA) resin which acts as a bond between the asphalt or concrete and the finishing system with the different types of aggregates.

This resin is a flexible material that retains its flexibility performance and provides high resistance to wear and tear and traffic stresses.

### Main features

- Variety of aggregates sized between 1 and 3 mm
- Can be applied on asphalt or concrete surfaces
- Withstands all types of traffic
- Adapts to the movement of flexible paving
- Opening to traffic in 2 hours
- Non-slip
- Fuel-resistant
- No need for joints
- Decorative

## Customisable design

This system finished with natural stone allows for a customised design thanks to a wide range of options with a variety of sizes, colours and types of aggregate.

The size of the aggregates is between 1 and 3 mm.

This product complies with the current non-slip requirements for pedestrian and road traffic.



## Properties

Application temperature	5oC – 30oC
Mix duration/treatment time at 20oC	15-18 min
Drying time at 20oC	60-120 min
Tensile strength (ISO 527)	11.0 mPa
Elastic modulus at 20oC	82.4 mPa
CS-17 Taber abrading wheels, 1 kg, 1000 cycles	75 mg
Viscosity at 25oC	460 – 730 mPa·s
Density at 25oC	1.30 g/cm <sup>3</sup>

## Application

The surface must be clean and free from waste and contamination. Surface irregularities on the base of more than 1 mm may be seen in the final finish.

For concrete surfaces, the pore must be opened and binder resin must be used to ensure mechanical anchoring.



The flexibility of the material makes it possible to absorb part of the movement caused by the surface, but it cannot be guaranteed that any potential cracks caused by the retraction of the concrete will not be seen in the surface.

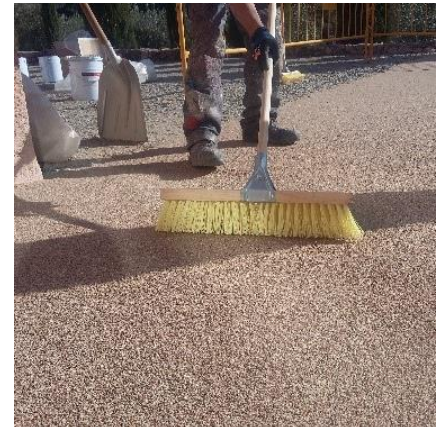
The application temperature is between 5°C and 30°C.

If necessary, the pore or texture may be opened to optimise anchoring with the existing paving.

Next, the PUMA resin (A) is poured and levelled on

the surface, and the natural stone aggregates (B and C) are applied and distributed.

The road can be opened to traffic between 2 and 4 hours after application depending on the ambient temperature.



### Mechanical properties test

The IFSTTAR assessment report tests material using a FABAC machine test.

FABAC machines are used to test the fatigue behaviour of continuous reinforced concrete pavements, applying a load of between 0.5 and 5 km/h. The tyres used for this experiment are Michelin 315/80 R22-5 156L multiway 3D XZE.

The surfaces were subjected to three million loads (double axle half shafts loaded at 65 KN) with a loading speed of 3.6 km/h.

To study the evolution of the samples, several tests were carried out at certain stages of the loads, using the machine at 500,000, 1 million, 2 million and 3 million cycles. The measurements consisted of SRT (pendulum test), MTD (mean texture depth) and DFT (coefficient of longitudinal friction generated

between a rubber pad and the road during braking).

Three test areas allowed the Wehner and Shultze (polishing resistance) tests to be carried out, measuring the depth of wear in order to quantify the possible degradation of the samples tested caused by this problem.

Testing began on 26 September 2017 and ended on 7 February 2018. The climatic conditions were representative because they ranged from relatively summery temperatures at the beginning of the test to winter ones at the end of the test.

In conclusion, the experimental sample was subjected to 3 million cycles and 9/10 of test pieces did not undergo significant variation.

## Braking test

A braking test was carried out at the LCPC track in Bouguenails, France.

The test was carried out using a Peugeot 406 equipped with different distance and braking sensors to measure braking distance, vehicle speed and brake application time.

Braking distances were performed on samples at different speeds (50, 70 and 90 km/h) with ABS.

Tests were performed on each sample, including a reference sample of new and old asphalt pavement, thick Firflex, thin Firflex and precast Firflex.

Sample name	Speed (km/h)	Braking distance (m)
New Asphalt	50	15.8
	70	27.4
	90	43.8
Old Asphalt	50	17.1
	70	36.1
	90	48.1
Thin Firflex	50	13.7
	70	24.7
	90	37.7
Thick Firflex	50	14.5
	70	26.5
	90	43.0
Precast Firflex	50	14.9
	70	25.7
	90	40.7