

III. SAMPLES TRACEABILITY

III.1. M 1194

Sample M 1194 was received in a container and laid on the ground by the transporter. Prior to the tests, sample M 1194 has been screened at 200 mm and bagged, the coarser blocks being crushed by hand with a hammer. In order to avoid natural drying, this operation was achieved as soon as possible after sample reception. Pictures 1 to 4 show, respectively, the bagging installation, the size of some coarsest aggregates, the screening operation and the hand crushing.

Picture 1 : Bagging installation - overall view.



Picture 2 : Coarsest aggregates (size of the reference stick : 200 mm).



A fourth sample for laboratory scale testing was generated by sieving part of sub-sample M 1194 B at 1.6 mm. This operation was achieved on a circular vibrating screen (dia. 60 mm) of Ritec MR 24 type without any particular problems (clogging). The -1.6 mm obtained was indexed as sub-sample M 1194 D.

Table 2 : M 1194 pilot crushing tests.

Test number	1	26	27	28
Crushed sample reference	M 1194/1	M 1194 A	M 1194 B	M 1194 C
Roller opening (mm)	15	15	25	25
Crusher capacity (kg/h)	-	815	956	1,000
Minus 10mm recovery (%)	-	62.4	50.2	-

Picture 6 : M 1194 pilot crushing - roller crusher.



V.3. M 1194 vs. M 1257¹

Two samples of both M 1194 A and M 1257 A were calcined together at 800°C for 2 hours and at 900°C for 45 minutes. The comparison of the two sample was done on the basis of their bulk density and linseed oil absorption after calcination. The results of these calcinations are summarized in Table 6.

Table 6 : Comparison of sample M 1194 and M 1257.

Sample	M 1194 A	M 1257 A	M 1194 A	M 1257 A
Calcination conditions	800°C – 2 hours		900°C – 45 minutes	
Bulk density (g/cm ³)	0.57	0.44	0.58	0.46
Oil absorption (%)	52	70	48	68

The two conclusions of this comparison are :

- Sample M 1257 is better than M 1194, especially in terms of hardness;
- Calcinations at higher temperature decrease product quality.

VI. CONTINUOUS CALCINATION

VI.1. Pilot installation

Continuous calcination trials were conducted in a small scale continuous counter-current rotary kiln (2.0 m length - 0.2 m inside diameter) equipped with a 75 kW propane burner and lined with SiO₂-Al₂O₃ refractory concrete. The slope of the kiln can be mechanically adjusted, while its rotation speed can be controlled by an inverter.

Exhaust gas are draft by a 7.5 kW fan (4,000 m³/h) which is also driven by an inverter and are dedusted by a cyclone (0.4 m diameter – 1.0 m height) which allows to extract the particles down to ≈ 5 μm, the finer material being collected by a sinter plate filter (52 m²), of Herding type. These ultrafines were not recovered due to contamination issues.

Crushed samples are fed to the kiln using a belt conveyor (0.70 m length - 0.07 m width) driven by an inverter allowing to adjust the feed rate.

Picture 9 shows a view of the pilot plant.

Picture 9 : Laboratory rotary kiln - overall view.

