SPINOR® A12

- Spinor® is a product range of fine to ultra-fine blast furnace slag binders with a maximum grain size distribution from 48 µm to 6 µm. (Ref. 2 & 3)
- The 100% passing (D100-Dmax) is considered to name the grade. For instance, all the grains of Spinor® A12 are finer than 12 µm, and the 12 µm is the coarser grain.
- Such fines and ultra-fines require dispersing agents in order to defloculate the grains.
- A dedicated, unique manufacturing site was designed for ultrafine binders ("UFB") in the area of the LUMBRES' plant (North of France). Indeed, an ordinary process - consisting of separating fines from the production of conventional cements - prevents from achieving an optimized and consistent quality.
- For the integrity of the constructions (well, structures, etc.), you - as the providers of solutions and technologies - can expect nothing less than **consistency and reliability**.

UFB workshop of Lumbres plant.


Stock of selected high blast furnace slag.

2 fundamental features
1. Slag based binder
2. Optimised grain size distribution
   - A grinding precision of a few microns
   - A high level of accuracy in the distribution control of grain size

GBFS %	> 80 %
CaO	44 %
SiO_2	31 %
$Al2O_3$	10 %
Specific gravity (g/cm³)	2,94
Bulk density	0,7

Diameter / passing (%)	µm (inf. or equal to)
D100	12
D98	10
D95	7
D85	5
D50	3

W/C	C/W	Composition of 1 m³ grout			Grout specific gravity
		Spinor® A12 (kg)	Water (liter)	Superplasticizer (kg)*	
3	0,33	300	890	9	1,20
2	0,50	430	845	13	1,29
1,5	0,66	541	805	16,5	1,37
1	1,00	754	730	22,5	1,50

W/C	C/W	Flow time Marsh cone (sec.)*	Plastic viscosity at t_0 (mPa.s)	Free water After 3 hours (%)**	Gelification time**** (hours)	Compressive mechanical strenght after 7 days (MPa)***
3	0,33	29	2,5	25	11	6,5
2	0,50	29	2,5	14	8	8,0
1,5	0,66	30	2,5	12	6	10,0
1	1,00	31	3,0	< 5	5	12,0

Equipment for injection (soils and rocks) and rehabilitation

- All the Spinor® grouts require the same equipment on site, **as conventional cement suspensions**:
  - 1 high energy mixer (1 300 to 2000 rpm) , turbo mixer or high-speed colloidal mixer
  - 1 low agitation vat (approx. 60 rpm) to keep the grout at a low viscosity and to prevent sedimentation)
  - 1 grouting pump or press

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2
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- The mixing results of normal **paddle mixers** are not recommended for high quality grouting
- A **turbo mixer** is more suitable : a centrifugal pump circulates the grout at a high speed in the turbo-mixing container and creates a shearing action between the fractions. The best result is obtained by using a colloidal type mixer.
- Equipment and systems recommended : **Hány system, Atlas Copco's Craelius system.**
- **Mixing time** => 5 minutes
- **Maximum batch size** = 80% of the container volume.
- In a colloidal mixer, the **temperature** might increase several degrees due to the energy release of the shear force breaking. This might induce early hardening of the grout and should be controlled by the agitator.