



## The essential of Sulfur Mortar for concrete specimens surfacing

Sulfur mortar is one of the solutions to carry out a surfacing of concrete specimens in order to obtain a flat surface that guarantees an unbiased result of the fracture test by avoiding premature ruptures.

In this article we will address the following points:

1. The standards
2. The products offered by the SNL
3. The qualitative approach of the SNL
4. Good practices
5. Diagnostic

### 1) The standard:

The standard for surfacing of concrete specimens P18-416 was replaced by standard 12390 in 2015. **Table 1** below provides an understanding of the evolution of sulphur mortars.

Resistance	NF P18-416 before 2015	NF EN 12390 after 2015	Composition
Until 50MPa	Type A	EN 12390-2015	50% Sulfur/ 50% sand according to the specification type A
Beyond 60 MPA	Type B	Not included in the 2015 standard	60% Sulfur/ 40% sand according to the specification type B

The 2015 revision did not include type B for high-strength concrete, which is why customers continue to request type B of the old standard NF P18-416 to evaluate their HP concretes.

For all other concretes with a strength of less than 50 MPa, type A labelling remains customary, although the correct name is now "sulphur mortar in accordance with standard EN 12390-2015".

## 2) The products offered by the SNL

The SNL offers you:

- Ready-to-use sulfur mortars
  - ✓ Sulfur mortar according to EN 12390-2015 also called by habit type A
  - ✓ Type B sulphur mortar according to the old standard P18-416 on request.
- Sulfur
  - ✓ Powdered sulphur (or sulphur flower)
  - ✓ Sulfur lentil
- The sand
  - ✓ Sand for sulfur mortar according to EN 12390-3
  - ✓ Sand for type B sulfur mortar according to the old standard

## 3) The qualitative approach of the SNL

Sulfur is mainly used as a component of industrial products or in agriculture. The surfacing of concrete specimens is a marginal use and sulfur is therefore not tested for this application, which can sometimes cause usage problems depending on the minor components present in the sulfur.

The SNL buys large quantities of lentil sulfur and keeps them dry to avoid any moisture build-up that causes bubbles in hot sulfur.

We also have each new batch tested by a few customers with extensive experience in sulphur mortars to qualify it before putting it on sale.

## 4) Good practices

- ✓ Principle: the process involves coating the 2 parallel faces of concrete with a flat, thin coating made of a mixture of sulphur and sand set by cooling.
- ✓ The Material:
  - A heating pot with thermostat capable of reaching 150°C
  - A ladle allowing to collect the necessary product
  - A non-metallic mallet
  - All this equipment must be placed under a fume hood.
  - High temperature oil
  - A temperature control sensor

- ✓ Preparation of the surfacing product

Prepare a mixture of sulphur and sand purchased from SNL respecting the specification of the sand and the respective percentages of sulphur and sand (see table 1)

Fill the container to three quarters of its capacity and homogenize the mixture

Set the thermostat to 150°C and stir the mixture regularly with the ladle until complete fusion and as soon as the consistency is homogeneous. Then adjust the thermostat to between 120°C and 130°C. Pay attention to the time of descent in temperature given the inertia of the sulfur mortar.

- ✓ Operating procedure:
  - Deburr the edge of the levelling surface
  - Wipe and dry the face to be faced. Ideally, take out the specimen at least 15 minutes before its surfacing
  - Apply a thin layer of oil to the bottom of the surfacing device and its inclined surface
  - Homogenize with the ladle the surfacing product which must be between 120°C and 130°C then take the necessary quantity and distribute it on the bottom of the surfacing apparatus.
  - Thickness of the surfacing layer: the thickness must be regular between 2 and 4mm
  - Carry out the crushing test at least 30 minutes after the specimen has been surfaced

## 5) Diagnostic

- ✓ **Bubbles in sulfur mortar:**
  - Often synonymous with wet sulphur and the presence of water
- ✓ **Foliation:**
  - Often synonymous with poorly controlled temperature in heating or cooling
    - Regularly check the temperature versus the thermostat setpoint
    - Preferably use an oil-filled heating pot
    - Respect cooling times: indeed, sulfur mortar at a certain inertia and too hot mortar can contract upon contact with the cold surface of the surfacing plane.
    - Powdered sulphur and lentil sulphur have a slightly different heating rate; it is therefore important to adapt its settings and heating times if you switch from one to the other.

*Foliation*



## 6) Q&A

**Lentil sulphur versus powdered sulphur:** lentil sulphur has the advantage of generating little dust, which makes it easier to handle. The composition is the same and they are used in the same way with nevertheless a slightly different heating rate.

### Packaging:

- ✓ 10kg bags for ready-to-use sulfur mortars
- ✓ 25kg bags for sulfur
- ✓ 25kg bags for sand

**Transport:** the classification of sulphur or sulphur mortar will depend on both the type of sulphur (lentil or powder) and the mode of transport (road, air, maritime). Please consult us for more details