LABORATORY TESTS FOR POWDER ADDITIVES

Our supplier MÜNZING offers a versatile range of powdered products for a wide range of applications. A number of methods are available to assist our customers as best as possible in the complex selection of the suitable product as well as in the development of suitable formulations. We offer our customers the use of laboratories of MÜNZING to ensure the optimal use of our products. Find a short overview of the possibilities below.

MAINLY THE FOLLOWING PRODUCTS ARE AVAILABLE

- Powder defoamers
- Wetting agents
- Shrunking inhibitors

THESE PRODUCTS ARE USED FOR A LARGE RANGE OF APPLICATIONS, FOR

- Self levelling floor screeds
- Plasters
- Joint fillers
- Mortar
- Powder paints
- Adhesives
- Cements
- Pigment mixtures
- Gypsum
- Lime
- Redispersible polymer powders

The most important methods are briefly outlined:

TESTS WITH DEFOAMERS:

For the application of additives to powder-type building materials in a test setup, only minimal sample quantities should be used to simulate conditions on the building site. Usually relatively short mixing times reflect the behavior in real application best.

Hobart Mixer:

At least 1 kg powder (dry) is needed to achieve an adequate filling level for an optimal mixing. The mixing water is given to the mixing container and the powder is sprinkled slowly (more than 30 seconds) into the water. Depending on system or on customer requirements the material is mixed for 1 to 3 minutes. Then wet density and flow spread

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LABORATORY TESTS FOR POWDER ADDITIVES

are determined. According to demand various castings are produced from the remaining substance.

Color Mixer „Red-Devil“:

This mixer is used to homogenize powder mixtures: all powder components are weighed into a PE bottle and homogenized with the Red-Devil Mixer for 5 minutes. Then water is added and both components are premixed with a metal spatula for a short time and subsequently homogenized for 30 seconds in the Red-Devil Mixer. Directly thereafter the wet density and the flow spread are determined. According to demand various castings are produced from the remaining substance.

In the case of thin liquids fast running stirrers should be used, but for very thick materials, such as stable adhesives, dough kneaders are best.

Determination of Wet Density:

For this determination a 100ml steel pycnometer without a lid is used. The pycnometer is completely filled and the excessive material is removed with a glass plate. After that it is weightened and its specific gravity calculated.

Determination of the Air Content:

The air content is determined with a standard air content measuring instrument. The measuring principle: The compressibility of the sample in the instrument is displayed directly on a calibrated scale as the air content of fresh mortar.

Dry Density: $\rho_S = \frac{m1}{m_1 - m_2} \times \rho_{1q}$

ρ_S: density of the test specimen
ρ_{1q}: density of the liquid
m_1: weight of the test specimen exposed to air
M_2: weight of the test specimen immersed in liquid

Depending on system or on customer requirements the material is mixed for 1 to 3 minutes.

LABORATORY TESTS FOR POWDER ADDITIVES

Not only the air void content but also the pore structure and the influence of additives on floating or separations are important.

Determination of the Dry Density:

After hardening is complete the test specimen are formed and further dried at 60° to 80° C to constant weight. Porous materials or materials with high water absorption properties are coated with a high-viscous acrylic dispersion or with a solvent-based clear lacquer and dried once more for 24 hours. Following this the specific gravity is calculated by gauging the buoyant force in a liquid.

Flow Properties:

In individual cases the powdered additives do not only influence the pore- and air contents but also flow properties, so we have to determine flow-and stability properties with different methods as, for example, the determination of flow spread with the Hägermann-Table.

Depending on substances to be measured (mortar, levelling compound, plaster, etc.) instead of the standard sample funnel another container is used. Funnel, beaker or ring are placed and firmly held in the middle of the flow table. After filling the products to be tested the ring has to be hold in position for another 30 seconds, he is lifted up slowly and then the lifting mechanism of the flow table is started. During a standard test 15 strokes are performed. Immediately after the final stroke the flow spread is determined with three measurements in different directions

The compressibility of the sample in the instrument is displayed directly on a calibrated scale as the air content of fresh mortar.

SHRINKAGE INHIBITORS

The most important criterion is the measurement of the shrinkage behavior. The necessary test specimens are prepared with precision steel moulds. For inserting the measuring device notches are drilled on both ends of the form.

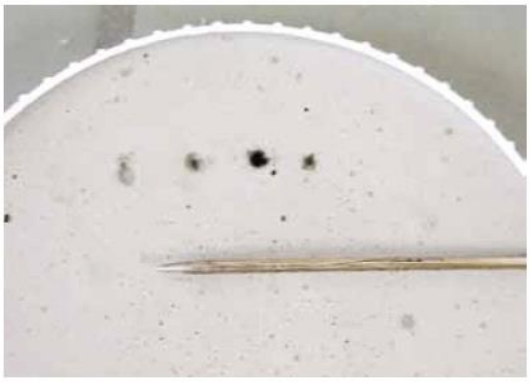
Over the trial period the change in length is measured: The test specimens are formed after 24 hours, but latest when an adequate strength is attained. After removal from the mould the length of the test specimens is measured and the value obtained is used as

LABORATORY TESTS FOR POWDER ADDITIVES

initial length. Then length is measured again after 3, 7, 14, 28 days, 3 and 6 months. Swelling or shrinkage is specified in mm/m relating to the measured initial length.

Additional length is determined in its original/wet state:

The testing period amounts 24 to 28 hours. The test sample is filled into a form made of window glazing tapes and thin plastic foil used for the bottom. A glass plate levelled with a spirit level is used as the weight-bearing ground. Two reflectors are positioned on the liquid mass pointing on the laser distance measuring systems.



Test Setting Behaviour: Every 5 minutes a needle is pressed into the test specimen

At the end of the measuring period the final length is determined with a precision slideway and calculated back to the initial length. Swelling or shrinkage is specified in mm/m relating to the measured initial length as same as in the case of long-term shrinkage.

Setting Behaviour

As the additives can also influence the setting behaviour it is necessary to test it. For this purpose every 5 minutes a needle (Ø = 2 mm) is pressed into the test specimen.
After removing the needle the sample is shaken five times on a table. If the puncture mark closes, the material is yet ready to use. If the puncture mark is still being seen but only little force was needed to insert the needle, the material starts to solidify. A noticeable resistance marks the beginning of hardening.