Explanation of the different moisture measurement methods

**Methods**

**Capacitive moisture measurement**

Application areas

The dielectric process makes it possible to measure the tiled areas or also screeds with underlying floor heating, by which drilling is a very big risk. It is enough already when one puts the measuring instrument on the surface of the building material which is to be measured.

Operation

Increased moisture values manifest themselves not only in the increase of the electrical conductivity, but also in increase of the dielectric constant. The capacity of the condenser, which is the heart of the measuring device, is measured then. Depending on the dielectric (release material or condenser plates) the capacity of the condenser changes. That means, that if there is a material with a higher moisture content in a stray field of the condenser, this results in a higher dielectric constant. The capacity of the condenser changes as well and is converted as a weight in the measuring instrument and displayed.

**Resistance moisture measurement**

Application areas

As the dielectric measuring device, the resistance moisture measurement is also based on the connection with the changed current flow in dry und wet building materials. After this kind of instrument was used at the beginning in forestry, the measurement of mineral substances has also been possible for a long time already, thus ensuring the use in construction materials moisture measurement.

Operation of resistance moisture measurement

With the help of two electrodes, the electric resistance of a building material is determined. The resistance changes depending on the moisture content in the test substance and is displayed on the instrument in manufacturer-specific units. When different building materials are taken into consideration, a conversion table allows the determination of the measured values of humidity in percentage. The electrodes which are used are mainly dependant on the measured building material and its accessibility. Surfaces can be measured with different impact electrodes. For deeper layers which appear always interesting for humidity measurement, particularly measuring probes that can be inserted through holes or gaps in the depth are suitable.

**Microwave moisture measurement**

Lots of bulk materials are suitable for that way of measurement. In general, the emission energy is used to measure the moisture content in the material. The microwave device loses energy in the process of measurement when the sample is inside. The more water the substance contains, the bigger the energy loss is. Water, some kind of takes the energy in, but at the same time it can also reflects it. These two processes, when the energy is reflected and when it si absorbed help to conduct the necessary measurements. The difference is only in the position of the radiator and receiver. In case of reflection, they will be on one side of the sample. The Microwave moisture measurement provides results at once and allows measuring the whole moisture content in the substance. No bad side-effects happen, such as damaging the sensor or problems with the materials, as the measurement takes place without
direct contact with the material (it is in-between emitter and receiver). The microwave moisture measurements allow getting very accurate and precise results and are often used for verification. The materials are not changed in that process, microwave moisture measurements does not change the structure or temperature.

Kiln Measurement – weighing - drying process

Kiln measurement or kiln drying refers to the thermo gravimetric moisture measurements. In that case the mass change with happens in the substances when they are heated, is determined. Also, in that process, the measuring materials is being dried for so long until the equilibrium is set (reached). This is achieved when the weight of the measuring material takes a constant value, which happens through repeated weighing.

The difference between the wet and dry weight indicates the loss of moisture, which the material sample experienced in the process of heating and drying. The kiln measurement is a destructive measurement method for determining the moisture. To determine the moisture content, a sample must be taken out for the measurement. That is why with one measurement only moisture can be measured, which was present in the sample or in the immediate vicinity from the sampling point. When sampling for kiln measurement it must be considered that the sample taken for measurement in the kiln must be used only for that purpose, in order to prevent an exchange of moisture with the air from the environment.

Measurable materials

Bulk materials, sand, sands, gravel, cement, concrete, coal, ore, salt, wheat chaff, corn, rye, triticale, wheat, spelled seeds, barley, oats, rape, pumpkin seeds, peas, soybeans, beetle beans, horse beans, sunflower seeds, rice, unpeeled rice, peeled, brown rice, poppy seeds, amaranth, flax, sorghum, coffee, cocoa beans, flax seeds, jatropha, buckwheat, sesame, sorghum, hops, alfalfa, whole grain, chips, wood, wood chips, grain, powders, grains, sugar, salt, flour, granules, pellets, granules, feed, pet food, animal feed, cat feed, dog food, paste, yoghurt, milk powder, biomass, silicates, panels, wood panels, wooden panels, MDF, fiber, wood flour, sawdust, fiber material, wood fiber, pulp, textile, textiles, wool, yarn, powdery material, powder, fillers, pigments, oxides, hydroxides, stone dust, asbestos, fiberglass, fabric chips, soot, fly ash, cinder, ash, pigments, paints, dyes, tiles, ceramics, calcium carbonate, talc, talcum, aggregates, sludge, mudd, tiles, ceramics, pharmaceutics, tabacco.