

Product Information

On-line

Neutron Moisture Measurement on Sand for the Glass Industry

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The logo for Berthold Technologies features a stylized blue 'C' shape on the left, followed by the word 'BERTHOLD' in a bold, blue, sans-serif font. Below 'BERTHOLD', the word 'TECHNOLOGIES' is written in a smaller, blue, sans-serif font, with wide letter spacing.

BERTHOLD
TECHNOLOGIES

Moisture measurement on Sand

Using the Neutron Moisture Analyser

- The quality of glass is determined by the chemical composition and the heat treatment. Due to reasons regarding melting techniques the accurate moisture of sand is required.
- The moisture must be known exactly in order to avoid errors in the composition of the mixture for melting.
- Having information displayed in the control room is clearly of benefit to the process.
- With a measuring range generally between 4 and 15 %, the accuracy would be better than +/- 0.1 %.
- Berthold neutron gauge measures a sphere of 600 mm diameter of sand in the hopper compared to other technologies, which only measure a small volume.

Location of measurement

- The bunker probe is placed in the outlet section of the sand hopper in a stainless steel protection-pipe with a wall thickness of 4-6mm.
- The bunker probe could also be installed in the weighing- hopper.
- The top of the bunker probe should be surrounded by at least 300 mm of product during the measurement.
- The protection pipe must be mounted with a slope of 30 - 45° from horizontal.

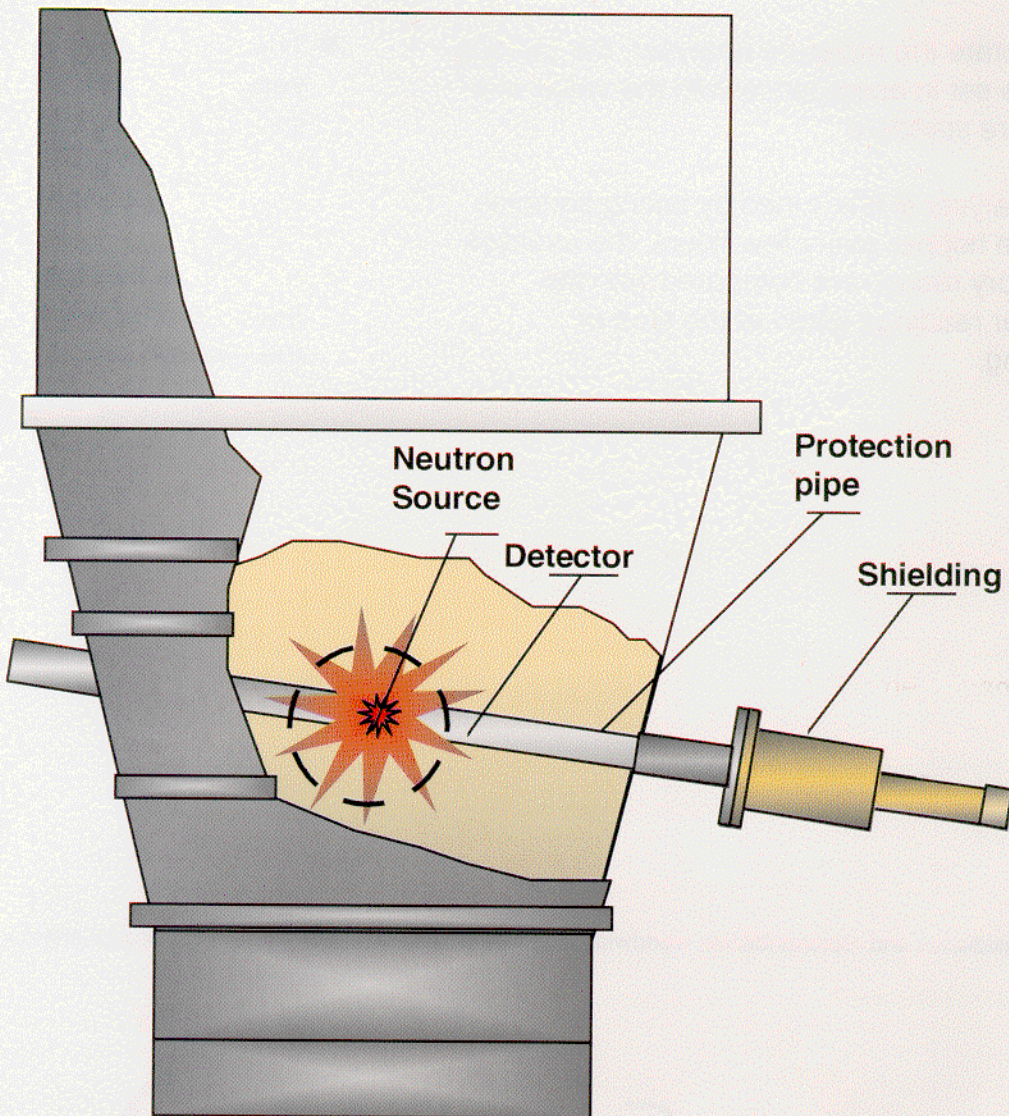
Berthold On-line Moisture Analyser

- **Berthold Analyser** provides on-line and real time measurement.
- Large measuring volume , ensuring a better and more representative measurement value.
- Easy to install, no moving parts
- High measuring sensitivity due to the use of ^3He counter tubes
- According to experience, fluctuations in the bulk density of fine sand are so small that density compensation is not required.
- No maintenance
- A decrease of number of rejected batches as well as an improvement of the quality of the glass are achieved.

Principle of measurement

- The nuclear method of moisture measurement is based on the principle that fast neutrons are slowed down by scattering the hydrogen nuclei, but they are hardly slowed down by scattering material of higher atomic number.
- A cloud of slow neutrons (thermal neutrons) is created around a source of fast neutrons, and its concentration depends only on hydrogen content in the volume or the volume moisture.
- A neutron source is combined with detector for slow neutrons. In the counter tube (detector) the thermal neutrons cause a pulse rate, depending on the moisture content (hydrogen content) of the sand.
- The neutron display is calibrated directly in weight percent moisture

Measuring installation - Bunker probe



Radioprotection

- The neutrons produce a dose rate of 7.5 micro Sievert per hour at a distance of 65 cm.
- In the bunker probe arrangement, the controlled area is within the vessel even when it is empty of sand.
- In case of maintenance to the hopper, the probe must only be placed into the shielding container.
- As the radioactive neutron source is mounted into the steel probe, security of the source is guaranteed.
- The neutron source is surrounded by a double stainless steel capsule.

Calibration

- To calibrate the moisture analyser, the reading must be set in accordance with the value of a "moisture standard".
- The Analyser is fine-tuned by taking samples from the hopper every few hours, the average laboratory results are compared with the analyser readings taken at the time of sampling.
- The comparative laboratory values versus the moisture readings are stored into the evaluation unit. Press "COMPUTE" and the system is then calibrated.
- Make sure that the samples are taken from the effective measuring volume of the neutron probe

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