

IMPULSE-NEUTRON-GAMMA TOOL

TYPE **ING42SC** 42/50mm



AREAS OF APPLICATION

The ING42SC is a logging tool for interface determination in cavities. Interface determination surveys are of key importance in controlling the development of caverns.

During the leaching phase of a cavern the surveys are used to determine the exact position of the interface between the brine and the blanket medium used, e.g. nitrogen, oil or air.

MEASURING PRINCIPLE

Determination of the depth of the interface in a cavern is made using the impulse-neutron-gamma technique. In this technique neutrons are emitted from a neutron source installed in the tool and these interact with the rock and the medium (brine, nitrogen) in the cavern.

The secondary gamma radiation which arises as a result is absorbed by two detectors (long and short measuring distance = significant and insignificant penetration depth of the radiation).

In the same way different media in the cavern can be classified by the differing intensities of the detected gamma radiation.

SURVEY PROCEDURE

After running the tool into the hole the ING42SC is tied in to a depth reference point (cemented casing shoe) using the M-CCL or CCL or to a radioactive reference point by measuring the natural gamma radiation.

Subsequently the depth of the interface is determined from the level shift in the

TECHNICAL SPECIFICATIONS

Diameter: 42 mm or 50 mm
Length: 4.125 m
Weight: 18 kg
Neutron tube: 120 kV, 14 MeV neutron energy
Burst frequency: 25 Hz

Temperature (90°C max.): Resolution: 0.01 K
 Accuracy: +/- 0.2 K
Pressure sensor (400 bar max): Resolution: 0.1 bar
 Accuracy: +/- 0.5 bar

M-CCL/CCL

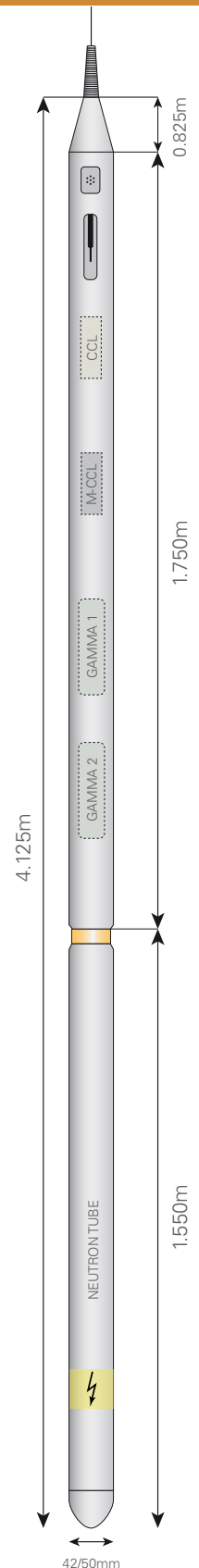
NaJ Gamma detectors: Gamma 1: 110mm
 Gamma 2: 30mm

OPTIONAL PRESSURE MODULE *HPPEXT* (HIGH PRECISION PRESSURE EXTENSION)

Diameter: 42 mm
Length: 0.9 m
Weight: 6 kg
Pressure sensor (HighPrecision): Resolution: 0.001 bar
 Accuracy: +/- 0.03 bar
 Measuring range only up to 300 bar

total counts/sigma recordings. After the interface level has been determined either the tool is kept at the required depth and the interface is adjusted by extracting or adding blanket medium until it coincides with the tool position, or the interface level is altered and repeatedly measured by logging until the depth is reached at which the interface is required.

Before running the tool out of the hole a depth correlation is again made by tying into the depth reference point (cemented casing shoe or radioactive reference).



Schematic diagram of
 PNT - tool type ING42SC



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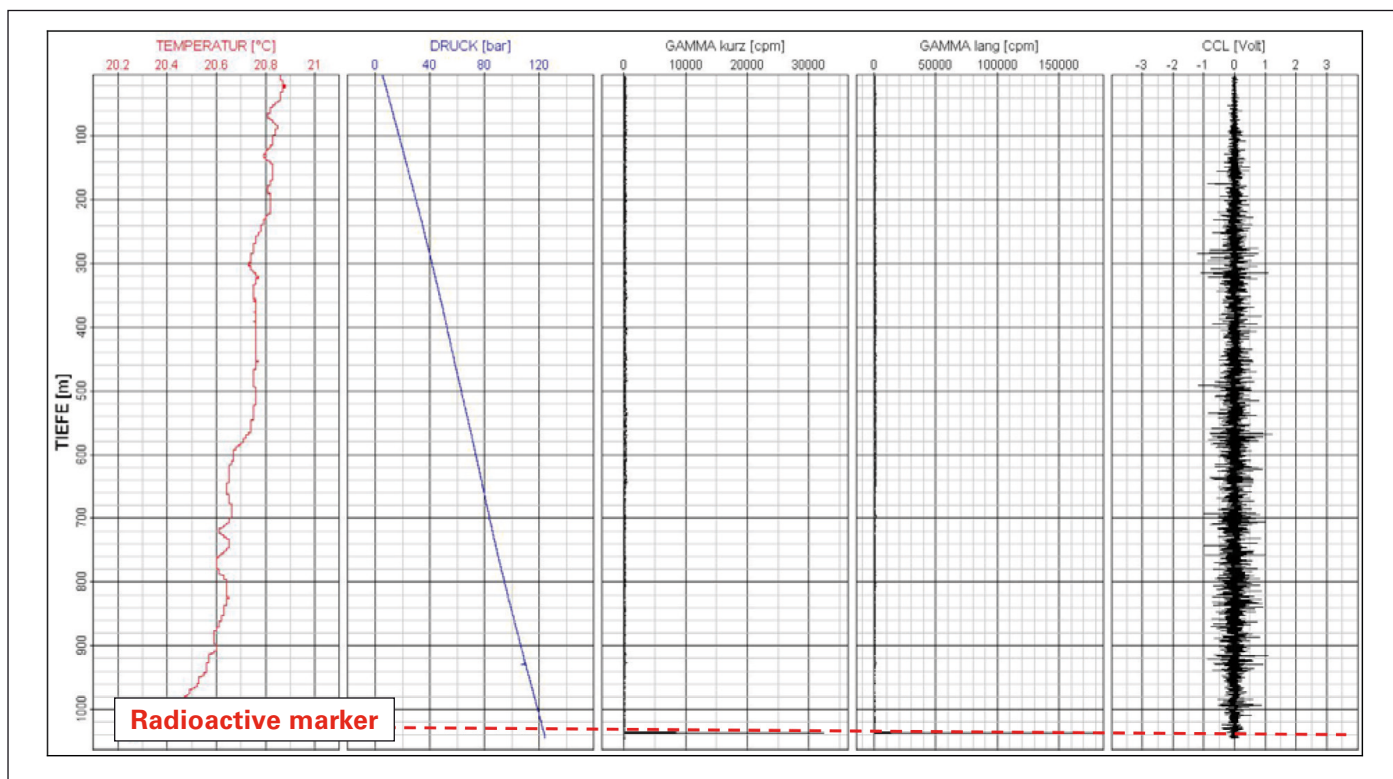
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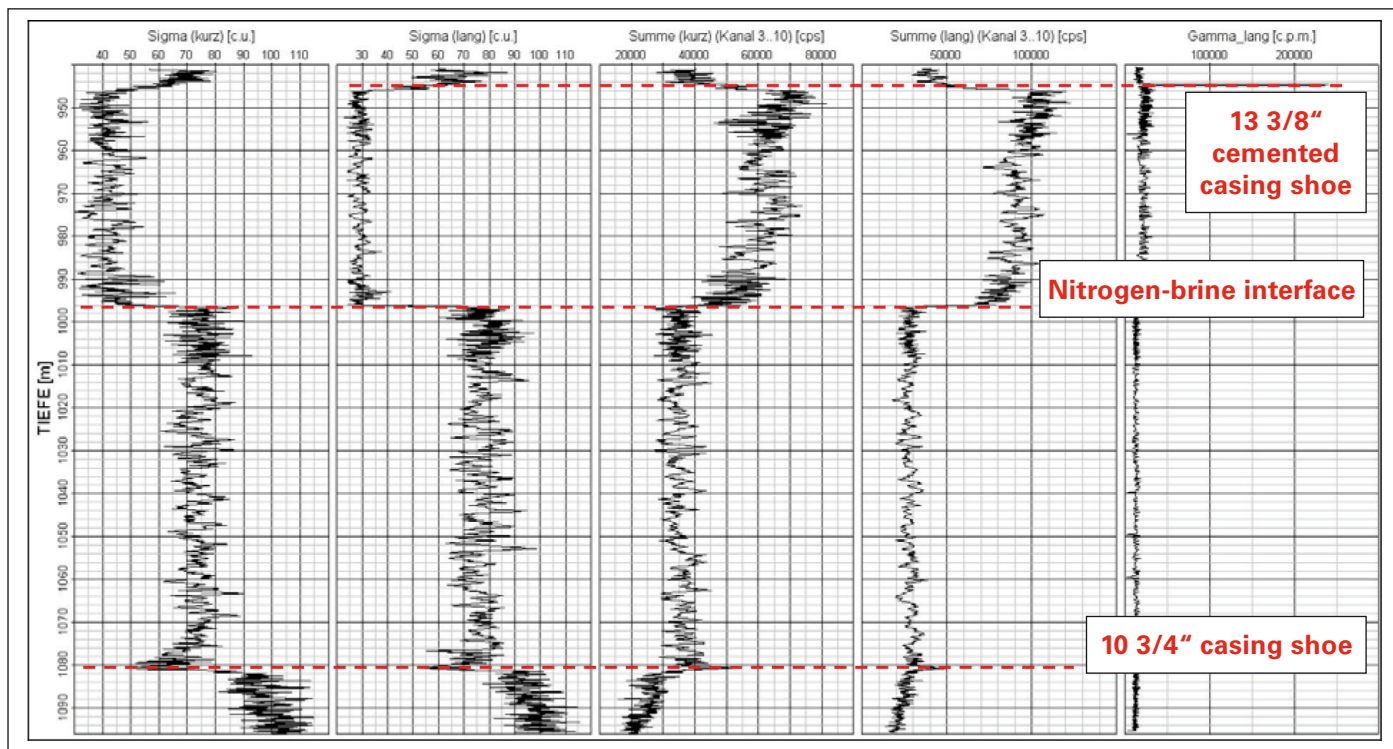
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Examples of logging and determining the interface



Display of the physical conditions in a cavern measured using the PNT-tool Type ING42SC



Display highlighting the identification of the interface level and the depth reference points