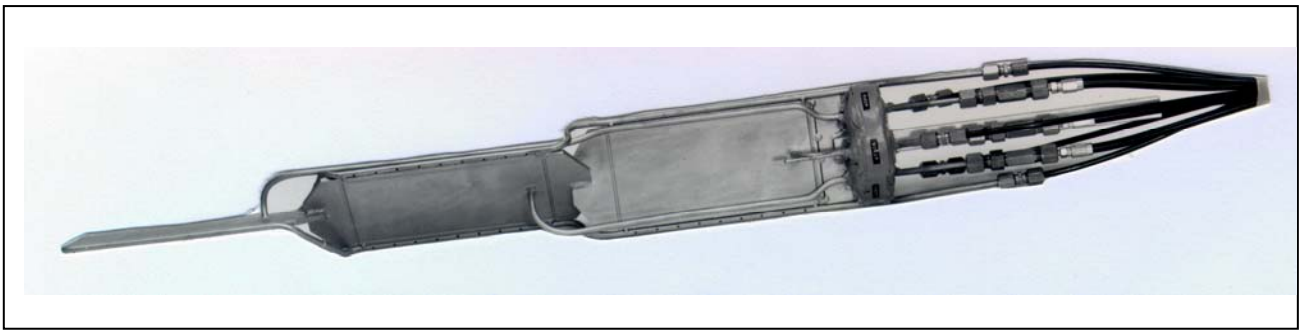
GLÖTZL Baumeßtechnik

BORE HOLE CELL

Type: BB . . .

Art. No.: 03. . .



The bore hole cells or stress monitoring systems (SMS) are a suggestion for determination of the principle component of stress in size and direction.

The stress is a tensorial size which is determined by 9 resp. 6 directed sizes.

The installation of such a measuring equipment is an essential problem. Normally, this equipment is installed in a bore hole.

The deepening of the boring causes a stress transposition and thus a disturbance which seems to be unavoidable.

To solve this problem, it is our suggestion to install the measuring equipment in the bore hole and then to grout the annulus with injection material.

The basis for this idea is the

effect of hard inclusion.

This means that the injection material should have a higher stiffness as the surrounding rock.

The thus effected stress concentration is acting contrary to the stress transposition by the deepening of the boring.

Figure 1

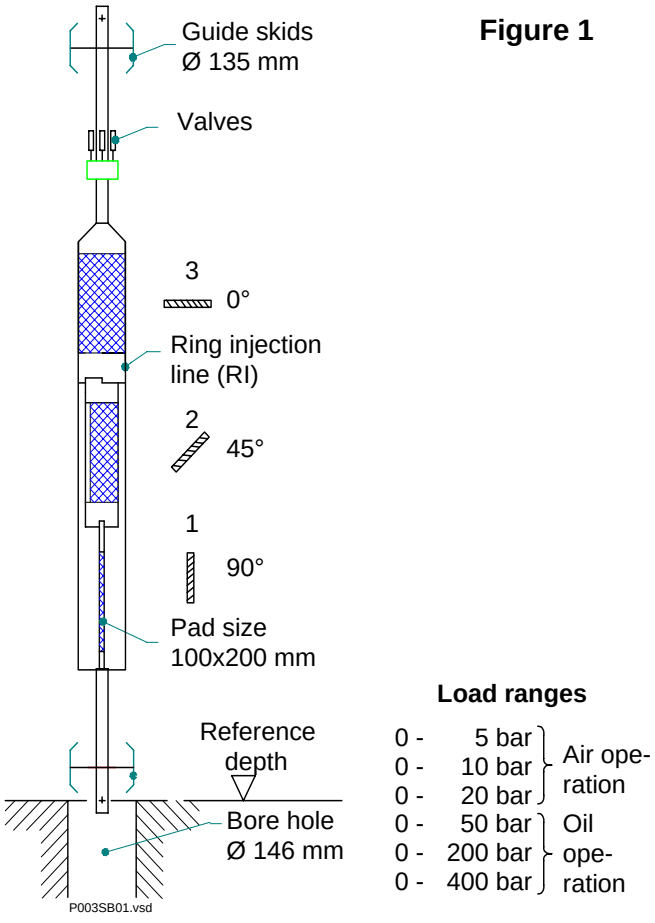
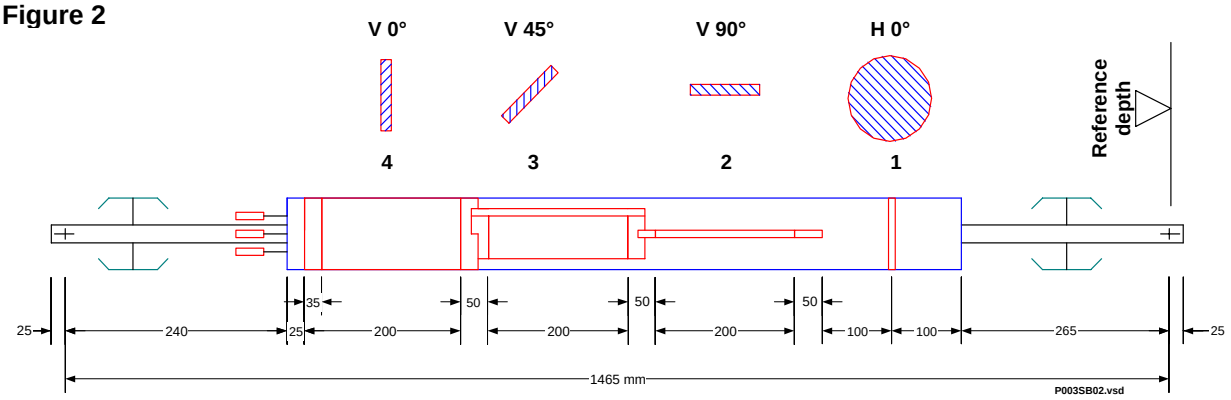


Figure 1 shows the assemblage of three cells which absorb the components. This enables the observation of the two-dimensional portion of the main stress.

Figure 2



This variant – shown in fugure 2 – shows a SMS with 4 cells, where the 4th cell is only acting as indicator in the axis direction of the bore hole.

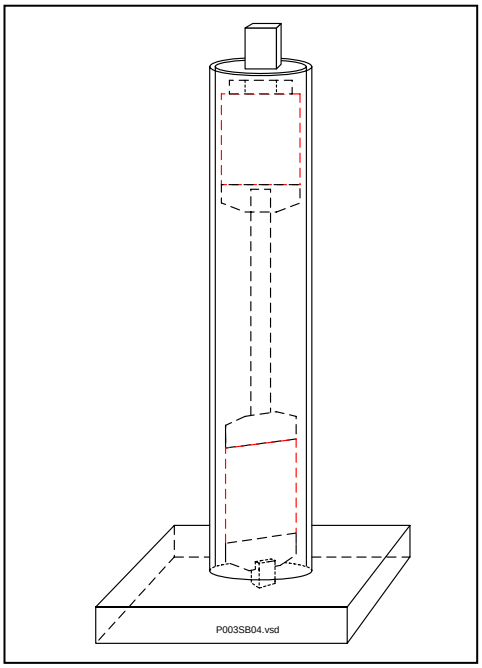
6 cells are necessary for determination of the main stress.

3 cells are inclined in a level of 0°, 120°, 240° e.g. The remaining cells are turned and inclined to record the third dimension. The evaluation and visualization are plotted resp. are shown as algorythms.

Installation of the cells - fixed in a tube – is done by means of direction rods to record the angle orientation.

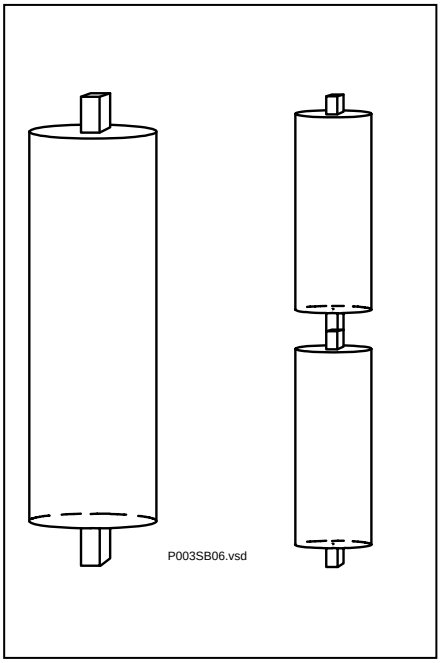
If required, a compass equipment resp. an inclination measuring unit can or should be used.

Concreting in of Bore Hole Cell in Tube Form:

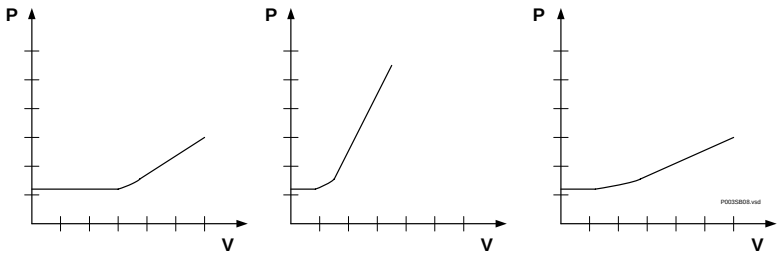


E-modulus $_{\text{concrete}}$
> E-modulus $_{\text{rock}}$

Diameter 110 mm
Length 900 mm



Retightening of bore hole cell by means of a retightening tube

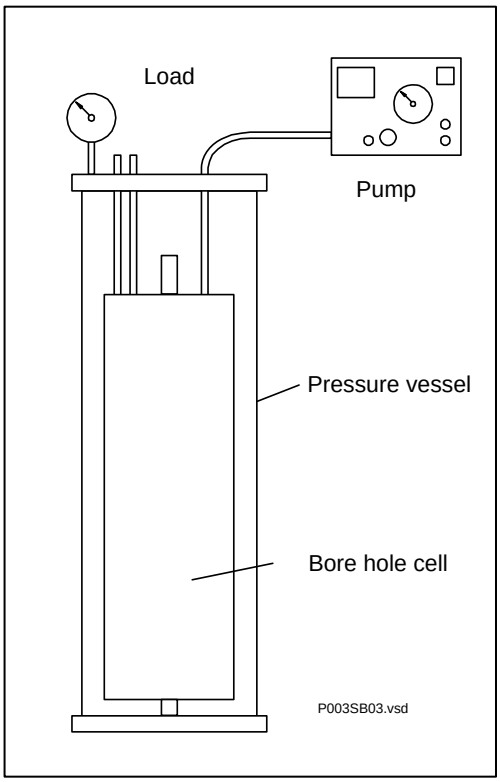


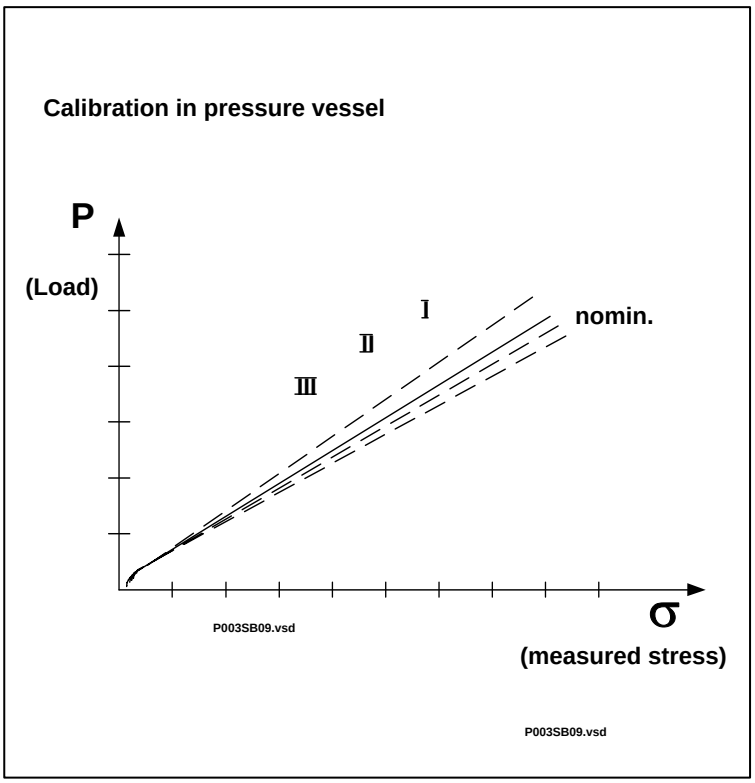
After injection and the complete bedding of the stress cells, stress arises.

This stress structure is time-dependent and has an asymptotical course.

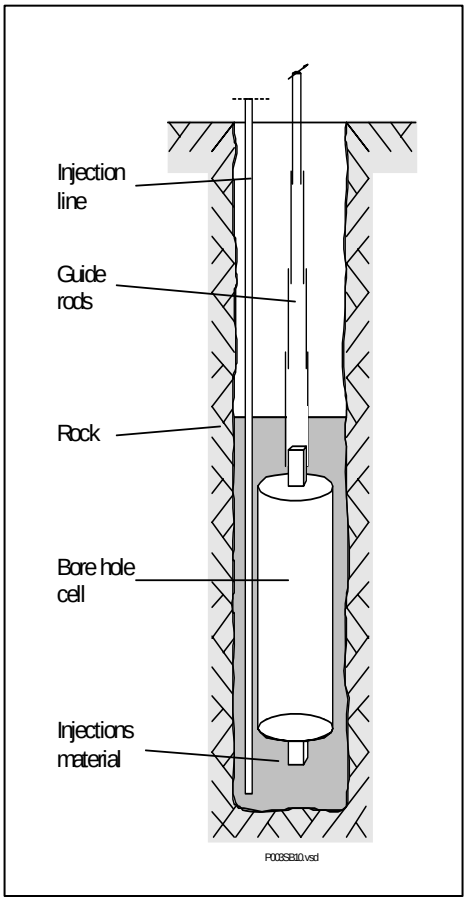
In cooperation with the company BGR, a system has been developed to initiate this procedure resp. to speed it up.

Ring injection lines around the rim of the transducer pads and also crossing the areas of the pads creates the space to pressurize the cells.



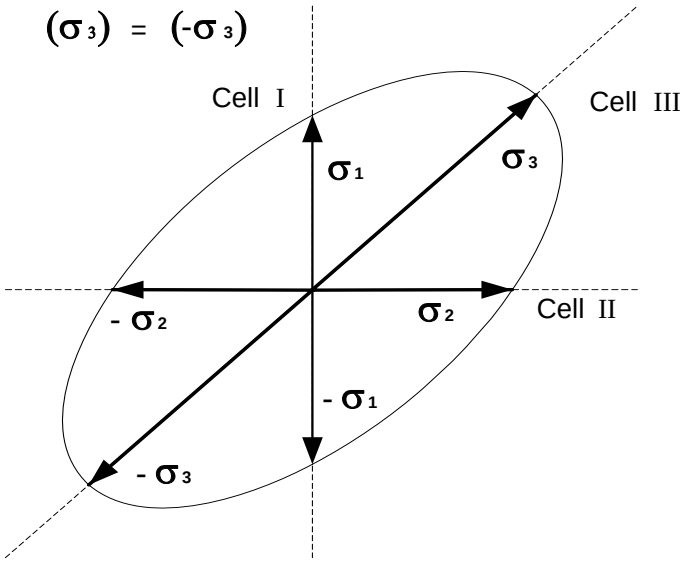


Installation in Bore Hole



- By means of guide rods for directionally oriented installation
- Injection of bore hole cell by means of concrete with expanding addition
- Measurement of horizontal main stress in size and direction

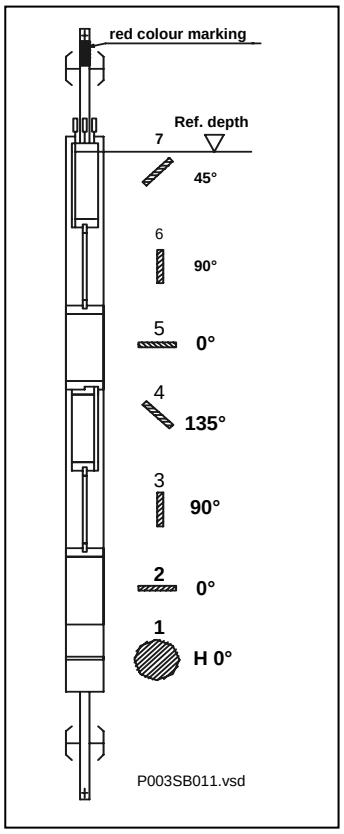
Stress ellipse
Main stress



Examples:

Type BB 15/25 KF50 6V/H

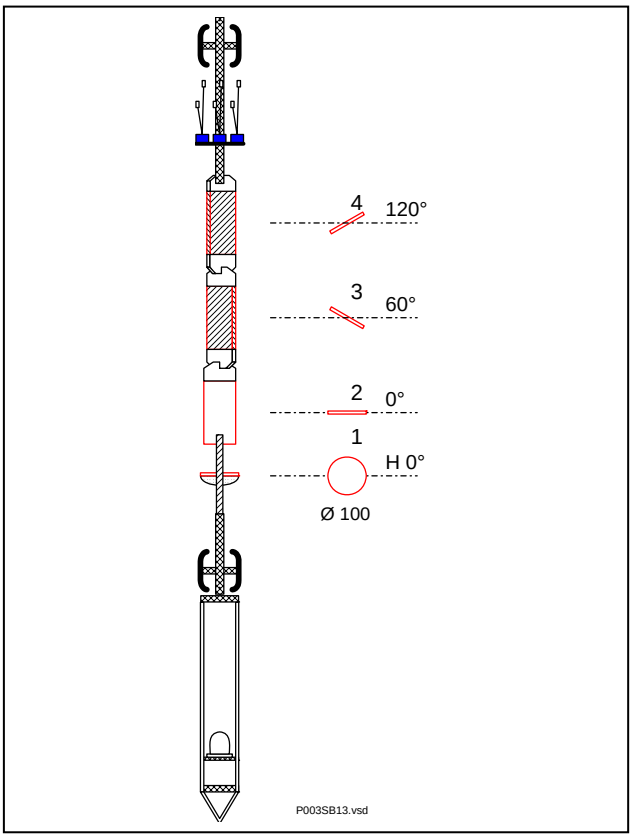
6 bore hole cells vertical at 0°, 45° and 90° at 0°, 90°, 135°, 0°, 90° and 45°
1 bore hole cell horizontal 0° for measurement of stress in the bore hole axis

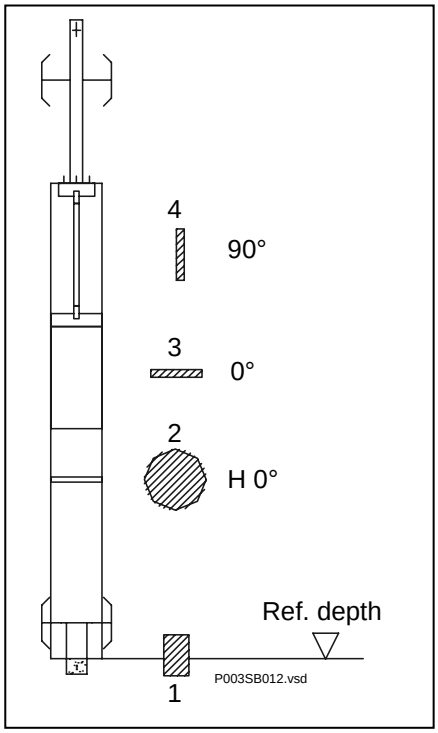


Type BB 10/20 QF 50/3 V/H

3 bore hole cells vertical at 0°, 60° and 120°

1 bore hole cell horizontal 0° for measurement of stress in the bore hole axis





Type BB 10/20 QF 50/3 V/H

2 bore hole cells vertical at 0° and 90°
1 bore hole cell horizontal 0° for measurement of stress in bore hole axis

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