

2D borehole deformation gage



Description

Model **4338 2D borehole deformation gage** is measuring instruments for stress change while excavating an overlap large-diameter borehole at existed borehole.

It is useful to measure stress of rocks while excavating at tunnel, mine, base area of power plant. Also, it is useful to measure while excavating for strengthening system of mine or dam.

If rock mass has elastic and competent, it is possible to measure stress with overcoring technique and BDG (borehole deformation gage)

BDG has 3 pairs of strain gage inside for measuring 3 directions of stress in cantilever structure (hexagonal symmetry / 60° each) and there are 6 bulging plungers outside of BDG for measuring diameter of borehole. Also, it is waterproof.

[Overcoring is]

Overcoring is a method of measurements for rock stress and it excavate existed borehole again for being large diameter.

The readout

It is required only dynamic data logger which can connect foil strain gage sensor.

Applications

Model 4338 BDG (borehole deformation gage) can measure stress of rock mass

- Measuring stress of rock mass at tunnel and mine.
- Power plant of unclear or hydroelectric power.
- Measuring stress of rock mass of dam foundation.

Specification

Model	4338
Applied sensor	FSG (foil strain gage) sensor
Resolution	1.0 microstrain
Resistance	350 Ω
Operating temperature	-30~80°C
Borehole diameter	Ø38mm EX diamond drill
Min.depth of overcore	210mm
Max. depth of overcore	Max. 15m
Material	Stainless steel
Dimensions	Standard case : Ø35×272(L)mm Reverse case : Ø35×385(L)mm
Weight	2.0kg
Signal cable	Ø10mm, 0.5mm ² ×8C shielded PU sheath cable
Weight of signal cable	2.0kg / 15m
Accessories	FSG borehole deformation gage 1set reverse case 1ea, plunger 6ea appropriate pliers

Features

In case rock mass is weak such as crack, it is hard to excavate with EX diamond drill for overcoring.

BDG(borehole deformation gage) is possible to use repeatedly, and has long lasting instruments for work site. Also, it is simple to install and it is not required epoxy and concrete cement while sensor is in borehole.

However, it is required to check accurate for three dimensions of stress distribution which are from 3 different directions of borehole.

BDG can gather the best result from uniaxial or biaxial stress fields such as area closed to rock mass or close to mine pillar

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Test procedures

- ① To drill $\varnothing 38\text{mm}$ EX diamond test borehole at rock. The depth of borehole should be below 30m. Normally, it is below 10m.
- ② To put FSG borehole deformation gage into borehole up to test point by install tool kit.
There are 6ea of plungers which is divided into 60° . It is displayed hexagonal symmetry. It can measure 3-direction of displacement. Also, signal cable should be located the middle at bottom of drill rod for coming out from back side of water supply.
- ③ 120 rpm drilling speed is suitable. It can be overcoring with $15\text{mm} \sim 20\text{mm}/\text{min}$. speed at $\varnothing 150\text{mm}$ core barrel.
- ④ To check the stress data each depth.
- ⑤ When taking off rock core after drilling borehole, it causes deformation where rock core is removed area. Then, FSG borehole deformation gage will absorb and measure the bore deformation.
- ⑥ It is possible to calculate by coefficient of elasticity for correlation between stress and deformation rate. It can calculate stress of rock mass by deformation rate from the measured value during overcoring.
- ⑦ For correlation between stress and measured value, it should be calculated by elastic coefficient.
- ⑧ To repeat procedure then, it is possible to gather stress of direction and current state tridimensional. After that, result of stress can be calculated using EXCEL program easily

Ancillary equipments

[Tool kit for removal core]

Tool for cutting and removing the core from rock mass after insert and expand inside of EX borehole.

[Chamber kit for measuring coefficient of elasticity]

It is a biaxial measuring chamber for coefficient of elasticity from core (hand pump and press gauge)

[Calibrator]

Tool for checking stability of model 4338 BDG.

