

GEOPHYSICAL WELLLOG service

- Optical Telewiewer Log (OPTV)
-) Acustic Telewiewer Log (BHTV)
-) Sonic Log & Cement Bond Log (CBL)
- 4) 🕂 Normal Resistivity & SP Log
- 5) Fluid Velocity Log
- 6) ⊢ Mechanical Caliper Log
- 7) Natural Gamma Ray Log (GR)
- 3) Fluid Temperature, Conductivity Log and physical parameters of fluids
-) $^{
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Optical Televiewer Log (OPTV)

- Fracture and cavities detection

- Detailed geomechanical analysis from the oriented borehole image
- Casing and piezometer inspections
- Check on the structure consistence
- Archeological survey
- Paleoclimate survey on alpine glacial masses

The tool generates a continuous a 360 ° oriented image of the borehole wall using an optical imaging system. The OPTV log is performable in dry and clear water condition. It needs to be centralized.









Acoustic

Sonic Log (FWS) and Cement bond Log (CBL)

Depth

1m:200m

250

255

260

265

270

275

280

285

290

Ohm.m

Ohm.m N16

Ohm.m

FLOWMETER UP

0

md/min 40

LOWMETER DOWN

md/min 40 2000

2000

2000



- Fracture and cavities detection
- Vp and Vs values of the geological formations in non-cased borehole
- Lithology and porosity of rock formations
- Elastic proprieties of rock formations
- Grout quality check on casing and pipe

The sonic tool involves recording of parameters linked with the transmission of sound waves in the rock formations. It is operative in fluid-filled borehole. It needs to be centralized.





Normal Resistivity Log (8"-16"-32"-64")NRES, SP Log

Lithology and porosity of rock and soil formations

Pore fluid quality

The tool works on the basis of electrolytic conductivity, which means that it only be run in uncased borehole filled with an electrical conductive fluid.

Flowmeter and fluid velocity Log (FLOW)

- Water movement detection, upflow or downflow, along the borehole
- Useful for planning slotted portions of piezometer and well
- Absolute value calculation of singular flow contribution
- Performable also during pumping tests

The tool has un impeller with a vertical axis of rotation which turns if it is moved relatively to the water column. In case of slower velocity is used a tool capable to measure the heat flux in the water column. It needs to be centralized.

Mechanical Caliper Log (CAL)

- Fracture and cavities detection
- Detailed geomechanical analysis
- Useful for hydrogeological survey
- Volume calculation for the grouting phase
- Collar and casing survey

Our conventional 4-arms mechanical caliper benefit of an independent movement capability of each arm.



Fluid Temperature, Conductivity Log and physical Depth Image-NM Cond Temp 1:400 0*90*180 270*0* 400 1400 0 10



Natural Gamma Ray Log (GR)

- Detection of the main lithology as shale beds and evaporites
- Location of rich-bentonite portions in grouted column
- Correlation between wells

The radioactivity measurable in a well is the one linked to natural gamma ray emission by radioactive rocks and minerals. Natural gamma ray emission is detected by a Nal(Tl) crystal. The measurements can even be performed is cased hole.









Geothermal and hydrological analysis of well and borehole

- Useful for planning slugged portions of pipe and well
- Detection of gradients, anomalies and fluid interfaces
- Vertical heat gradient detection after casing grouting

Continuous measurement log of parameter

Deviation Log (DEV)

Continuous measurement of azimuth and borehole inclination

Useful to support downhole and crosshole seismic survey

Borehole deviation, also in horizontal and variably inclinated borehole. I needs to be centralized.



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Well Log Service

Waterstones S.r.l. offers a wide range of geophysical Log service in

borehole and well. We perform log activity in horizontal, variably oriented and vertical borehole up to 1400 m depth.

Our main activities

- Well Log service on geothermal well, Grado, GO, Italy.
- Well Log service on Line 3, metro Riyadh, Saudi Arabia.
- Well Log service for the geo-structural survey of pile sites, Courmayeur,AO, Italy.
- Well Log service for the geo-structural survey of S. Leo, RN, Italy.
- Well Log service on geothermal well, S. Cesarea Terme, LE, Italy.
- Well Log service on LRT Site, metro Doha, Qatar.
- Well Log service on deep grouted pannel, Montegelli, FC, Italy.
- Well Log service for hydrogeological analysis, Priolo, SR, Italy.
- Well Log Service for hydrogeological analysis, Loppio, TN, Italy.
- Well Log service for the GERD Dams Project, Ethiopia.
- Well Log service for the geo-structural survey at the excavation front of Brenner Basis Tunnel, Mules, BZ, Italy.
- Well Log service for paleoclimatic survey on Ortles glacier, BZ Italy.
- Well Log service for the geo-structural survey of a hydro tunnel, Val Senales, BZ Italy.
- Well Log service for the geo-structural survey at the excavation front of Laives tunnel, BZ, Italy.
- Well Log service for the Chespi Palma Real Dam Project, Ecuador.
- Well Log service for hydrologic analysis, Mestre, VE, Italy.
- Well Log service on travertine quaternary deposits, Tivoli, Roma, Italy.