OPERATING PRINCIPLE:

The Cement Bond Log instrument acquires an omnidirectional, high-resolution full-wave acoustic data in cased and open holes. It accurately infers directly the cement quality from the degree of acoustic coupling of the cement to the casing and to the formation.

One ceramic monopole transmitter and two ceramic receivers are used to produce and analyse the waves.

It operates on the principle that acoustic amplitude (in millivolts) is rapidly attenuated in good cement bond but not in partial bond or free pipe.

Reduction of the amplitude or increase of the decibel attenuation is an indication of better quality bonding of the cement behind the casing to the casing wall.

On the recorded **cased hole** data, it is possible to identify the Cement Bond and define a Bond Index.

Cement bonding is affected by:
- Cement job design and execution as well as effective mud removal
- Cement in place and its mechanical properties (compressive strength)
- Temperature and pressure changes applied to the casing after cementing
- Cement additives or epoxy resin applied to the outer wall of the casing

On the recorded **open hole** data, it is possible to obtain information on formation’s interval transit time.

APPLICATIOnS

- Evaluation of cement quality
- Location of cement top
- Well integrity
- Determination of zone isolation
- Leakage source detection

BENEFITS

- Surface leakage prevention
- Hydraulic Bond
- Zone isolation
**CBL - VDL**

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## SPECIFICATIONS:

<table>
<thead>
<tr>
<th></th>
<th>Imperial</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. OD</td>
<td>2.5”</td>
<td>63.5 mm</td>
</tr>
<tr>
<td>Length</td>
<td>16.4’</td>
<td>5.03 m</td>
</tr>
<tr>
<td>Weight</td>
<td>72.3 lb (90.4 lb with Telemetry)</td>
<td>33 kg (41 kg with Telemetry)</td>
</tr>
<tr>
<td>Max. Temperature</td>
<td>257/350 ºF</td>
<td>125/175 ºC</td>
</tr>
<tr>
<td>Max. Pressure</td>
<td>12 kpsi</td>
<td>850 bar</td>
</tr>
</tbody>
</table>

**Transmitter type**

- Ceramic, monopole

**Spacing**

- T1-R1: 3 ft (915 mm)
- T1-R2: 5 ft (1515 mm)

**Verification**

- Casing slowness check: 187 μs/m (57 μs/m)

**Logging Parameters**

- Casing OD Range: 4” - 16” (100 – 400 mm)
- Logging Speed: 1800 - 3000 ft/h (9-15 m/min)
- Sample rate: Selectable
- Centering: Required
- Cable compatibility: Mono or multi conductor
- Top Connector: GO1

**Output**

- Depth Correlation (Gamma Ray, CCL)
- Run-time
- Single receiver transit time (T1-R1, T1-R2) [μsec]
- Full Waveform [μsec]
- Amplitude Near, Amplitude Far (mV)
- BI – Bond Index

**Measuring Parameters**

**Full-wave sonic**

- Vertical Resolution: 610 mm
- Measuring Range: 15-250 μsec/ft (50-800 μsec/m)
- Accuracy of DT: 1 μsec/ft, +/- 3 μsec/m
- Repeatability of DT: 1 μsec/ft, +/- 3 μsec/m

1 Centralized tool in a 200mm OD casing

**Gamma Ray**

- Sensor type: NaI scintillation crystal
- Range: 0 – 3000 GAPI
- Accuracy: +/- 5% of measured values

2 Gamma Ray measurements are radioactive measurements and hence subject to statistical variations. These variations depend inter alia on logging speed and filter strength.

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