

WCH4



Wireless ultrasonic tests

Borehole measures Lithium

Automatic cross-hole Integrated battery

Modular wireless instrument for cross-hole surveys on foundation poles

WCH4 is an innovative modular wireless instrument for cross-hole tests on foundation poles. System core are motorized reels electronically controlled on which are mounted high-power borehole probes for cross-hole investigations on foundation poles, diaphragms, and all those infrastructural cement or concrete works that could be verified by cross-hole tests, that is through descent in tubes prepared at casting and subsequently filled by water. Each reel of WCH4 system integrates a motorized probe with cable 60 mt, and all control electronics which supervises automatic management of the probes during descent/ascent of probes (cross-hole) and saving data. Due to Rugged tablet and the almost complete absence of physical cabling, settings, measurement management, besides display and interpretation of acquired data, are easy and immediate. In direct analysis mode each wave emitted by the internal generator is fully displayed and moreover it's possible to modify parameters of display to make even easier reading velocity through crossing and the possible presence of tested defective material. Through the use of 2-3-4 motorized reel with automatic and simultaneous movement, it's possible to exponentially reduce survey time, because with one only descent/ascent of probes inside investigated pole (which has to be instrumented with 2-3-4 tubes) it's possible to obtain corresponding sections. Acquired data at every single pulse are displayed in real time on large monitor of the tablet, allowing immediate viewing of possible imperfection in the investigated structure. Executive procedure of cross-hole with 2-3-4 channels is managed with fully automated modes. Only operations required by user is the placement of encoder to read the position of the motorized probes on prepared tubes and the early alignment of the probes on pole head. Once concluded this operation, just push the key to start data acquisition which is automatically managed by the system. It's possible to verify data as they are acquired in order to check in real time performance test. It's also possible to immediately print test report with its data of the just run investigation directly on site. Cross-hole method of analysis on foundation poles of buildings and infrastructural works allows to perform an high resolution accurate and qualitative verification of investigated material, usually a foundation pole. An ultrasonic wave is sent from a transmitting to a receiver device, which are automatically guided from the instrument along total length of the pole entirely "drowned" during casting. Velocity of the sonic wave and its energy are strongly influenced by the quality of the cement. So, it's possible to verify its features and provide a tomographic representation called diagraphy. In CROSS-HOLE tests on concrete pole (CLS), in order to obtain a right measurement of delay of the crossing wave and an optimal reception of the signal, it's necessary to manage constant advancing of the probes, which is feasible due to medium velocity indicators and measurement of depth displayed with a graphic on manual encoder which, in case of overcoming of medium parameters, indicates what to do to return back in limits.

Reference standards: ASTM D6760-08

Methodologies

Ultrasonic Cross-Hole Testing

General

Wireless technology	WiFi - 2.4 GHz - 802.11b
Wireless synchronization	band 5 GHz, 8 selectable channels
Operating temperature	-20/+80 °C
Single unit dimensions	L220 x H225 x P250 mm
Reference legislation	ASTM D6760-08

Acquisition

Resolution	12 bit
Time bases	100ns, 200ns, 500ns, 1μs, 2μs, 5μs, 10μs, 20μs
Samples per event	2048
Amplification factors	x1, x2, x4, x5, x8, x10, x16, x32
Bandwidth	50 MHz
Ultrasonic filters	50 Mhz
Differential error	<0.03%

Probes

Typology	Borehole
Frequency	frequency of resonance 52 kHz
Minimum excitation voltage	500V
Maximum excitation voltage	2000V
Minimum step of measurement	10 mm

