

NLAD Pioneer™



NLAD Pioneer™ Specifications

Test Method	Ultrasonic Pulse Velocity Impact Resonance
Controller	Samsung Galaxy
Thickness	up to 6ft
Compressive Strength	3ksi to 30ksi
Solenoid	25 million cycles
Impactor Material	Brass
Interface	USB 2.0
Dimensions	18" L x 5.5" W x 6.25" H
Weight	11.25lbs/5.1kg
Power	
Rechargeable Battery	Li-Ion 7.2V 5Ah UN 38.3, UL 1642, IEC 62133
AC Adapter	110-220Vac 50-60Hz
Environmental	
Operating Temperature	32°F to 120°F (0°C to 49°C)
Storage Temperature	-4°F to 126°F (-20°C to 52°C)

NLA Diagnostics (NLAD) introduces NLAD Pioneer™, a nondestructive concrete characterization system designed to estimate concrete compressive strength and wall thicknesses.

The NLAD Pioneer™ is controlled by a smart phone and utilizes sound wave propagation and impact resonance to evaluate the condition and wall thickness of a concrete structure. The apparatus is pressed against a concrete structure by a single operator using two hands and the proposed tests are performed automatically with a single press of a button.

The ultrasonic pulse velocity test method in the pitch-catch configuration is used to determine the compressive strength of the concrete specimens. The pitch-catch method allows the operator to covertly test the concrete wall from one side contrary to the through-transmission or the semi-direct methods. The pulse travels through the concrete and undergoes multiple reflections at the boundaries of the different material phases within the concrete.

A complex system of stress waves which includes both longitudinal waves (P-waves) and shear waves (S-waves), develops and propagates through the concrete. The first wave to reach the receiving transducer is the P-wave followed by the S-wave which are converted into an electrical signal. Compressive strength is calculated by using the measured P-wave and S-wave time of travel with the pitch-catch method of ultrasonic testing.

Wall thickness of a concrete structure is calculated by using the P-wave velocity obtained through the pitch-catch method of ultrasonic testing in conjunction with the resonance frequency obtained through the impact resonance test method controlled by an electromechanical impact hammer.



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NLAD design of the narrowband transducer assembly consists of a piezoelectric epoxy composite material to a glass ceramic front face which is placed in contact with the concrete structure using a dry contact pad. These transducers can be used to both transmit and receive.

The narrowband transducer arrangement is designed to match the acoustic impedance of concrete to ensure that the ultrasonic pulses generated at the transmitting transducers pass into the concrete and are then detected by the receiving transducer. It is essential that there is adequate acoustical coupling between the concrete and the face of each transducer.

For many concrete surfaces, the finish is sufficiently smooth to ensure good acoustical contact using a coupling medium and by pressing the transducer against the concrete surface. The transducer assemblies utilize a thin layer of dry coupling medium that separates the surface of the concrete from its contacting transducer.

The dry contact pad has a similar response curve to the ultrasonic gel which is commonly used in acoustic testing and often considered too messy for many uses. The dry contact pad requires only minimum

pressure to obtain sufficient contact with concrete surfaces, even those which are very rough or uneven and would typically require smoothing and leveling. Thus, not only does the narrowband transducer acoustically match the concrete, it's dry contact pad also effectively behaves as a plaster as it molds and adheres to the surface under test.

Operation

- Estimates compressive strengths and thicknesses of concrete structures with a single press of a button running on Android operating system.
- Lightweight and hand-held for field deployment.
- Ease of use reduces routine concrete coring inspection procedures.
- Provides rapid assessment testing in cases of suspected damage while in the field.
- Battery-operated with a "low battery level" indication.
- Dust and rain cover.
- Two handles for one-man operation.
- USB, Wi-Fi and Bluetooth connections to copy data files from the instrument, enabling data to be instantly transmitted via the internet for off-site expert analysis.
- Ten Gigabytes of internal storage (expandable with Micro-SD cards), can store over two million readings or signatures. Save and archive them with meaningful filenames to easily build a database of historical information.
- Application software upgrades for advanced functions can be downloaded and installed remotely through the NLAD website.



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