



CONCRETE SENSORS LABORATORY SERVICES

Performing concrete maturity testing to enable use of Hilti Concrete Sensors



Deliverables

- Maturity testing for one or more concrete mix designs as requested by the customer
- Results of maturity testing will be made accessible as a selectable Mix Design entry in the Hilti Concrete Sensors app
- A list of materials and quantities needed for maturity testing provided by the customer and/or customer's ready-mix plant (RMP)
- Customized verification report based on tested mix designs

Scope of Hilti Laboratory Services

- **Ultimate** ●●●●● Concrete maturity testing at **four** different temperatures
- **Premium CGRC** ●●●●○ Concrete maturity testing at **one** single temperature
(Customer Generated Reference Curve)
- **Verification** Review of concrete submittal and verification report based on customer's cylinder break data

Service features	ULTIMATE ●●●●●	PREMIUM CGRC ●●●●○	VERIFICATION
Testing performed by Hilti	■	■	
Redi-mix plant coordination of materials	■	■	
2-Cylinder sensors (verification sets) for field verification	■	■	■
Data analysis and testing report	■	■	
Data input to software by Hilti	■	■	
Reference curve (1-temperature cylinder testing)	■	■	
Temperature sensitivity (4-temperature cube testing)	■		
Verification that correct concrete mix was poured	■	■	■

Execution

Ultimate Service will be **performed** by Hilti Concrete Sensors Laboratory (HCSL).
CGRC service will be performed by a 3rd party laboratory that is partnering with the customer.

Customer responsibilities

The customer is responsible for ensuring the wet and dry materials, in the quantities and condition specified are delivered to the Hilti Concrete Sensors Laboratory (HCSL) from the customer or customer's ready-mix plant (RMP). The customer is responsible for carrying out the verification process of tested mix design onsite with included Concrete Sensor Verification Sets.

For each concrete mix to be tested at the Hilti Concrete Sensors Laboratory (HCSL), the following must be provided:

- Complete submittal and engineer approval for use in the project
- List and quantities of wet and dry ingredients used in the project
- Confirmation from the ready-mix plant (RMP) of the accurate chemical dosages
- Customer is required to provide available historic break data for the mixes to be tested
- Information, if the estimated in-app strength is needed for:
 - Starting and beyond 18 hours after initial pouring or
 - Starting and beyond 24 hours after initial pouring
- Expected first pour date when the customer will use each mix

Payment

- Hilti will provide a **quote** to the customer prior to service delivery and will perform any HCSL services only after the customer accepts the quote with a signed service agreement and Hilti confirms the order
- Any **additional work** and/or material required after order confirmation due to customer changes will be at an additional charge



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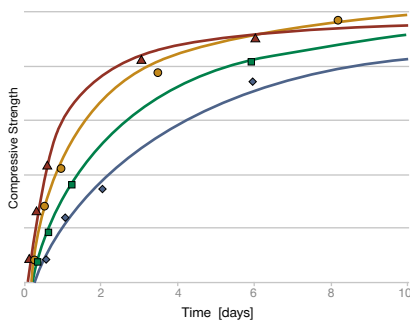
Laboratory Services Levels

Distinct testing levels following ASTM C1074, delivering accuracy, speed, and quality control.

Ultimate Laboratory Service

Equivalent Age (Arrhenius Equation)

Temperature Impacts Strength Development

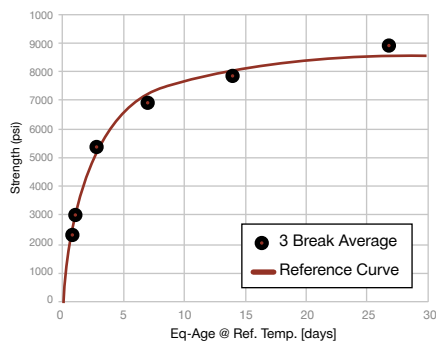


Characterization of concrete mix design at **four** different temperatures to gain highest accuracy

Premium CGRC Laboratory Service

Temperature-Time (Nurse-Saul Equation)

Compressive Strength to Equivalent Age Relationship



Characterization of concrete mix design at **single** controlled (laboratory) temperature to produce reference curve

Verification Service

VERIFICATION REPORT
Sensors-in-Cylinders compared to Cylinder Break data



In-field mix design **quality check** comparing sensors in cylinders data to 3rd party break data per ASTM C1074

Laboratory Service

Value

More precise concrete strength data and **optimized** jobsite progress

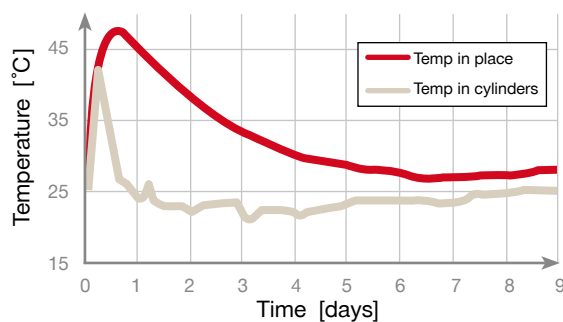
Monitor concrete **strength** with some improvement of strength information and jobsite progress

Part of **Ultimate/Premium** lab service or using mixing design previously tested in HCS library

The Ultimate Difference

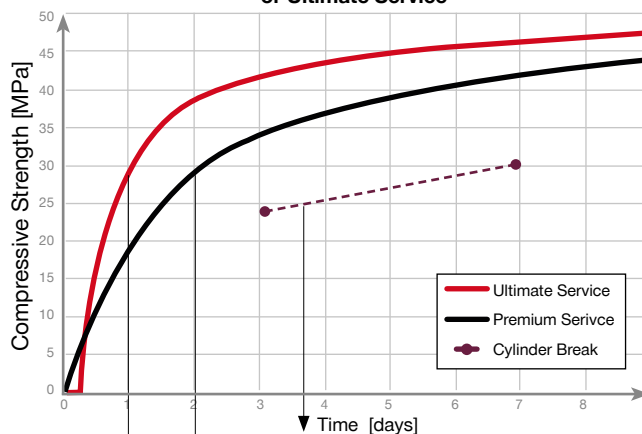
By choosing the Ultimate Laboratory Service, you can expedite your projects by up to 50% compared to traditional methods.

Temperature evolution: in structure vs. cylinders



Given a concrete mix, temperature and strength development in structure vs. in-sample cylinders can vary consistently.

Strength development: w/o service, w/ Premium or Ultimate Service



ULTIMATE ●●●●●

PREMIUM CGRC ●●●●○

CYLINDER BREAKS ●●●●●

Time to strip forms with a target strength of 30 MPa:
No sensors > 3 days
Premium CGRC > 2 days
Ultimate > 1 day