TORONTECH

CONSTANT TEMPERATURE WATER BATH - TORONFT™ WB

Constant Temperature Water Bath - ToronFT™ WB

ToronFT™ WB Constant Temperature Water Bath provides a stable, temperature-controlled water immersion environment for measuring the insulation resistance and dielectric withstand voltage of wires and cables. The tank works alongside an insulation resistance tester and a withstand voltage (hipot) tester, serving as the liquid electrode through which test voltage is applied to the outer surface of the wire insulation. An intelligent PID temperature controller with auto-tuning maintains the water at the setpoint from 0 to 98 °C with a stability of less than 1.5 °C.

The stainless steel interior resists corrosion from prolonged water contact and cleaning chemicals, while the exterior features an electrostatic baked-paint finish for long-term durability. A 4,000 W electric heater brings the water to temperature quickly, and heating power can be scaled to match custom tank sizes. The ToronFT™ WB is available in six standard capacities from 27 L (30 × 30 × 30 cm) to 576 L (120 × 60 × 80 cm), with custom dimensions available on request.

A high-precision PT100 thermocouple sensor feeds temperature data to the PID controller, and a built-in timer allows the operator to program soak durations for repeatable test cycles. The relay-based control system, combined with power overload, short-circuit, and control-circuit overload protection, keeps operation straightforward and safe across production and laboratory environments.

APPLICATIONS

Constant Temperature Water Bath - ToronFT™ WB Applications

The ToronFT™ WB supports water-immersion electrical testing in any facility that manufactures, certifies, or inspects insulated wire and cable products.

- Wire and Cable Manufacturing QC: provides a controlled immersion bath for in-line and end-of-line insulation resistance and withstand voltage testing of building wire, appliance wiring material, and flexible cords.
- UL and VDE Product Certification: meets the water immersion conditions specified in UL 758 (Sections 35 and 36) and VDE 0472 for short-term and long-term insulation resistance testing of appliance wiring materials at room and elevated temperatures.
- Power Cable Qualification: supports insulation resistance and dielectric testing of low-voltage and medium-voltage power cable samples per IEC 60502 and IEC 60227 requirements.
- Automotive Wire Testing: verifies the insulation integrity of automotive primary wire and harness assemblies that must withstand moisture exposure during vehicle service life.
- Telecommunications Cable Testing: provides temperature-controlled immersion for measuring insulation resistance of communication cable and fiber optic cable compounds per IEC 60811-302.
- R&D and Material Development: allows researchers to evaluate new insulation compounds, polymer blends, and coating formulations under controlled water immersion and temperature conditions.
- Third-Party Testing Laboratories: equips independent test labs with a standardized water immersion setup for certification and compliance testing across multiple wire and cable product categories.

TORONTECH
ToronFT™ WB
Constant Temperature Water Bath

Standards

The ToronFT™ WB supports the water immersion conditions required by the following international wire and cable testing standards.

- UL 758 - Standard for Safety: Appliance Wiring Material (Sections 35, 36: Insulation Resistance Test in Water)
- UL 83 - Standard for Safety: Thermoplastic-Insulated Wires and Cables
- IEC 60811-302 - Electric and Optical Fibre Cables: Test Methods for Non-Metallic Materials: Electrical Tests: Measurement of DC Resistivity
- IEC 60811-402 - Electric and Optical Fibre Cables: Test Methods for Non-Metallic Materials: Water Absorption Tests
- IEC 60502-1 - Power Cables with Extruded Insulation and Their Accessories for Rated Voltages from 1 kV up to 30 kV
- IEC 60227 - Polyvinyl Chloride Insulated Cables of Rated Voltages up to and Including 450/750 V
- VDE 0472 - Testing of Insulated Cables and Flexible Cords
- EN 50525 - Electric Cables: Low Voltage Energy Cables of Rated Voltages up to and Including 450/750 V

FEATURES

Constant Temperature Water Bath - ToronFT™ WB Key Features

The ToronFT™ WB combines precise temperature control with durable construction to support repeatable water immersion testing.

- Intelligent PID Temperature Controller: an auto-tuning PID controller maintains the water temperature at the operator’s setpoint with a stability of less than 1.5 °C, meeting the temperature tolerance requirements of UL 758 and IEC test methods.
- Wide Temperature Range (0 to 98 °C): covers room-temperature insulation resistance tests, elevated-temperature long-term soak tests at 50 °C per UL 758 Section 36, and higher-temperature aging studies up to near-boiling.

- High-Precision PT100 Sensor: a platinum resistance temperature detector provides accurate, repeatable temperature measurement with fast response time, feeding reliable data to the PID controller.
- 4,000 W Electric Heater: heats the water quickly to the target temperature, reducing idle time between test batches. Heating power can be scaled for custom tank sizes.
- Stainless Steel Interior: resists corrosion from prolonged water immersion and cleaning agents, maintaining a clean test environment and extending the service life of the tank.
- Electrostatic Baked-Paint Exterior: a durable exterior finish resists scratches, chemical exposure, and humidity in production-floor environments.
- Built-In Timer: allows the operator to program soak durations for repeatable test cycles, supporting both short-term and long-term immersion tests without manual timekeeping.
- Six Standard Tank Sizes: capacities from 27 L to 576 L accommodate specimen lengths ranging from short wire samples to full cable assemblies. Custom dimensions are available for non-standard specimen sizes.
- Safety Protection System: includes power overload protection, short-circuit protection, and control circuit overload protection to safeguard the equipment and operator during extended test runs.
- Relay Control System: a straightforward relay-based control architecture uses proven industrial components for dependable, low-maintenance operation in both laboratory and production settings.

THEORY & METHOD

Theory and Method

Water immersion insulation testing measures the ability of a wire’s insulation layer to resist electrical leakage when the outer surface is in continuous contact with a conductive liquid. The operator submerges a length of insulated wire in the Water Bath and connects one terminal of an insulation resistance tester (or hipot tester) to the wire’s conductor while connecting the other terminal to the water itself. The water acts as a continuous electrode that contacts every point on the insulation surface simultaneously, exposing any pinhole, void, or thin spot in the insulation to the applied test voltage.

For insulation resistance measurements, the tester applies a DC voltage (typically 500 V or 1,000 V) between the conductor and the water and records the resulting leakage current. Dividing the applied voltage by the leakage current yields the insulation resistance, expressed in megohms. A high resistance value confirms that the insulation layer is intact and that current leakage through the polymer is within acceptable limits. For withstand voltage (hipot) testing, the tester ramps an AC or DC voltage to a specified level and holds it for a set duration. If no breakdown or flashover occurs, the insulation passes the test.

Temperature directly influences insulation resistance: higher temperatures increase polymer chain mobility and accelerate ion migration within the insulation, which lowers resistance. Standards such as UL 758 prescribe specific water temperatures (room temperature for the short-term test, 50 °C for the long-term elevated-temperature test) to standardize the test conditions. The PID-controlled heater in the ToronFT™ WB holds the water at the required setpoint throughout the soak period, removing temperature variability as a source of measurement error.

TECHNICAL SPECIFICATIONS

Constant Temperature Water Bath - ToronFT™ WB Technical Specifications

Parameter	Specification
Temperature Control Range	0 to 98 °C
Temperature Stability	< 1.5 °C
Electric Heating Power	4,000 W (customizable per tank size)
Input Voltage	220 V / 50 Hz (110V is also available)
Temperature Sensor	PT100 platinum resistance thermocouple

Parameter	Specification
Temperature Controller	Intelligent PID with auto-tuning
Control System	Relay control
Interior Material	Stainless steel
Exterior Finish	Electrostatic baked paint
Safety Protection	Power overload, short-circuit, control circuit overload

Available Tank Sizes

Model	Inner Dimensions (L × W × H)	Capacity
ToronFT™ WB 27L	30 × 30 × 30 cm	27 L
ToronFT™ WB 60L	50 × 40 × 30 cm	60 L
ToronFT™ WB 100L	50 × 50 × 40 cm	100 L
ToronFT™ WB 190L	65 × 65 × 45 cm	190 L
ToronFT™ WB 216L	60 × 60 × 60 cm	216 L
ToronFT™ WB 576L	120 × 60 × 80 cm	576 L
Custom	Per customer requirement	Custom

Note: Custom tank sizes and heating power configurations are available. Contact Torontech for pricing.

TORONTECH.com

TORONTECH

Torontech Inc.
251 Consumers Road, Suite 1200
Toronto, Ontario, M2J 4R3, Canada

Phone: +1 416 368 2721 | Fax: +1 416 981 7652
Email: info@torontech.com

Torontech, LLC
601 Brickell Key Drive, Suite 700
Miami, FL 33131, USA

Toll-Free: 1-866-383-7919
Email: sales@torontech.com

Torontech ME FZE
Meydan Grandstand, 6th Floor,
Meydan Road, Nad Al Sheba,
Dubai-261440, UAE

Phone: +971 488 19252
Email: me@torontech.com

USA | Canada | EU | UAE | GCC | KSA | India | Africa | Latin America | Asia