TORONTECH

SEPTEMBER, 2026

NEWSLETTER

UNIVERSAL TESTING MACHINES

Frames, Environments, and Strain Measurement from ***0.1 kN to 3,000 kN***

Every material certificate rests on a stress-strain curve, and every stress-strain curve rests on three things: A frame stiff enough that it does not add its own deflection to the reading, a force measurement traceable to **ISO 7500-1**, and a strain measurement that reports what the specimen did rather than what the crosshead did.

Get any one of them wrong and the machine still produces a number however, inaccurate . That is the uncomfortable part of tensile testing: a bad result looks exactly like a good one until someone else repeats it.

Torontech's Universal Testing Machine lineup covers the full span of that problem: servo-hydraulic frames with 600, 1,000, 2,000, and 3,000 kN max. capacity, electromechanical frames from 0.1 kN, horizontal beds with 14 m between fixtures, temperature chambers from -150°C to 1,100°C, and non-contact strain measurement to ISO 9513 Class 0.5. One supplier, one control philosophy, and one set of standards behind every number.

HOW A TENSILE TEST WORKS

METHOD:

Tension Test for Metallic Materials | **ASTM E8/E8M / ISO 6892-1**

The frame only operates during Steps 2 and 3. Step 4 uses a load cell and extensometer, with measurements recorded by software, while Step 1 is for specimen preparation. A frame accurate to ISO 7500-1 Class 0.5 can still produce a poor modulus result if the strain measurement is poor.

① **Machine Specimen**
Cut to a standard geometry; measure the original cross-section.

② **Set Gauge Length**
Mark Lo and fit the extensometer over that length.

③ **Apply Load**
Pull at a controlled rate; the closed loop holds it.

④ **Record Curve**
Force and extension logged continuously to fracture.

⑤ **Derive Properties**
Yield, tensile strength, modulus, elongation.

Key Point:
The frame only performs Step 3. Steps 2 and 4 belong to the extensometer, and Step 1 belongs to specimen preparation. A frame accurate to ISO 7500-1 Class 0.5 paired with a poor strain measurement still produces a poor modulus.

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

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METHOD:

Tension Test for Plastics, Films, and Textiles | **ASTM D638 / ISO 527 · ASTM D882 for film**

A conditioned specimen of known cross-section is pulled at a rate fixed by the standard while force and extension are recorded. Stress and strain come out the same way they do for metals. What does not carry over is that the rate, the temperature, and the conditioning are part of the result rather than the background conditions.

① **Condition Specimen**
23 °C and 50 % RH for 40 h to ASTM D618.

② **Machine Specimen**
Cut the dumbbell or strip; measure the real cross-section.

③ **Set Rate and Gauge**
Fit the extensometer; take the speed from the standard.

④ **Record Curve**
Force and extension logged continuously to break.

⑤ **Derive Properties**
Modulus, yield, tensile strength, elongation.

Key Point:
The frame only performs Step 4. Polymers are viscoelastic, so pulling faster reads stronger and stiffer from the same material — which makes Steps 1 and 3 the ones that decide whether the result is reproducible. A strength quoted without its test speed and conditioning is a reading, not a material property.

Did You Know?

ASTM E8 and ISO 6892-1 **do not measure elongation the same way.** ISO 6892-1 uses a proportional gauge length, Lo = 5.65 times the square root of the original cross-sectional area, which scales the gauge length to the specimen.

ASTM E8 more commonly fixes it, typically at 2 inches or 50 mm. Because elongation after fracture concentrates in the necked region, a shorter gauge length reports a higher percentage from the same broken bar. **So an elongation figure quoted without its gauge length is not a material property, it is a number.**

This is why certificates carry the standard and the gauge length together, and why A and A50mm are written as different symbols.

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Miami, FL 33131, USA
Toll-Free: 1-866-383-7919
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Torontech ME FZE
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PRODUCT HIGHLIGHT

Servo-Hydraulic Frames

Servo-hydraulic frames at 600, 1,000, 2,000, and 3,000 kN for high-capacity tension, compression, bend, and shear testing of metals, rebar, fasteners, and structural components. Every frame runs on a fully-digital closed loop control with FPGA signal processing; so force, displacement, and strain are processed simultaneously rather than read sequentially.

TT-MSH Series | Servo Hydraulic

Four-column servo-hydraulic frames at 600, 1,000, 2,000, and 3,000 kN with dual test spaces, so tension and compression swap without removing heavy fixtures.

Features/Advantages:

- **Dual Test Space:** Separate upper and lower spaces mean a change of test type is a change of station, not an afternoon of fixture handling.
- **Spherical Bearing Self-Alignment:** The load path self-aligns, which is what keeps bending stress out of a nominally axial tensile result.
- **±0.5% of Reading, ISO 7500-1 and ASTM E4:** Force accuracy held to 1/50 of load cell capacity; strain to ±0.5% with ASTM E83 Class B or ISO 9513 Class 0.5 extensometers.

TTM-3000 | 3,000 kN Hydraulic

High-capacity frame with the hydraulic cylinder in the lower section, for tensile, compression, bending, and shear testing to ASTM E8.

Features/Advantages:

- **3,000 kN Capacity, ±1% Accuracy:** Force measuring range of 60 to 3,000 kN with 950 mm maximum tensile test space and 880 mm between columns.
- **Full-digital Closed Loop, FPGA Signal Processing:** Constant stress, strain, displacement, and force-hold from one measurement system, with every channel processed in parallel so the loop corrects without lag.
- **German VOITH Servo Valve, European Pump:** The servo valve and high-pressure pump are specified parts rather than generic hydraulics.

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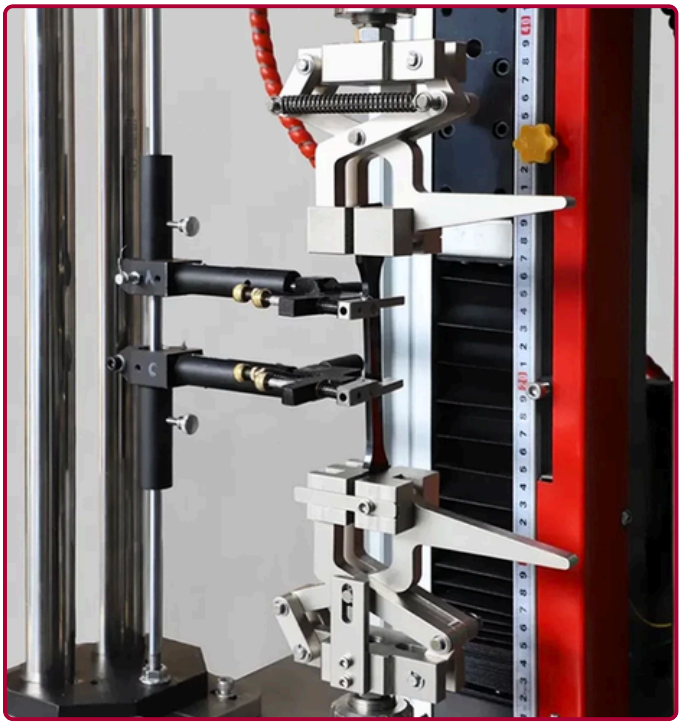
Electromechanical Frames

Servo motor and ball screw frames for precise, clean, low-to-mid force testing of plastics, films, textiles, components, and metals.



TTM-Series Electromechanical

Benchtop to floor-standing electromechanical frames from 10 kN to 600 kN on one control platform.

Features/Advantages:

- **0.5 Accuracy Class to ASTM E4 and ISO 7500-1:** Force indication within ±0.5% of reading across a measuring range of 0.4% to 100% of full scale.
- **Grade Held Across The Whole Range:** Test force resolution of 1/300,000 of maximum force, with accuracy class unchanged from the bottom of the range to the top.
- **Interchangeable Load Cells:** One frame spans film testing to metal testing without giving up resolution at the low end.

Tensi-10 Single Column

Single-column frame to 10 kN in four heights, for tension, compression, flexure, shear, tear, and peel on light materials.

Features/Advantages:

- **German DOLI Controller as Standard:** Closed-loop control of force, displacement, or deformation rather than open-loop crosshead motion.
- **±0.5% from 0.04% of Capacity:** The accuracy floor sits low enough to make a 10 kN cell usable on low-force film and suture work.
- **Speed Range 0.0005 to 2,000 mm/min:** Covers slow creep-rate loading and high-speed peel on the same frame, with 0.0001 mm stroke resolution.

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Horizontal Test Beds

Horizontal frames for wire, rope, chain, shackles, and overhead conductors, where the specimen is measured in meters rather than millimeters.

TT-HTTM-1000 1,000 kN Test Bed

Servo-hydraulic horizontal test bed with 6 m between fixtures, built for rope, shackle, and conductor break testing.

Features/Advantages:

- **1,000 kN Over A 6m Test Length:** A 9 m bed weighing 15,000 kg gives the reaction mass that a full-scale rope break demands.
- **Calibration without A Second Press:** A reverse loading structure lets the load cell be calibrated in compression on the machine itself.
- **Dual-side Displacement Sensors:** Optional sensors on both sides cancel the bias from misalignment or side loading before it reaches the strain result.

TT-HTTM Series Conductors & Cables

Servo-driven horizontal frames from 100 kN to 500 kN, in creep and tensile configurations for overhead conductors.

Features/Advantages:

- **Up to 14m Between Fixtures:** The 100 kN creep model runs three test stations at 14 m; the tensile models run a single station at 10 m.
- **ISO 7500-1 Class 0.5 on the Creep Model:** The long-duration configuration carries the tighter accuracy class, with load resolution of 500,000 steps and no range switching.
- **Creep Testing Built as A System:** Climate chamber holding 10 to 35°C at 2°C per hour, UPS with 10 minutes of hold-up, and a diesel generating set behind it.

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Test Environment and Strain Measurement

The frame applies the load, but temperature and strain measurement decide whether the number reflects service conditions and the specimen itself.

ToronTTC / ToronTF Chambers & Furnaces

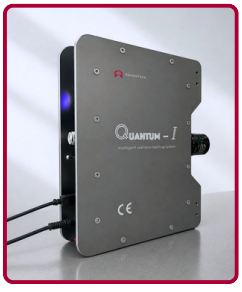
Five tensile test chambers and two split-type furnaces that integrate with the load frame to test at service temperature.

Features/Advantages:

- **-150°C to +300°C Across Five Chambers:** From ambient to 300°C for standard hot tensile work up to liquid-nitrogen cooling for cryogenic testing.
- **Furnaces to 1,100°C:** ToronTF-900 covers 300 to 900°C for tensile and creep; ToronTF-1100 reaches 1,100°C for metallurgical work.
- **Barrel-type Split Structure:** The furnace opens around the specimen, so loading does not mean threading a sample through a fixed tube.

Quantum Series Video Extensometer

Non-contact strain measurement using digital image correlation, for tests where a clip-on extensometer cannot survive or cannot be trusted.



Features/Advantages:

- **ISO 9513 Class 0.5:** Quantum-1 holds Class 0.5 to 650 mm field of view, Quantum-2 to 180 mm with resolution better than 0.2 µm.
- **Axial and Lateral Strain at Once:** One sensor returns both, which is what a plastic strain ratio or area reduction measurement needs.
- **Nothing Attached to The Specimen:** No slippage, no alignment error, and no operator reaching into a frame at 900°C or near a specimen about to break.

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WHICH TESTING MACHINE MATCHES YOUR SPECIMEN?

BEST FOR	RECOMMENDED MODEL	WHY THIS IS THE BEST FIT?
Rebar, structural steel, and heavy fasteners at maximum capacity.	TTM-3000	3,000 kN with full-digital electro-hydraulic servo control and a 950 mm tensile space; the top of the range for certification of heavy sections.
High-capacity labs alternating between tension and compression all day.	TT-MSH Series	600 to 3,000 kN with dual test spaces plus spherical bearing self-alignment; the test type changes without needing to change fixtures after each type of test.
Plastics, films, and metals in a routine QC lab.	TTM-Series	0.5 accuracy class to ASTM E4 and ISO 7500-1 with interchangeable load cells from 10 kN to 600 kN on one platform.
Low-force work: films, sutures, adhesives, peel and tear.	Tensi-10	German DOLI closed-loop control with ±0.5% from 0.04% of capacity, and speeds from 0.0005 to 2,000 mm/min.
Rope, shackle, and conductor break tests at full scale.	TT-HTTM-1000	1,000 kN across a 6 m test length on a 15,000 kg bed, with on-machine load cell calibration in compression.
Long-duration creep on overhead conductors.	TT-HTTM Series	Three stations at 14 m, ISO 7500-1 Class 0.5, with climate chamber, UPS, and generator backing a test that cannot be restarted.
Testing at service temperature rather than room temperature.	ToronTTC / ToronTF	Chambers from -150°C to +300°C and split furnaces to 1,100°C, designed to integrate with the load frame.
Strain measurement where a clip-on gauge cannot go.	Quantum Series	ISO 9513 Class 0.5 non-contact DIC with simultaneous axial and lateral strain, and re-analyzable image data.

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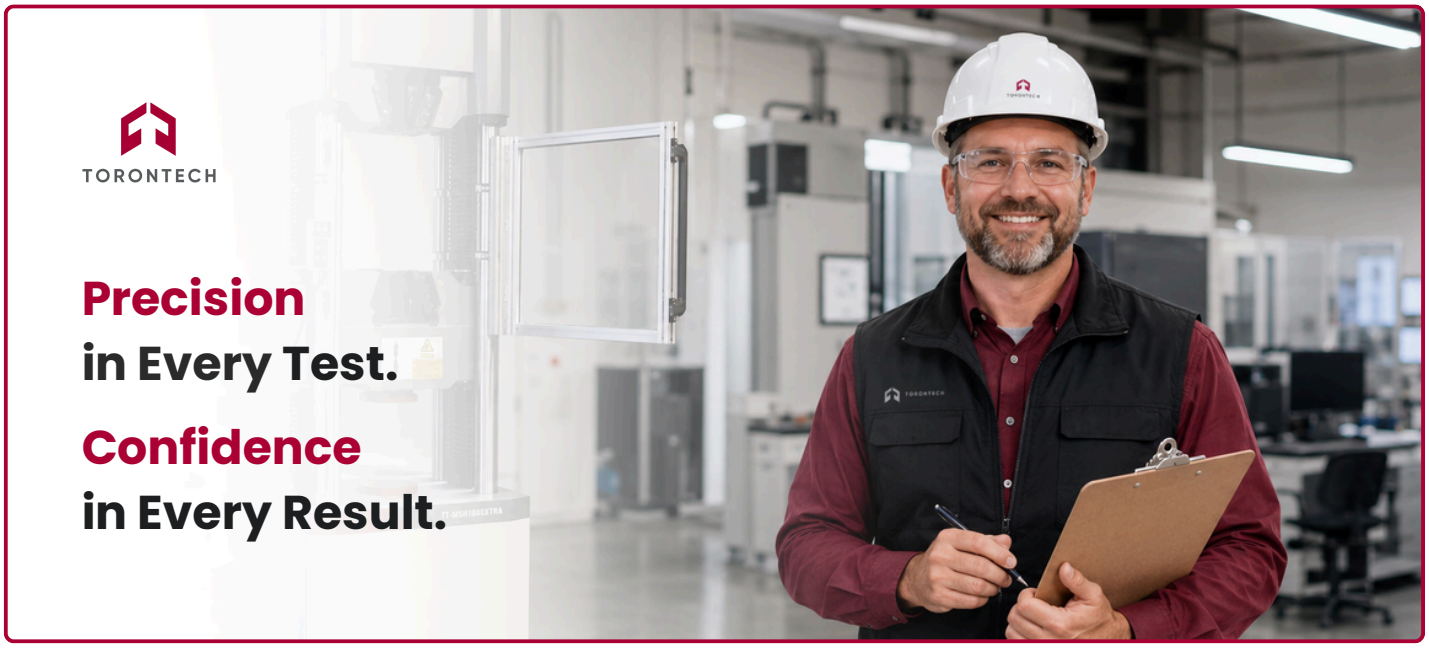
Why Choose Torontech for Universal Testing

- **One Supplier from 0.1 kN to 3,000 kN:** A single-column film tester and a 3,000 kN rebar frame come from the same lineup, so a lab that grows does not end up running two vendors, two software packages, and two service contracts.
- **The Test Environment is Part of The Range:** From touchscreen models to column-lift platforms with integrated weighing and imaging, each configuration targets caregiver efficiency, patient safety, and modern critical care workflows.
- **Traceable to The Standards Your Report Cites:** Force to ISO 7500-1 and ASTM E4, strain to ISO 9513 and ASTM E83, methods to ASTM E8 and ISO 6892. The accuracy class is stated with its verified range, not as a headline.
- **Built Around The Specimen You Actually Have:** Horizontal beds customizable in length to 14 m, interchangeable grips for changing specimen shapes, and on-machine load cell calibration that keeps verification in house.



Build a Testing Program Around the Number You Have to Defend

From a benchtop frame checking incoming film to a 15,000 kg bed breaking overhead conductors, the Torontech Universal Testing Machine range is built so the frame, the environment, and the strain measurement all hold to the same standard.

Explore the full lineup: https://www.torontech.com/category/universal-testing-machines-tensile-tester/

For guidance on selecting the right frame, capacity, grips, and strain measurement for your standard: sales@torontech.com

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