Thermetrics *(Seattle, WA)* designs and manufactures precision biophysical instruments for evaluating the thermal properties, thermal protection, and thermal comfort of textiles, garments, athletic and protective apparel, seats, beds, and dynamic thermal environments such as aircraft, truck, and automobile interiors. Our company’s growth into the textile testing industry began in 1988 with delivery of a Thermal Hand manikin system to the US Army, which was (and still is) used to evaluate gloves and protective handwear for soldiers. Fast forward to today, and our thermal manikin, guarded hotplate, and flame test systems can now be found at testing/certification agencies, commercial/government test labs, and textile research centers world-wide.

When temperatures turn up or down, industry turns to Thermetrics for thermal comfort testing solutions that deliver advanced performance, innovative design, leading-edge features, and lifetime technical support.

**THERMAL COMFORT**

How can you be sure that a human would be comfortable in the tested garment? Newton knows! Newton thermal manikins running ManikinPC (Manikin Physiology Control and Predictive Comfort) software add new thermoregulation capabilities and create a closed-loop feedback control package that allows Newton to accurately mimic the human thermoregulatory system and provide metrics for thermal comfort and sensation. The ManikinPC control system also permits variable activity levels that simulate the human metabolism while sleeping, resting, working, or exercising. In fact, any level of activity can be input and appropriate metabolic wattages will be imposed onto the manikin, allowing it to respond in real-time with an appropriate thermal response.

- **“Newton” Advanced Thermal Manikin w/Manikin PC**
  
  ManikinPC (Manikin Physiology Control and Predictive Comfort) software is a closed-loop feedback control system that accurately simulates the human thermoregulatory system and adds real-time thermoregulation to any Newton thermal manikin. Ensure consistent and repeatable results, with excellent human subject correlation, by using ManikinPC’s 9-point thermal sensation and thermal comfort scales to evaluate both garments and environmental control systems.

- **HVAC Automotive Manikin**
  
  Complete turn-key system for measuring the effect of vehicle heating and air conditioning designs on passenger comfort. The manikin is easily posed and features an external sensor matrix that includes air velocity, temperature, radiant heat flux, and relative humidity. Sensor data can feed into the ManikinPC Physiological Model to generate metrics for thermal sensation and thermal comfort.

- **STAN Seat Test Manikin**
  
  A 50th percentile “back and buttocks” manikin developed to evaluate the thermal comfort and moisture management properties of automobile seating. STAN is an adaptation of the SAE J826 HPMII body form, for superior compatibility with existing automotive seat positioning methods. 6-zone format with a backside cooling function measures the energy transfer from a heated seat. Sweating Skin option available.
Quickly and accurately evaluate the thermal properties and moisture management characteristics of textiles and garments in accordance with relevant ASTM, ISO, EN, and NFPA standards. Thermetrics' thermal manikin and guarded hotplate (skin model) systems are used to calculate Thermal Resistance (Rct, in SI or Clo units), Evaporative Resistance (Ret), Permeability Index (Im), Vapor Pressure, Area Weighted Averages, Equivalent Temperature (Teq), Cooling Rate, and more. Exclusive ThermDAC control software handles the complex job of data collection and analysis. Do you have a research need that is not addressed by one of our standard instrument packages? If so, feel free to contact us for a custom system designed to fit your requirements.

- **“Newton” Advanced Thermal Manikin**
  The complete thermal comfort solution for garment and environmental testing. 20, 26, or 34-zone formats, fully articulated carbon-epoxy body form, with Sweating Skin, Walking Motion, Breathing, Physiological Model, and Female conversion options available.

- **“Nemo” Submersible Thermal Manikin**
  Used for immersion tests of protective clothing and marine survival gear. 22-zone format. True weight aluminum shell construction for proper flotation characteristics. Fully articulated, sealed, and waterproof to 3 meters. Sweating Skin option available.

- **“Simon” Sleeping Bag Thermal Manikin**
  Lower cost, turn-key system used for sleeping bag and general garment/environmental testing. 13-zone format. Carbon-epoxy construction, body form jointed at the shoulders and hips only.

- **“Timmy” Child Thermal Manikin**
  Fully articulated, 10-year old child body form used for thermal comfort testing of children’s apparel. 15-zone format. Carbon-epoxy construction, Sweating Skin and Walking Motion options available.

- **Thermal Hand • Thermal Foot • Thermal Head Manikins**
  Special-purpose thermal manikins used for measuring the thermal properties and insulative performance of hand, foot, or headwear. Each of these carbon-epoxy manikin systems is available as dry or sweating models. 8 or 14-zone formats (Hand), 12-zone “hi-top” format (Foot), 6 or 8-zone formats (Head).

- **Sweating Guarded Hotplate (Skin Model)**
  Used by textile testing organizations worldwide to produce accurate measurements of the thermal resistance (Rct) and vapor permeability (Ret) of textile samples in accordance with ISO 11092, ASTM F1868, ASTM D1518, and NFPA 1971. Two SGHP sizes are available. Each can be ordered as an integrated system (with climate chamber) or as a stand-alone system (hotplate only).

- **Dry Guarded Hotplate**
  GHP systems fully comply with the ASTM D1518 test standard. Option 1 is met using the standard fabric mesh hood, Option 2 is met using the optional airflow plenum hood. Two GHP sizes are available.

- **Dynamic Hotplate**
  New and innovative guarded hotplate with digital sweat control and backside cooling, to allow for use in higher ambient temperature conditions and under sustained thermal loads — such as tests with a heated blanket or solar exposure. Data generated includes measurement of heat flow both into and out of the hotplate surface (Positive Heat Flux and Negative Heat Flux).

- **ST-2XL Comfort Test System**
  Place the ST-2XL on seat/bed surfaces to quickly evaluate the thermal properties and moisture transfer characteristics of cushioning materials. Weights can be added to simulate normal compression levels.
Going where no human should have to go, Thermetrics’ thermal protection product line evaluates a fabric’s capacity to resist the transmission of heat to the wearer. This is accomplished by measuring the time elapsed for convective and/or radiant heat to penetrate through a test fabric. Thermetrics provides complete flame and radiant test systems for characterizing the protective performance of FR fabrics, garments, and protective clothing ensembles. All systems include ThermDAC Burn Model software to automatically receive and log sensor data, calculate the incident heat flux, predict the burn injury level at each sensor, and estimate the total predicted burn injury area as a result of the thermal exposure.

• “Burnie” Flame Manikin
Characterize the performance of garments or protective clothing ensembles in a simulated flash fire environment as per ASTM F1930 and ISO 13506. The Burnie manikin features a fireproof ceramic composite shell (dimensions as per ASTM D6240) and precision copper calorimeter sensors. Complete system includes articulated manikin body form, control electronics, modular burn chamber with 12-torch array, and PC laptop with ThermDAC burn prediction software.

• Flame Hand Manikins
The flame hand manikins also feature a fireproof ceramic composite shell containing 9 copper calorimeter sensors. Complete system includes hand form (fingers can be permanently attached or removable) with moveable thumb to simplify the installation and removal of test gloves. PC laptop with ThermDAC burn prediction software is included. A compact test chamber with 4-torch array is also available.

• TPP (HTP) Test Device
The TPP (Thermal Protective Performance) rating, also known as HTP (Heat Transfer Performance), measures the rate at which convective and radiant heat penetrates a composite fabric and predicts the burn potential to human skin. Complies with ISO 17492, ASTM D4108, ASTM F2700 / F2703, and NFPA 1971 / 2112.

• RPP Test Device
The RPP (Radiant Protective Performance) test device utilizes a bank of 5 quartz tubes to measure the burn potential due to radiant heat exposure as per ASTM F1939 and ASTM F2702. With optional ISO accessory the RPP device can approximate ISO 6942 tests – but will not specifically meet the ISO 6942 standard.

• Stored Energy Test Device
The Stored Energy Test (SET) device provides a standardized procedure and controlled radiant heat conditions to generate repeatable measurements of heat storage and transfer in protective fabric materials, as per ASTM F2731. ThermDAC burn model software is included.

• CCHR Test Device
The CCHR (Conductive and Compressive Heat Resistance) test device evaluates the potential for skin burns that may be associated with a fabric’s conductive properties under compression, as per the ASTM F1060-08 and NFPA 1971 standards. ThermDAC burn model software is included.

Will I be comfortable? Stay protected? Meet the standards?
Thanks to innovative test equipment and software from Thermetrics, you’ll know.
For complete specifications, please visit www.thermetrics.com.