



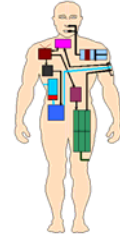
Sweating manikin skin systems



While we're on the topic of sweating...



Specialized manikins for any project.



Our latest installations, and more.

Measurement Technology NeWs

Newsletter published by Measurement Technology NW

Spring/Summer 2005

Measurement Technology NW (Seattle, Washington) has perfected a manikin sweating skin system based on a matrix of fluid ports that work in combination with a removable wicking fabric skin layer to accurately distribute water over the manikin surface. Available for "Newton" manikins and for many older manikins via retrofitting, the system is fully compatible with ASTM's new sweating manikin standard.

The system's computerized fluid supply begins with a single constant pressure pump and reservoir located external to the manikin. This supply is connected to the manikin's internal fluid distribution tubing network. At each zone, dedicated microprocessors modulate the fluid volume and divide the metered flow between fluid ports on the surface of manikin.

The fabric skin layer consists of a tightly fitting elastic suit, including hands, feet, and hood. The durable hi-tech fabric we use has outstanding wicking properties, and will provide years of reliable, repeatable performance. Zipper-closures allow the suit to be taken on and off for replacement or cleaning, or when only dry testing is necessary.

Using MTNW's exclusive ThermDAC software interface, each manikin zone can be controlled to a specific fluid flowrate. These flowrates can be adjusted at any time during the course of the test to optimize the wettedness of the fabric skin. Based on the real-time Ret measurements calculated by ThermDAC, the volumetric flowrate for 100% saturation can be estimated and used as the steady-state fluid setpoint.

MTNW offers two sweating skin systems... a removeable fabric sweating skin or an integrated porous metal sweating skin.

For special applications requiring higher resolution and optimal sweat distribution - such as the evaluation of automotive climate control systems - our "ADAM" manikins feature an integrated porous metal sweating skin surface that can simulate sweating levels from at-rest evaporative cooling rates (dry skin surface) to 100% saturation.



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Measurement Technology NW manufactures a wide range of precision instruments for measuring and evaluating the thermal comfort of textiles, garments, and dynamic thermal environments such as aircraft, truck, and automobile interiors. Our complete line of thermal manikins and guarded hotplate systems are designed to support current industry test standards for thermal insulation and moisture permeability.

Sweating or Dry, hotplates from MTNW get the job done right.

MTNW's sweating guarded hotplate, a design frequently referred to as the "skin model", gives textile testing organizations the ability to produce accurate, repeatable measurements of the thermal resistance (Rct) and vapor permeability (Ret) of textile samples.

Our proven SGHP system was designed in accordance with ISO 11092, ASTM F1868, EN31092, and NFPA 1971. Its sweating capability is achieved through a unique porous wicking assembly on the surface of the test plate and its outer guard ring, and its compact design includes hotplate, gravity-fed fluid supply system, ambient temperature and humidity probes, and variable speed airflow hood. The adjustable hood easily accommodates a variety of sample thicknesses, and MTNW's exclusive ThermDAC control and data logging software includes several hotplate-related features.

For tests measuring only the thermal resistance (R-value) of fabrics in accordance with ASTM D1518 and ISO 11092 (dry portion), MTNW's dry guarded hotplate system is a highly cost effective test instrument. A copper test plate and guards



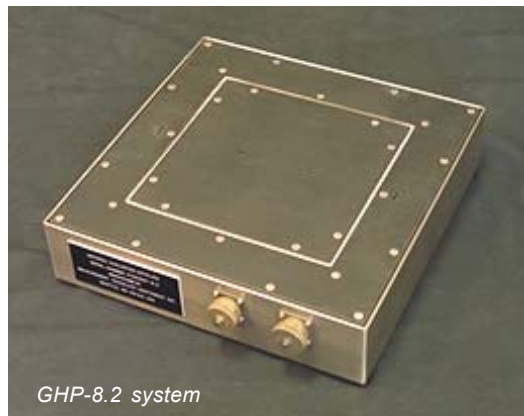
environmental chamber (an optional stainless steel hood with ambient RH sensor for dry ISO 11092 testing is also available), and power conditioning control hardware. All hotplate systems include a Dell computer preloaded with Windows operating system, MTNW's ThermDAC hotplate control software, and Microsoft Office.

ThermDAC was developed specifically for manikin and hotplate systems. It is a Windows-based application providing full thermal control, fault detection, and data logging capabilities. For hotplate systems, user-defined tests allow operators to set non-standard test conditions and custom tolerance criteria. Red and green lights on the screen indicate steady state and in-tolerance conditions. Multiple graph displays with zooming let the operator view device or ambient conditions in detail, and ThermDAC's automated functions make testing as easy as clicking "start" and walking away.

Measurement Technology NW's sweating and dry hotplate systems come in two sizes: an 8.0" (20.3 cm) square plate with 2.0" (5 cm) guard, or a 10.0" (25.4 cm) square plate with 5.0" (12.7 cm) guard. The smaller 8.2 size is popular with European and Asian labs testing to ISO and ENV standards - which do not specify a particular sample size. The larger 10.5 size is preferred by North American users who test to ASTM standards - and are accustomed to the 20"x20" sample size.

with stable resistance wire heating generate uniform heat flux, and accurate measurements of temperature and plate heat flux are then used to calculate steady state thermal resistance for textile samples, insulation, batting, and other similar insulative materials.

The affordable GHP system includes hotplate with lateral and lower thermal guards, ambient temperature sensors, a fabric diffusion hood for creating uniform ambient conditions without an



Over the last 10 years we've installed an impressive number of sweating and dry hotplate systems around the world. Many of these systems are in constant "24/7" use, yet problems are few and far between! For a list of references or for more detailed specifications and pricing, please contact MTNW.

Recent thermal installations and other good news.

It's been a busy period here at Measurement Technology NW. We have shipped off a 26-zone sweating/walking "Newton" manikin system to the **National Institute of Industrial Health** in Japan, where the manikin will be used to evaluate the thermal and moisture management characteristics of protective clothing systems. This manikin featured our 50th percentile Asian male body form and a few other operational modifications required for our first Japanese installation.

Another 26-zone sweating/walking "Newton" manikin system - this time utilizing our 50th percentile Western male body form - was shipped to the Department of Design and Human Environment at **Oregon State University**. Plans call for this manikin to be used in general thermal comfort tests and recreational garment/ensemble evaluation.

Projects involving custom test equipment and software are a frequent (and much anticipated) occurrence at Measurement Technology NW. If you have a testing need which is not accurately addressed by one of our standard thermal packages, call us! We'll be happy to take on the challenge.

Our friends at **USARIEM** continue to update their older manikin systems, and we have recently completed a retrofit of their trusty thermal foot and hand systems. These high resolution instruments allow the Army to test and evaluate the thermal properties of shoes, boots, and gloves before they're approved for use by our country's soldiers. And only USARIEM researchers would have a spare copper manikin head laying around - which we used to create a new 6-zone sweating head manikin for testing the thermal comfort of helmets and other headgear (see photo on page 4).

Downunder, **The Specialty Group** in Australia has received a new SGHP-8.2 guarded sweating hotplate and steady-state environmental chamber, while Spain's **CTAG** purchased a customized ST-2 seat tester manikin for comparing and evaluating the thermal properties of automotive seating.

MTNW thanks all of our customers for their support. Our diverse line of thermal manikins and guarded hotplate systems would not be what it is today if it weren't for you.

ICEE 2005

The 11th International Conference on Environmental Ergonomics was held at the Ystad Saltsjöbad Hotel in Sweden, May 22-26, 2005, and MTNW would like to extend a big "thank you" to the conference organizers from Lund Technical University in Lund, Sweden, and to all the conference attendees who came by our table to learn more about the thermal testing equipment we manufacture. We had the opportunity to spend quality time with a diverse set of researchers from leading organizations around the world, and we're already looking forward to the next ICEE conference, which will be organized by the Jozef Stefan Institute in Ljubljana, Slovenia in 2007.



ASTM F23.60 Subcommittee (Human Factors)

Measurement Technology NW participated in a recent ASTM subcommittee review of thermal manikin standards:

- 1) *Standard Test Method for Measuring the Thermal Insulation of Clothing Using a Heated Manikin (F1291)*
- 2) *Standard Test Method for Measuring the Evaporative Resistance of Clothing Using a Sweating Manikin (F2370)*
- 3) *Standard Test Method for Measuring the Heat Removal Rate of Personal Cooling Systems Using a Sweating Manikin (F2371-05)*

Because thermal resistance values and the resistance to evaporative heat loss provided by clothing can be used to determine the comfort or stress of people in different environments, these standards will help define how the type, style, and fit of clothing affects heat and moisture exchange rates between the human body and the environment.

The continuing development of Personal Cooling System (PCS) garments has revealed the need for an objective new performance testing standard. MTNW's sweating manikin systems already have a feature that automatically calculates heat removal rates compared to a reference test.

www.mtnw-usa.com

Measurement Technology NW has established relationships with top thermal instrumentation companies around the world. These representatives help us provide ongoing consultation, project coordination, installation assistance and service support.

In South Korea: Technox, Inc., (Mr. Her, Young-Chul), E-mail: tni@technox.co.kr
In Taiwan: Tien Shiang Scientific Instruments Company LTD, (Mr. C. S. Yao), E-mail: tinshing@ms16.hinet.net
In Turkey: Kontrol LTD, (Mr. Serhan Tozar), E-mail: kontroltest@ttnet.net.tr

When specialized testing needs call for specialized manikins, MTNW can help. (We've seen it all)

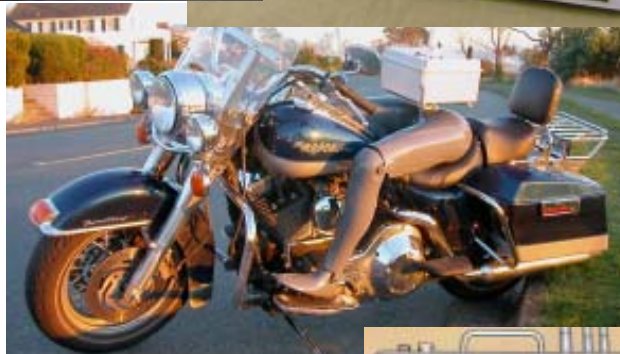
While it looks somewhat macabre to visitors at our Seattle facility, specialized "body part" manikins play an important role in the thermal comfort evaluation of headgear, gloves, shoes and boots, vests, and all the other articles of clothing we humans use to keep ourselves warm and comfortable.

We've had the honor of building many specialized manikins over the years, including hands, feet, head, and torso models. We've built a pair of legs for a major American motorcycle manufacturer, outfitted our ST-2 manikin with a second sweating insert in order to replicate buttocks, and added breathing systems, flame resistant skin, and many other enhancements to our manikins in response to unique customer testing needs.

Our exclusive ThermDAC software has also seen some new features added for specific testing requirements, such as real-time calculation of evaporative resistance (R_{et}) and permeability index (i_m). By request, ThermDAC now includes the capability to read-back data files and use the software's graphs and statistical analysis tools to review prior tests.

As mentioned on page 3, the evaluation of Personal Cooling Systems (PCS) is now possible through an operating mode called Heat Difference. In this mode, manikin performance is compared to a reference test. Measuring the power difference between the two tests determines the effective cooling capacity of the equipment under evaluation.

As thermal testing becomes both more common and more comprehensive, MTNW is pleased to have played a small role in its maturation. The last 17 years haven't always been easy, but they have been fun. Sure, we still get puzzled looks from people when we talk about the things we make and do, and our spouses often wonder what we might really be up to, but building the very best thermal testing equipment has been - and will continue to be - our contribution to the cause.



MTNW is actively involved in the advancement of international research and test standards for the evaluation and prediction of human comfort in clothing, textile assessment, and environmental ambiance. Trust Measurement Technology NW to bring the latest technology and methodology to your application.

Measurement Technology NW

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