SWEATOR

INSIDE CLIMATE

SIMULATION OF THE THERMOREGULATION AT THE HUMAN-TEXTILE INTERFACE

An optimal balance between heat and humidity is a crucial aspect for comfort around humans. Comfort is a question of perceived heat. A concept which is captured within a microclimate.

At a human-textile interface, this microclimate is a result of the human thermoregulation interacting with the ambient climate. Under standardized conditions it carries a comfort blueprint which allows to differentiate finished textile solutions.

SWEATOR simulates the human thermoregulation process by emitting controlled heat and water vapour. The device has been designed in various shapes to best fit and test the thermo-physiological attributes of a wide range of finished products and textile patterns. Standard conditions enable the microclimate formation at the *SWEATOR*-textile interface to be a direct consequence of test product performance. *SWEATOR* offers a professional and quantitatively reproducible way to obtain comfort relevant key indicators of finished textiles.

Please contact us in case of further questions.
Prices and delivery times on request.

PRODUCT FEATURES

- Easy handling
- Professional build up of thermo-dynamic key data
- Controlled heat dissipation – water based
- Highly reproducible “transpiration” process
- Touch screen control unit with wall holder
- Compatible to *SWEATLOG* technology
- Proven device in several industry segments

FIELDS OF APPLICATION

- Thermo-physiological testing of finished products
- Sleep systems, lying systems
- Apparel, workwear, fashion
- Footwear, compression wear
- Head protection
- Textile patterns

TEST PRINCIPLE

SWEATOR is a gravimetric method to gain microclimate and thermo-dynamic key data of finished textile products or samples. *SWEATOR* simulates the human thermoregulation at rest. Controlled heat is provided through a body of water and controlled sweat through diffusion processes. Under the standardized conditions the microclimate at the *SWEATOR* textile interface can be directly linked to textile performance attributes and comfort trends.

SWEATOR TORSO

INSIDE CLIMATE

SWEATOR TORSO has been designed to simulate human heat dissipation and sweat emission within sleep and lying systems as well as apparel (stand-up version). It offers two independent heat and sweat zones to either simulate the front or back of a human torso or both sides parallel.

***TORSO L* lying / *TORSO Apparel* standing-up with test object / SCU control unit**

TECHNICAL DATA

Shapes:	*TORSO S:*	*SWEATOR TORSO* with one heat and sweat zone, second side blinded, with SCU control unit and a set of 4 standard sensors for T/RH measurements.
	TORSO L:	Like *TORSO S* with two heat and sweat zones.
	TORSO Apparel	Like L as stand-up version with filling level cylinders and shoulder piece (non-permeable).
Data output:	T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m^2), R (m^2K/W; m^2Pa/W), and MVTR ($g/m^2/h$) under standardized conditions.	
Data storage and evaluation:	Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.	
T/RH tracking:	4 *SWEATLOG BodyView* sensors included. Additional sensors or sensor arrays on request (*SWEATLOG*).	

SPECIAL FIELDS OF APPLICATION

- Sleep system testing – mattresses, toppers, duvets
- Complex medical bed products with active or passive heat-humidity features.
- Apparel testing with stand-up apparel kit
- Compatible to *SWEATLOG* measurement devices (see *SWEATLOG* factsheet).
- *SWEATLOG SleepView* supported measurements allow the visualisation of various microclimate layers.

SWEATOR HEAD

INSIDE CLIMATE

SWEATOR HEAD has been designed to simulate the human heat dissipation and sweat emission into finished head protection devices.
A standard head form with perforation may carry virtually any helmet, hat, cap, bump cap, baclava, and more.

SWEATOR HEAD with and without test object / **SCU control unit**

TECHNICAL DATA

Shapes:	*SWEATOR HEAD* DIN EN 960:2006, size 585 shaped head with perforation.
Data output:	T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m²), R (m²K/W; m²Pa/W), and MVTR (g/m²/h) under standardized conditions.
Data storage and evaluation:	Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.
Data visualisation:	In combination with *SWEATLOG HeadView* the microclimate between *HEAD* and test product can be visualized with the provided software.
T/RH tracking:	4 *SWEATLOG BodyView* sensors included. Additional sensors or sensor arrays on request (e.g. *HeadView*).

SPECIAL FIELDS OF APPLICATION

- Head protection devices of all kinds.
- Workwear, fashion, military, air force

SWEATOR FOOT

INSIDE CLIMATE

SWEATOR FOOT has been designed to simulate the human heat dissipation and sweat emission into finished footwear. A standardized foot form (EU 42) with perforation and flexible toe section fits virtually any shoe, boot, sock, or compression wear.

SWEATOR FOOT with and without test object **/ SCU control unit**

TECHNICAL DATA

Shapes:	*SWEATOR FOOT*	Foot, standardized, size EU 42, removable toe section
Data output:		T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m^2), R (m^2K/W; m^2Pa/W), and MVTR ($g/m^2/h$) under standardized conditions.
Data storage and evaluation:		Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.
T/RH tracking:		4 *SWEATLOG BodyView* sensors included.

SPECIAL FIELDS OF APPLICATION

- Microclimate tracking in footwear of all kinds.

SWEATOR SKIN

INSIDE CLIMATE

SWEATOR SKIN has been designed to simulate the human heat dissipation and sweat emission into textile patterns. The *SKIN* is the only *SWEATOR* version with a direct membrane-textile interface serving as the heat and sweat zone. It may be used to provide controlled heat and humidity into textile patterns, pillows, seats, and other devices.

***SWEATOR SKIN* box operates upwards and downwards / SCU control unit**

TECHNICAL DATA

Shapes:	*SWEATOR SKIN regular*	Box shape with “sweat”-lid (exchangeable)
	SWEATOR-SKIN lab	Like regular with mounted constant ventilation to obtain even higher reproduction (controlled convection).
Data output:	T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m²), R (m²K/W; m²Pa/W), and MVTR (g/m²/h) under standardized conditions.	
Data storage and evaluation:	Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.	
T/RH tracking:	4 *SWEATLOG BodyView* sensors included.	

SPECIAL FIELDS OF APPLICATION

- Identification of the thermo-dynamic attributes of textile patterns
- Controlled heat and humidity input into devices such as seats, wheelchairs, office furniture (upside down operation possible)
- Compatible to *SWEATLOG BodyView*

SWEATOR

INSIDE CLIMATE

GENERAL TECHNICAL OVERVIEW

SWEATOR TORSO

Dimensions:	LxWxH	85 x 50 x 35 cm (including handrails)
Heat-sweat:	water based	controlled at 37°C (arbitrary)
Water diffusion:	membrane bag	perforated hard shell (non-metal)
Sweat rate:	p-dependent (Pa)	at 37°C water T and 21°C/50 % RH approx. 90 g/m²/h – 120 g/m²/h
Sweat area:	60 x 40 cm	0,24 m² (one side)
Weight:	empty	approx. 10 kg
	filled	approx. 15 kg (one side) – 20 kg (both sides)

SWEATOR HEAD

Dimensions:	L x W x H	32 x 20 x 20 cm, head size 58
Heat-sweat:	water based	controlled at 37°C (arbitrary)
Water diffusion:	membrane bag	perforated hard shell (non-metal)
Sweat rate:	p-dependent (Pa)	at 37°C water T and 21°C/50 % RH approx. 90 g/m²/h – 120 g/m²/h
Sweat area:	one side	approx. 0,062 m²
Weight:	empty	approx. 2 kg
	filled	approx. 4,5 kg

SWEATOR FOOT

Dimensions:	Foot form (boot)	EU 42, removable toe section
Heat-sweat:	water based	controlled at 37°C (arbitrary)
Water diffusion:	membrane bag	perforated hard shell (non-metal)
Sweat rate:	p-dependent (Pa)	at 37°C water T and 21°C/50 % RH approx. 90 g/m²/h – 120 g/m²/h
Sweat area:	one side	approx. 0,057 m²
Weight:	empty	approx. 1 kg
	filled	approx. 2,5 kg

SWEATOR SKIN

Dimensions:	L x W x H	30 x 25 x 10 cm, box style
Heat-sweat:	water based	controlled at 37°C (arbitrary)
Water diffusion:	water tank	membrane shielded sweat field (non-metal)
Sweat rate:	p-dependent (Pa)	at 37°C water T and 21°C/50 % RH approx. 200 g/m²/h – 360 g/m²/h
Sweat area:	14,5 x 19,5 cm	approx. 0,028 m²
Weight:	empty	approx. 2 kg
	filled	approx. 4,5 kg

SCU CONTROL UNIT

Input:	touch screen	various levels and input options
Heat control:	PT1000 controller	37°C core water T advised
	active time tracking	sec
Water control:	pump unit	even allocation of warmed water
Energy input:	0 - 100 %	equal to 0 - ≈ 100 W
Test phases:	three	setup, pre-test, test phases
Weight loss:	optional	digital scale may be integrated *(A scale is not part of the delivery. Please ask for options in case of interest.)*

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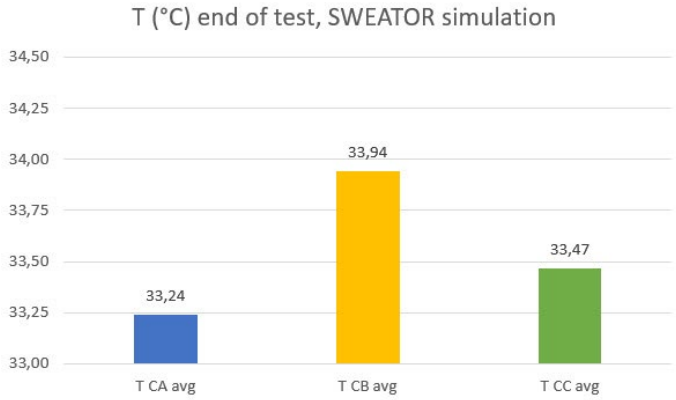
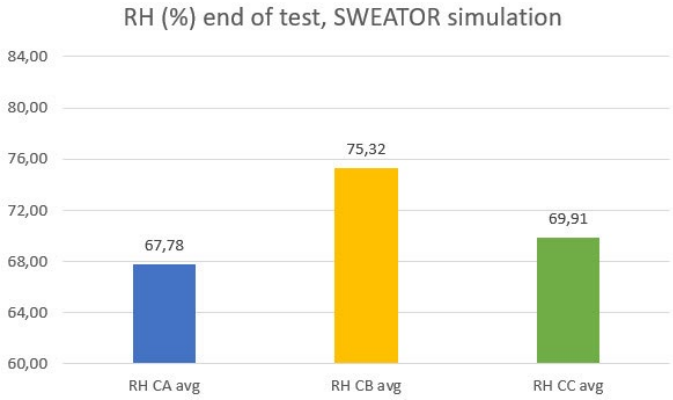
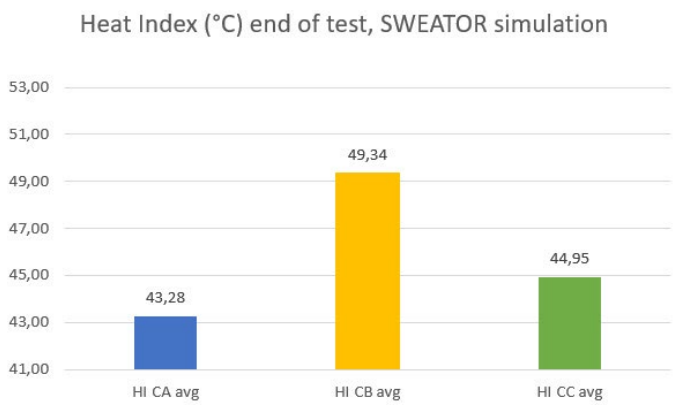
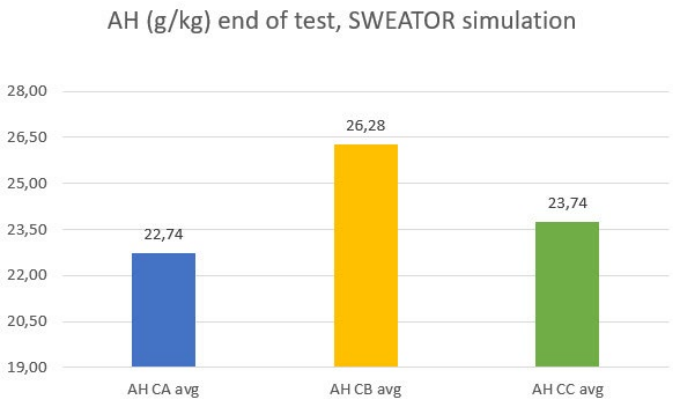
EVALUATION EXAMPLES
Quantitative *SWEATOR* based test data

Comfort relevant microclimate result between *SWEATOR* (representing a human) and comparable test duvets. Heat Index = concept of "perceived" heat.









Technical thermo-dynamic indicators of the above duvets after 120 test minutes.

Thermo-dynamic results SWEATOR test (here: 120 min)				
Key indicators	**Description**	**CA**	**CB**	**CC**
MVTR (g/m²/h)	Moisture vapor transmission rate per hour	95,77	64,52	79,64
Q total (W)	Total energy consumption	26,36	19,68	21,52
Q et (W)	Evaporative energy release	15,96	10,75	13,27
Q ct (W)	Conductive energy release	10,40	8,92	8,25
R et (m²Pa/W)	Resistance against evaporative transfer	33,31	61,46	42,84
R ct (m²K/W)	Resistance against conductive transfer	0,19	0,29	0,29

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