ThermaRate™

Thermal Barrier Test Apparatus

SDL ATLAS®
TEXTILE TESTING SOLUTIONS

ThermaRate™

INNOVATIVE INSTRUMENT

Thermal Testing: Critical for protective clothing articles worn by first responders, military personnel, and industrial workers in the proximity of fires or extreme heat sources.

The ability of an article of clothing to protect from burn injury is a function of how the heat flux is delivered to the skin over time. The protection provided by the safety clothing is a function of the fabric system's thermal resistance and the draping of the clothing over the body. The traditional and accepted method of performing the test on completed protective clothing ensembles is done on a thermal manikin. This test has sources of controlled heat flux, measurements of the thermal resistance of the fabric, and includes the effects of fit and drape of the entire garment on a human form. These manikin tests are highly realistic but are complex and expensive when used for research, development, and procurement approval of fabrics for protective clothing.

SDL Atlas introduces an innovative test instrument for measuring burn injury protection of fabric samples. The system is designed to simulate the fabrics being in the proximity of fire or high heat. The ThermaRate gives fabric manufacturers a lower cost, easier method of testing the thermal protective feature of their fabric.

This fully automated, small scale tester includes selectable control of radiant heat flux, irradiation time, gap between fabric and sensor, and the choice of skin simulant sensor or heat flux gage output to be used in the burn injury algorithm.

The ThermaRate is the commercial development of the Fabric Burn Protection Evaluation System developed by PSI for the US Army Natick Laboratories.

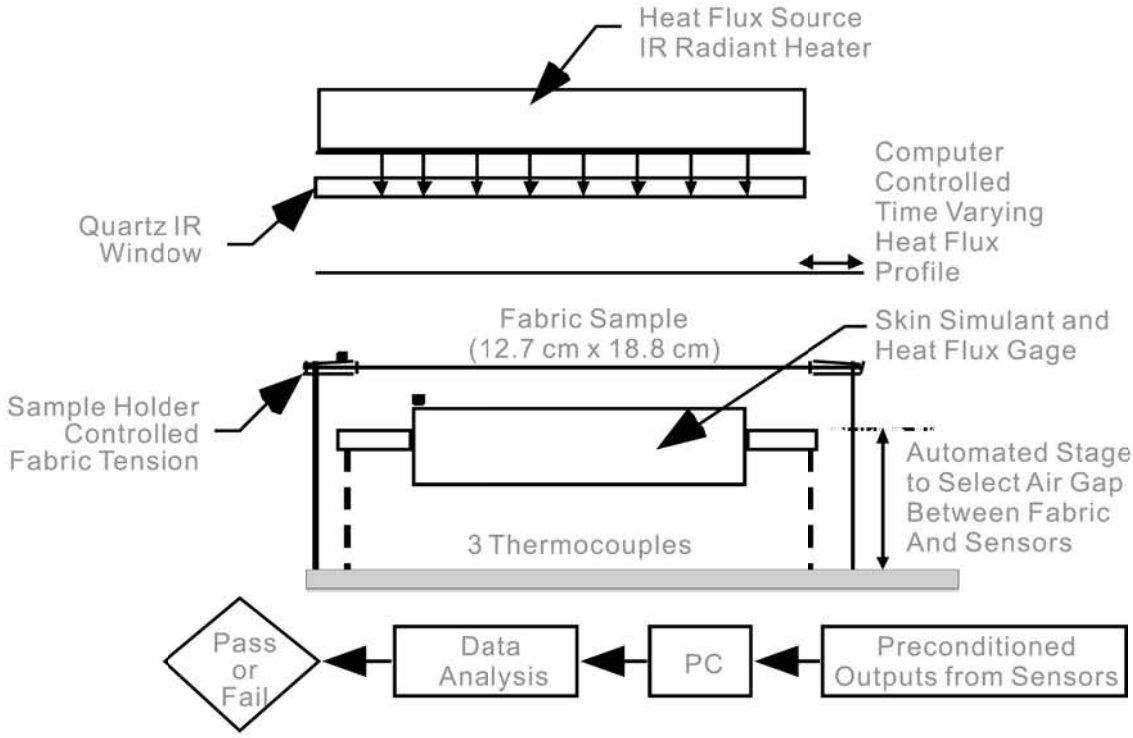

Fig. 1 - ThermaRate Component Diagram

Skin Simulant(c)	0.0
Heat Flux(kw/m2)	0.0
Photodiode(kw/m2)	0.0
Thermocouple 1(c)	0.0
Thermocouple 2(c)	0.0
Thermocouple 3(c)	0.0
Company	SDL ATLAS
Operator	sdl atlas
Data	2014 / 01 / 06
Sample	TBTA
Rise Time(s)	3
Shutter Open Time(s)	3
On Time(s)	6
Decay Time(s)	3
AD Rate(Hz)	100
Heat Level (Kw/m2)	100
At X Position(cm)	0
Air Gap(cm)	0
Basal Temperature(c)	35.0
Calculation Model	Stoll
Select Sensor	Stoll
	Henrique & Moritz
	Tanaka
2nd Degree Burn	Mehta & Wong

PASS

Fig. 2 - Test parameters

Figure 1 shows a diagram of the instrument and sample exposure area and how the gap between the sample and sensors can be easily set. The automatic shutter ensures precise exposure as determined by the user in the test setup screen as shown in Figure 2.

The software allows the user to easily control the air gap, radiant heat flux, exposure time, and the choice of skin simulant sensor or heat flux gage. From a pull down menu, the user may select constants from Stoll, Tanaka, (both found within ASTM F1930), Henrique & Moritz, and Mehta & Wong.

The Ω integral criterion for triggering a pass/fail on the primary screen as well as the initial skin temperature used by the burn injury model is also required on the screen.

Based on the settings provided, an automated green/red indicator on the computer screen display provides a pass/fail indication based on the burn injury being under or exceeding second degree burn injury levels.

Fig. 3 – Graphical Output

Full details of the test are graphically displayed during operation and archived for user selectable data analysis.

SPECIFICATIONS

Heat source	:	IR Radiant Heater
Max heat flux	:	100kW/m^2 (adjustable)
Heat sensors	:	Skin simulant and heat flux gauge
Specimen size	:	12.7 cm x 17.8 cm
Specimen orientation	:	Adjustable to 0, 30, 45, 60 & 90。
Properties reported	:	Heat flux & temperatures, and auto calculate burn inquiry
Burn injury prediction	:	Yes
% burn injury	:	Yes (using exposure time)
Burn injury location	:	Correlates with air gap
Automation	:	Yes
Weight	:	150kg
Dimension	:	115*73*46cm(L*W*H)
Ordering Info.	:	107297 ThermaRate 230V, 50/60HZ

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