ASSESSMENT OF THERMAL INSULATION AND EVAPORATIVE RESISTANCE OF ELVEN FLAMEPROOF COMPOSITE

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Prepared for

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OBJECTIVE OF THE WORK

The objective of the project was to evaluate the thermal insulation and evaporative resistance of a flameproof composite provided by the customer in a standard lab environment.

PROCEDURES

Standard Test Methods:

ASTM F1868-17 Standard Test Method for Thermal and Evaporative Resistance of Clothing Materials Using a Sweating Hot Plate

Test Conditions: Sweating hotplate surface temperature 35±0.1ºC, Ambient temperature 25±0.5 ºC, RH 65±4%, air velocity 1.0±0.1m/s.

Sample Assessed:
Material 1: FLAMEPROOF COMPOSITE

All samples were conditioned in standard environment 21ºC RH 65% for 24 hours before test. All samples were tested "as received", no further treatment was applied.

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SUMMARY OF RESULTS

Table 1. Average values of tested and calculated items

Sample	Rct	Ret	Rcf	Ref	THL	NFPA PPE required THL
1	0.3604	429.567	0.2866	424.31	38.96	>205

Note:

Rct (°C·m^2/W), total thermal insulation of sweating hotplate, composite, and boundary air.

Ret (Pa·m^2/W), total evaporative resistance of sweating hotplate, composite, and boundary air.

Rcf (°C·m^2/W), intrinsic thermal insulation of the composite only.

Ref (Pa·m^2/W), intrinsic evaporative resistance of the composite only.

THL (W/m^2), the total heat loss predicted with **Rcf** and **Ref** in a 25°C, 65% RH environment.

DATA AND DATA ANALYSIS

#	R_{ct}	R_{cbp}	R_{et}^{A}	R_{ebp}
1	0.3649	0.0738	447.1	5.26
2	0.3599	0.0738	427.2	5.26
3	0.3564	0.0738	414.4	5.26
4				
5				
6				
7				
8				
9				
10				
Average	0.3604	0.0738	429.5667	5.26

Parameter	ASTM F1868 Symbol	Value	Units
Dry Thermal Resistance (bare plate & sample)	R_{ct}	0.3604	m^2*degC/W
Dry Thermal Resistance (bare plate only)	R_{cbp}	0.0738	m^2*degC/W
Dry Thermal Resistance (sample only)	**R_{cf}**	**0.2866**	**m^2*degC/W**
Wet Evaporative Resistance (bare plate & sample)	R_{et}^{A}	429.57	Pa*m^2/W
Wet Evaporative Resistance (bare plate only)	R_{ebp}	5.26	Pa*m^2/W
Wet Evaporative Resistance (sample only)	**R_{ef}^{A}**	**424.31**	**Pa*m^2/W**
Total Heat Loss	**Q_t**	**38.96**	**W/m^2**

NOTE: The ISO standard uses Pa & the ASTM standard uses kPa when calculating Wet Evaporative Resistance. Pa units are used here to match MTNW's ThermDac software output. This has been accounted for in the Total Heat Loss calculation and does not affect the result.