

Evaluación del estrés térmico por frío en el área de Empaque de Rosas

Tabla 1. Datos condiciones termo-higrométricas puesto empaque

Parámetro	Temperatura (°C)	Humedad (%)	Velocidad del viento (m/s)
1	4,6	61,0	1,2
2	4,5	63,0	1,0
3	4,7	62,0	1,1
Promedio	4,6	62,0	1,1

Tabla 2. Carga térmica metabólica área de empaque de rosas

Puesto	Mb (kW/m ²)	Pt (kW/m ²)	Tt (kW/m ²)	D (kW/m ²)	CTM (kW/m ²)
Empaque	43,3	25,0	45,0	0,0	113,3

Tabla 3. Aislamiento térmico del vestido de los ocupantes en el área de empaque de rosas

R1 (clo)	R2 (clo)	R3 (clo)	R4 (clo)	R5 (clo)	R6 (clo)	Icl (clo)
0,02	0,2	0,25	0,35	0,1	0,55	1,47

**CALCULATION OF REQUIRED CLOTHING INSULATION (IREQ),
 DURATION LIMITED EXPOSURE (Dlim),
 REQUIRED RECOVERY TIME (RT),
 and Wind Chill Temperature (twc)**

IREQ 2008 ver 4.2, Hakan O. Nilsson and Ingvar Holmer.
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CALCULATION OF REQUIRED INSULATION, IREQ AND DURATION LIMITED EXPOSURE, Dlim

113.3	M (W/m2), Metabolic energy production (58 to 400 W/m2)
0	W (W/m2), Rate of mechanical work, (normally 0)
4.6	Ta (C), Ambient air temperature (< +10 C)
13	Tr (C), Mean radiant temperature (often close to ambient air temperature)
33.2	p (l/m2s), Air permeability (low < 5, medium 50, high > 100 l/m2s)
0.0	w (m/s), Walking speed (or calculated work created air movements)
1.1	v (m/s), Relative air velocity (0.4 to 18 m/s)
62	rh (%), Relative humidity
1.47	Icl (clo), AVAILABLE basic clothing insulation (1 clo = 0.155 W/m2K)

IREQ & Dlim RESULTS (minimal to neutral)

Insulation Required, IREQ to (clo)

REQUIRED basic clothing insulation (ISO 9920), Icl to (clo)

Duration limited exposure, Dlim to (hours)

CALCULATION READY!

Figura 1. Calculo de IREQ, Dlim con programa IREQver4_2 ISO 11079

CALCULATION OF REQUIRED RECOVERY TIME, RT

90	M (W/m ²), Metabolic energy production, (normally lower!)
0	W (W/m ²), Rate of mechanical work, (normally 0)
25	Ta (C), Ambient air temperature, (normally warmer!)
25	Tr (C), Mean radiant temperature, (normally warmer!)
8	p (l/m ² s), Air permeability
0.2	w (m/s), Walking speed (normally lower)
0.4	v (m/s), Relative air velocity (normally lower!)
50	rh (%), Relative humidity
1.5	Icl (clo), Available basic clothing insulation, (normally lower!)

RT RESULTS (neutral)

Required recovery time (hours)

CALCULATION READY!

Figura 2. Cálculo del tiempo de recuperación con programa IREQver4_2 ISO 11079.

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**CALCULATION OF REQUIRED INSULATION, IREQ AND
 DURATION LIMITED EXPOSURE, Dlim**

113.3	M (W/m ²), Metabolic energy production (58 to 400 W/m ²)
0	W (W/m ²), Rate of mechanical work, (normally 0)
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13	Tr (C), Mean radiant temperature (often close to ambient air temperature)
33.2	p (l/m ² s), Air permeability (low < 5, medium 50, high > 100 l/m ² s)
0.0	w (m/s), Walking speed (or calculated work created air movements)
2	v (m/s), Relative air velocity (0.4 to 18 m/s)
62	rh (%), Relative humidity
1.47	Icl (clo), AVAILABLE basic clothing insulation (1 clo = 0.155 W/m ² K)

IREQ & Dlim RESULTS (minimal to neutral)

Insulation Required, IREQ to (clo)

REQUIRED basic clothing insulation (ISO 9920), Icl to (clo)

Duration limited exposure, Dlim to (hours)

CALCULATION READY!

Figura 3. Determinación de variables significativas en el tiempo de exposición a frío en el área de empaque de rosas para puesto 2. Aplicación utilizada: programa IREQver4_2 ISO 11079.