



SCARLET | TECH

UNDERSTANDING AND
MANAGING WORKPLACE
HEAT STRESS

Applying TWL on the Ground

Controls, Protocols, and Proven Results



www.scarlet-tech.com

Scarlet TWL-1S — Handheld Heat Stress Monitor

No. 1 Selling TWL Monitor in Middle East

UAE · KSA · Qatar · Oman · Kuwait · Australia

Instant TWL Reading:

Real-time display in W/m^2 with colour-coded action level

5-Sensor Array:

Dry bulb, wet bulb, globe thermometer, wind speed

Work-Rest Calculator:

Automatic recommended work/rest ratios based on live TWL

Data Logging:

Export historical TWL data to Excel for compliance records

Colour LCD Display:

Green/Amber/Orange/Red backlight matches action levels

Endorsed By:

ARAMCO, ADNOC, Shell, Dubai Municipality



Scarlet TWL-1SV — Fixed Automated Weather Station

Continuous, Automated TWL Monitoring

Ideal for large sites, offshore platforms, rail depots, refineries

Fixed Installation:

24/7 automated TWL data collection — no operator needed

Multi-Zone Network:

Up to 20 stations networked; site-wide heat risk dashboard

Live Alert System:

Automatic SMS / email / alarm when TWL drops below threshold

LoRaWAN / 4G / Wi-Fi:

Wireless connectivity — ideal for remote and offshore sites

Deployed At:

ADNOC, FERTIL, Etihad Rail, RTA Dubai, Abu Dhabi DMA

OSHAD Compliant:

Fully aligned with OSHAD-SF “Safety in the Heat” TG v3.0



TWL Implementation: 3-Step Protocol



HAAD “Safety in the Heat” Program — Proven Results

335+

Companies registered in Abu Dhabi’s heat program (2012)

496,037

Heat-exposed workers covered by the program (2012)

55,743+

Awareness materials distributed in just 3 months

6

TWL meter evaluation studies co-designed (Etihad Rail, ADNOC, DUBAL, GASCO)

Program Achievements (Health Authority Abu Dhabi, 2012)

- TWL “Safety in the Heat” Code of Practice — issued as part of AD EHSMS Regulatory Instruments (Feb 2012)
- Mandatory midday work ban 12:30–15:00 enforced via TWL monitoring system across all ADNOC group sites
- Training conducted at: Etihad Rail, Al Gharbia Municipality, Arkan, ADMA-OPCO, MASDAR, DHA
- TWL heat stress meter integrated into HAAD occupational health inspections for registered companies
- HAAD TWL desktop calculator distributed free to all registered employers: www.haad.ae
- Program contributed to measurable decline in heat-related hospitalisations reported in Abu Dhabi emirate

Source: HAAD OEH Section 2012 Annual Achievements Report

Case Study: Emirates Group — 60% Heat Illness Reduction



Implementation Details

Organisation:

Emirates Group — aviation, ground services, logistics.

Challenge:

High heat illness rates among ground crew, maintenance, baggage handlers in Dubai outdoor operations.

Solution:

Deployed Scarlet TWL-1S across ramp and ground operations areas. Implemented TWL-based work-rest protocols.

Key Actions:

TWL monitoring stations at apron & ground areas; mandatory rest when TWL < 140 W/m²; hydration programme; acclimatisation for new starters.

Result:

60% reduction in reportable heat illness cases within the heat campaign period

Lesson:

TWL-based management is MORE effective than time/temperature rules alone — wind & humidity matter.

Other Major Deployments — UAE & GCC

ADNOC Group

Oil & Gas — Offshore & Onshore

TWL-1SV network deployed across multiple ADNOC sites. Automated alerts when TWL drops to Orange/Red zones. Integrated with ADNOC EHSMS permit-to-work system.

Etihad Rail

Infrastructure — Rail Construction

TWL evaluation study conducted in collaboration with HAAD. TWL-1S used during construction phase in desert terrain at 45°C+. Led to revised heat management SOP across rail network.

FERTIL (ADNOC)

Petrochemical — Ruwais Industrial Area

Centralised automated TWL monitoring system deployed across FERTIL complex. Scope includes 10+ TWL-1SV fixed stations networked to central safety dashboard.

RTA Dubai




Public Transport Infrastructure

Scarlet TWL deployed for monitoring heat conditions for metro, bus depot and road construction workers exposed to Dubai summer heat (June–September).



Practical Work-Rest Cycles Based on TWL

When TWL drops, increase rest time proportionally to allow body core temperature to recover before resuming work:

TWL-1S Monitor	Working zone	Interventions	Rehydration schedule (per hour)	Work/Rest Cycle
	Low risk Unrestricted zone TWL: >140	No limits on self-paced work for educated, hydrated workers	Light work 600–1000ml/hr	Safe for all continuous self-paced work
	Medium risk Cautionary zone TWL: 115–140	Additional precautions are required Practicable Engineering control measures for reducing heat stress e.g. provide shade, improve ventilation etc. Working alone should be avoided Ensure workers intake adequate liquid	Light work 1–1.2 L/hr Heavy work >1.2 L/hr	Safe for continuous self-paced light work Continuous paced Work: 45min/ Rest: 15min
	High risk zone TWL: <115	Strict work/rest cycling is required No working alone No unacclimatized workers More emphasis on hydration and signs of heat strain Equipped with personal 2L water bottle on site at all times	All work >1.2 L/hr	Light work Work: 45min/ Rest: 15min Heavy work Work: 20min/ Rest: 40min

Sources: OSHAD-SF Technical Guideline Safety in Heat

Regulatory Framework — TWL in Gulf Standards

UAE	OSHAD / Abu Dhabi EHS OSHAD-SF Technical Guideline: "Safety in the Heat" v3.0	TWL referenced as preferred heat stress measurement tool; 12:30–15:00 outdoor work ban June–Sept enforced
UAE	HAAD / DoH Abu Dhabi Safety in the Heat Code of Practice (2011–present)	TWL monitoring required for registered heat-exposed employers; desktop calculator provided
Kuwait	KFAS / MOH Heat stress regulations for outdoor workers	Midday ban 11:00–15:00 (June–September); employers required to monitor and prevent heat illness
Saudi Arabia	MOMRA / MHRSD Ministerial Decision 3652 — outdoor work restrictions	Temperature & humidity thresholds; TWL adoption growing in ARAMCO & SEC supply chains
International	NIOSH / ISO 7243 ISO 7933 (WBGT), NIOSH REL for heat stress	TWL increasingly cited as more accurate than WBGT for high-humidity, high-radiant environments

Engineering & Administrative Heat Controls

Engineering Controls	Administrative Controls	PPE Considerations
<ul style="list-style-type: none"> ● Shade structures at work locations (shade alone can raise TWL by 30–50 W/m²) ● Ventilation & fans to increase air movement across workers ● Cool rest rooms / air-conditioned cabins within reach of all work areas ● Schedule heavy tasks for early morning when TWL is highest ● Insulate hot surfaces; enclose radiant heat sources 	<ul style="list-style-type: none"> ● TWL-based work-rest cycles — enforced, not optional ● Acclimatisation programme for all new outdoor starters ● Buddy system — no worker works alone in heat ● Pre-shift hydration checks using urine SG refractometers ● Heat illness recognition training for supervisors & workers ● Incident reporting & review when TWL drops below 115 W/m² 	<ul style="list-style-type: none"> ● Minimise PPE when safely possible — each layer adds thermal burden ● Light-coloured, loose-fitting, breathable fabrics where PPE is not mandatory ● Vented helmets; avoid dark-coloured hard hats ● Evaporative cooling vests — effective when TWL is above 115 W/m² ● Wetting clothing with water — effective temporary cooling measure

Acclimatisation: Gradually Acclimate Your Workers

Acclimatizing is when the body gradually becomes better at dealing with heat stress.

Once acclimatized, our body is less likely to experience heat-related illness. It usually takes 7 to 10 days to acclimatize.



Step 1 – Allow workers to self-pace wherever possible

Step 2 – Gradually increase workloads and exposure to heat

Step 3 – Allow new or returning workers more frequent breaks

Note: Un-acclimatized workers are defined as new workers or those who have been off work for more than 14 days due to illness or leave (outside the tropics and sub-tropics)



Designing a Heat Safety Management Programme

1

Hazard Assessment

Map all heat-exposed jobs and locations. Identify peak risk periods (June–Sept). Characterise tasks by metabolic rate.

2

Measurement System

Deploy TWL monitors. Select TWL-1S (spot checks) or TWL-1SV (continuous). Determine frequency and location.

3

Action Protocols

Set organisation-specific TWL action levels. Design work-rest tables. Assign supervisory roles and responsibilities.

4

Training & Awareness

Train all supervisors in TWL reading and response. Educate workers on hydration, acclimatisation, and self-reporting.

5

Monitor & Review

Track TWL readings vs heat illness incidents. Adjust protocols each season. Document and report to management.

Scarlet Tech specializes in delivering tailor-made, state-of-the-art HSE instruments for accurate measurement and real-time monitoring in demanding environments. Comprehensive range of professional HSE instruments: wireless anemometer, wireless crane camera system, heat stress meter, class 1 & 2 sound level meter.