Insights on Heat Stress Management at Workplaces & Case Studies

MINISTRY OF MANPOWER

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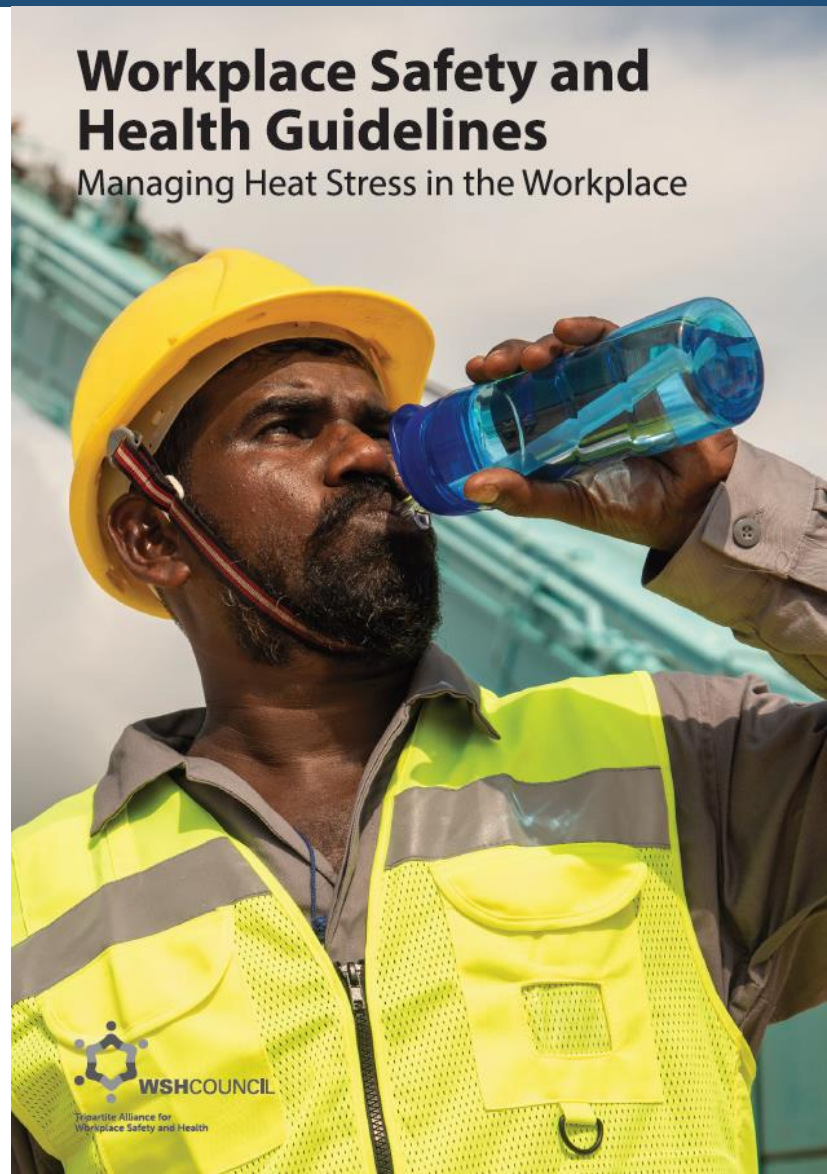
25 May 2023

Overview

- Heat Stress Management at Workplaces
  - ❑ Risk Management
  - ❑ Monitoring WBGT
  - ❑ Heat Acclimatisation & Work Rescheduling
  - ❑ Adequate Water Intake
  - ❑ Physical Preventive Measures
  - ❑ Emergency Response & First Aid
- Past Case Studies
- Heat Stress Management Compliance Checklist



Heat Stress Management at Workplaces

- Heat stress risk is foreseeable and well-recognised for outdoor works
  - ❑ Physical exertion + work environment + personal risk factors
- Heat sources in indoor environment could also pose heat stress risk
- Implement measures to prevent heat-related injuries

Risk Management

- Risk assessment to include heat stress hazard for outdoor work activities and indoor hot processes
- Identify workers vulnerable to heat stress and re-deploy them when required
- Monitor Wet Bulb Globe Temperature (WBGT)

WGBT	Heat Stress Risk Level
< 31°C	Low
31°C to 31.9°C	Moderate
≥ 32°C	High

WBGT risk table

Re-deployment plan

WBGT meters

WBGT hourly recording

Monitoring WBGT at Workplaces

Wet Bulb Globe Temperature (WBGT) is commonly used for workplace environmental monitoring of heat stress, a different index from ambient temperatures reported by NEA's weather stations

Where should WBGT be measured?

- Every hour, at areas where workers perform tasks
- At multiple locations, for large work areas
- Prior to work commencement and during work

WBGT takes into account the 4 environmental factors:

- Ambient temperature
- Relative humidity
- Wind speed
- Radiation(e.g. sunlight)

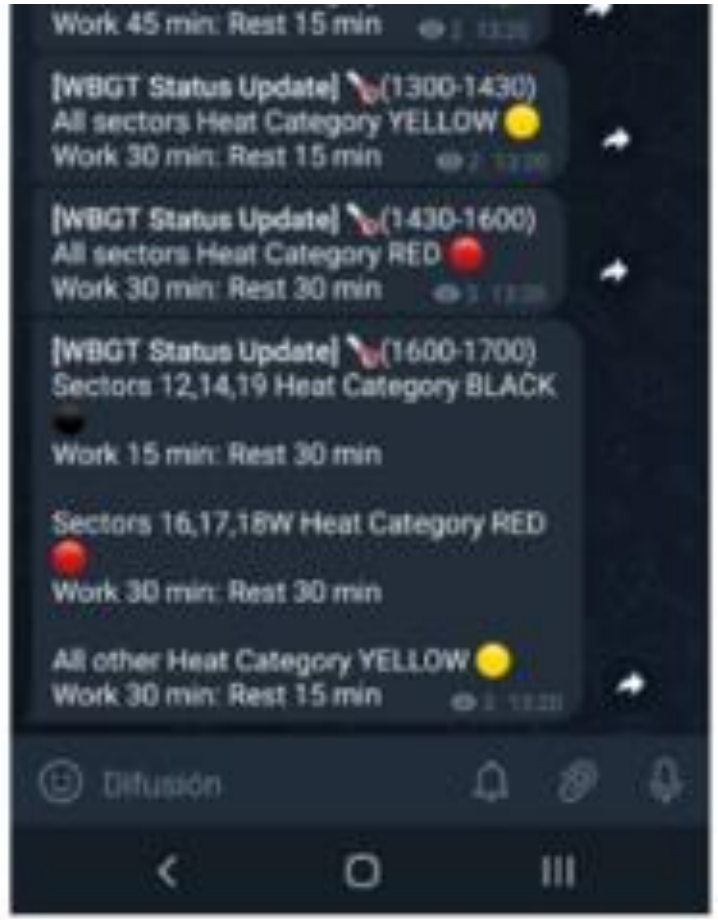
Heat Stress Risk Level	WBGT
Low	< 31°C
Moderate	31°C to 31.9°C
High	≥ 32°C

Timely implementation of control measures based on heat stress risk assessed at the workplace

Note: Ambient temperature (weather app) ≠ WBGT

Risk Management

Real time WBGT monitoring



Alert system

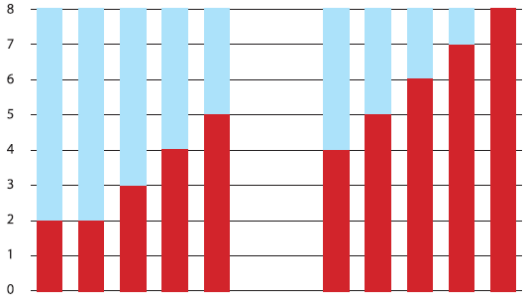
Heat Acclimatisation & Work Rescheduling

- Heat acclimatisation programme for
  - ❑ Newly assigned worker
  - ❑ Returning from long leave (more than 1 week)
  - ❑ Prolonged illness
  - ❑ New or returning worker from a country with colder climate

- Reschedule heavy physical work to cooler periods of the day
  - ❑ Avoid 11am-3pm as far as possible

- Schedule frequent short breaks under shade for workers

Hemisphere	Winter Months
Northern Hemisphere	Dec, Jan , Feb
Southern Hemisphere	June, July, August



Acclimatisation

Short breaks under shade

Metabolic Examples	Examples
Heavy	Intense arm and trunk work, carrying, shovelling, manual sawing; pushing and pulling heavy loads; and walking at a fast pace.

Heavy physical work

Adequate Water Intake

- Provide drinking water supply / facilities at locations near work areas and under shade (e.g. provide cold drinks to outdoor workers via water cooler, vending machines, cold drinks in cooler boxes)

- Schedule and supervise hourly hydration for workers

Shaded water cooler with cool water

Vending machine onsite

Supervised hydration

Shaded rest area with fans

Physical Preventive Measures

At rest and work areas:

- Provide shade to reduce direct sun exposure
- Provide adequate ventilation for effective cooling

Air coolers

Shaded work area

- Provide loose-fitting and light-coloured clothing to workers
- Provide insulation for radiant heat sources
- Provide mechanical aids to reduce workers' physical workload

Ventilation at work area

Shaded rest areas

Heat Stress Training

- Train workers on signs and symptoms of heat-related illness and preventive measures to take before or during work
  - ❑ Implement buddy system to look out for each other

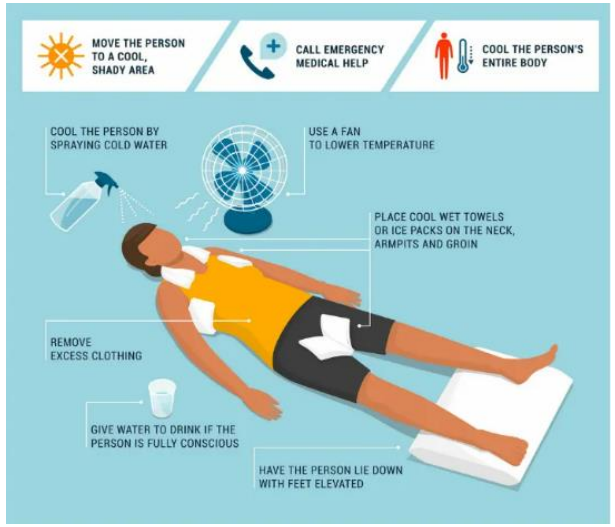
- Train supervisors to recognise early signs and symptoms of heat-related illness

Emergency Response & First Aid

- Establish reporting procedures for workers who feel unwell

- Establish on-site emergency response procedures for heat injury
  - ❑ E.g cold water immersion, ice packs, water spray, shower
  - ❑ Conduct drill for heat injury scenario
  - ❑ Standby ice packs or other heat injury response facilities on site

- Appoint first aiders for workplace with > 25 persons employed



First aid procedures


Ice packs at workplace

First aider appointed and undergone “Occupational first aid course”

Common Non-Compliances

- Acclimatisation programme only covers newly hired workers from colder climates
- No scheduled and supervised hourly hydration
- Drinking water/facility placed under direct sun
  - × Warm/hot water ineffective in reducing body temperature
  - ✓ Iced water
- No WBGT monitoring (Use weather app or thermometer - ambient temperature as reference)

Water bottle exposed to sun

Drinking facility under the sun

Weather app

Common Non-Compliances

- No emergency response procedures for heat injury
- Drills not conducted for emergency response for heat injury
- Incorrect first aid course
  - × Basic first aid course
  - ✓Occupational First Aid Course
- Heavy physical work not rescheduled to cooler periods of the day

Incorrect first aid course

Heavy physical work not rescheduled

Case Study: Fatal Heat Stroke

2020: 1 fatality involving lifting supervisor

Key Findings:

- First day of work at the worksite
- Did not work throughout circuit-breaker
- Work carried out under the sun (1330-1430)
  - ❑ Lifting could have been rescheduled to cooler periods of the day
- No structured hydration programme in place
- Had pre-existing medical condition

Location of accident

Case Study: Heat Exhaustion

- 2019: 1 technician
- Manual work in a confined space

Key Findings:

- Hot & humid work environment in confined space
- No scheduled water breaks
  - ❑ More frequent breaks on a fixed schedule, can bring down accumulated body heat
- No WBGT monitoring to assess the heat stress risk level within the confined space

Technician hydrojetting inside confined space

Case Study: Heat Exhaustion

- 2020: 1 construction worker

Key Findings:

- Working under direct sun
- No scheduled rest and water breaks
- No on-site WBGT monitoring
- Heat stress not identified in risk assessment

Construction worker was doing formwork

Heat Stress Management Compliance Checklist

- For companies' review and implementation, to prevent heat injuries

- 5 key areas
  - ❑ Risk management
  - ❑ Heat acclimatisation & work rescheduling
  - ❑ Adequate water intake
  - ❑ Physical preventive measures
  - ❑ Emergency response and first aid

WSHCOUNCIL
Tripartite Alliance for Workplace Safety and Health

Heat Stress Management
Compliance Checklist

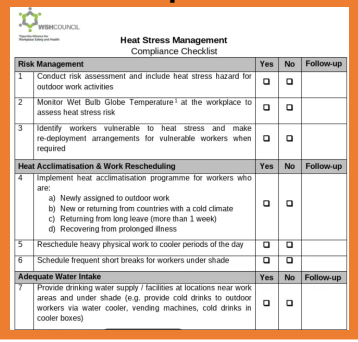
Risk Management		**Yes**	**No**	**Follow-up**
1	Conduct risk assessment and include heat stress hazard for outdoor work activities	❑	❑	
2	Monitor Wet Bulb Globe Temperature[1] at the workplace to assess heat stress risk	❑	❑	
3	Identify workers vulnerable to heat stress and make re-deployment arrangements for vulnerable workers when required	❑	❑	
Heat Acclimatisation & Work Rescheduling		**Yes**	**No**	**Follow-up**
4	Implement heat acclimatisation programme for workers who are: a) Newly assigned to outdoor work b) New or returning from countries with a cold climate c) Returning from long leave (more than 1 week) d) Recovering from prolonged illness	❑	❑	
5	Reschedule heavy physical work to cooler periods of the day	❑	❑	
6	Schedule frequent short breaks for workers under shade	❑	❑	
Adequate Water Intake		**Yes**	**No**	**Follow-up**
7	Provide drinking water supply / facilities at locations near work areas and under shade (e.g. provide cold drinks to outdoor workers via water cooler, vending machines, cold drinks in cooler boxes)	❑	❑	

Conclusion

- Heat injuries can be easily prevented
- Communicate heat stress risks and raise awareness
- Be prepared for hotter weather and step up to protect your workers.

Resources

Heat Stress Management Compliance Checklist



Heat Stress Management
Compliance Checklist

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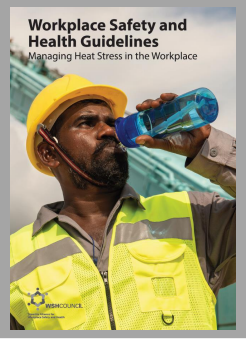
WSH Guidelines on “Managing Heat Stress in the Workplace”



Poster for “Monitor and Manage Heat Stress at Workplace”

Hydration Poster (English)

WSH Bulletin “Protect Workers from Heat Stress”

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Thank You