Crane Operators Working in Hot Conditions

WHAT CAUSES HEAT STRESS?
Workers operating cranes and lifts may face heat and sun exposure hazards. *Crane operators working in high temperatures, with high humidity, direct sun exposure, in enclosed cabins without breeze or wind, or in non-breathable personal protective equipment can experience heat-related illnesses.*

Temperatures inside a crane cab can turn dangerously hot in minutes. When the outside temperature is 26 degrees, it only takes ten minutes for the temperature inside a car to heat up to 37 degrees. The same can happen in crane cabs when the sun is out and the weather is warm.

The heat from the sun is absorbed by the surfaces inside a crane cab such as the seat and the instrument panel. These surfaces then re-radiate the energy, heating up the air inside the cab. If the cab windows are closed, the heat can't escape and the operator can experience heat stress in varying degrees of severity.

What Are Signs of Heat Stress?

Heat exposure can cause:

- Light-headedness, fainting or dizziness often brought on by dehydration and by not being acclimated to a hot work environment.
- Heat cramps which are muscle pains caused by loss of fluids and salt due to excessive sweating.
- Heat exhaustion occurs when the body has lost too much water and salt. Workers experience shallow breathing; increased heart rate; weak or rapid pulse; cool, pale, clammy skin; sweating; weakness; fatigue; dizziness; headache; nausea; fainting and muscle cramps.
- Heat stroke is the most serious heat-related illness. It is life-threatening and requires immediate medical attention. Heat stroke occurs when the body is unable to control its temperature and cool down naturally. Workers experience hot, dry, flushed skin, and are no longer sweating. They can become agitated and confused with decreased levels of consciousness and awareness. Heat stroke can also result in headache, nausea and vomiting, seizures, increased breathing rate, irregular pulse, shock, and cardiac arrest.

In addition, overexposure to heat can impair neurological performance,

which can increase the risk of accidents and injuries. It can also negatively influence productivity because dehydration and psychological distress decrease physical work capacity.

ASSESS RISK
Assess risk at the worksite. Consider factors such as temperature, humidity, required PPE and the type of work being done. Evaluate the risks and take action to reduce workers' exposure to heat.

What Can You Do to Prevent Heat-Related Illness?

Employers, supervisors and workers can conduct a risk assessment to identify situations that could require workers to perform tasks in high-heat conditions.

A risk assessment includes asking questions such as:

- What temperatures and humidity levels will workers be exposed to?
- Will workers be exposed to direct sun or be working in an enclosed area?
- Does the equipment used by the workers contribute to their heat exposure?
- Is water readily available?
- Does the required personal protective equipment have the potential to raise a worker's body temperature?
- How physically demanding is the work?

The American Conference of Governmental Industrial Hygienists (ACGIH) defines levels of work activities as:

- Heavy work, such as intense arm and trunk work, carrying, pushing and pulling heavy loads when riggers help tie or guide the load.
- Moderate work, including sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling and normal walking.
- Light work, including sitting with light manual work with hands or hands and arms, driving, or standing with some light arm work and occasional walking.

If a worker is likely to be exposed to environmental conditions that could cause heat stress, the employer must take action to avoid negative outcomes. Engineering controls should be implemented to reduce exposure. If engineering controls are not practical, the employer must use administrative controls.

WHAT'S THE DIFFERENCE BETWEEN ADMINSTRATIVE AND ENGINEERING CONTROLS?

Engineering controls are changes to the work environment and might include changing the weight of objects, adding physical shields to protect workers or purchasing additional equipment.

Administrative controls are workplace policy, procedures, and practices that minimize the exposure of workers to risk conditions.

Engineering controls are considered preferable when possible. For more information visit NIOSH's webpage on the hierarchy of controls.

Engineering controls

Here are some examples of engineering controls.

- Reduce worker activity through automation or mechanization.
- Cover or insulate hot surfaces to reduce radiant heat.
- Shield workers from radiant heat.
- Provide air conditioning or increased ventilation to remove hot air.

Administrative controls

If engineering controls are not practical, administrative controls must be implemented. Scheduling work to minimize heat exposure is the most effective solution in terms of administration controls.

The body adapts to working in hot environments if it is given a chance to gradually get used to the new conditions. This process, acclimatization, allows the body to better cope with heat stress.

General recommendations for acclimatization schedules are that workers who have not previously worked in a hot environment start at 20% of the full workload on the first day and increase the workload by 10-20% each day.

Workers returning to work in hot conditions after being away more than seven consecutive days can start at 50% of the workload on the first day and increase the workload by 10-20% each day. During the acclimatization period, it is important to gradually increase the time spent working in the heat at each workload level.

Determining appropriate work-rest cycles allows workers adequate time for them to cool down. Cool areas for breaks and rests, such as shaded or well-ventilated areas are vital.

Make sure workers drink water (without added salt) before as well as during and after work in a hot environment. Workers must not wait until they are thirsty to replace fluids.

Workers should wear light-coloured, breathable clothing let sweat evaporate. When working in direct sun, use wide-brimmed hard hats.

Regulations and Standards

BC Occupational Health and Safety Regulation (OHSR) 7.26-7.32 establishes the requirements for on-site testing for heat exposure and control measures.

WorkSafeBC defines a range of acceptable temperatures for specific

circumstances. These are called Threshold Limit Values (TLVs) for heat exposure. The table below specifies screening criteria for heat exposure at different levels of physical exertion. The temperatures are in centigrade and are based on Wet Bulb Globe Testing (WBGT) which accounts for the humidity, temperature, wind, and solar radiation in the environment being tested.

	TLV®				Action Limit			
Work/Recovery cycle	Light	Moderate	Heavy	Very heavy	Light	Moderate	Heavy	Very heavy
75 - 100% work	31	28	-	-	28	25	-	-
50 - 75% work	31	29	27.5	-	28.5	26	24	-
25 - 50% work	32	30	29	28	29.5	27	25.5	24.5
0 - 25% work	32.5	31.5	30.5	30	30	29	28	27

References and Resources

BC Occupational Health and Safety Regulation**.** Section 7.27 - 7.32 Heat Exposure

NIOSH. Criteria for a Recommended Standard- Occupational Exposure to Heat and Hot Environments

ISO 7243:2017. Ergonomics of the Thermal Environment – Assessment of Heat Stress Using the WGBT (Wet Globe Bulb Test) Index

American Conference of Governmental Industrial Hygienists (ACGIH) Screening Criteria for TLV and Action Limit for Heat Stress Exposure in the booklet Heat Stress and Strain

Information in this document is considered accurate at the time of publication. Please contact BC Crane Safety – Publications Review with any questions or recommendations for content revision. Please refer to WorkSafeBC for current copies of the Workers Compensation Act and Occupational Health and Safety Regulation (OHSR).