AAFA Guide to Protecting Workers from Heat Stress

April 2026

AMERICAN APPAREL & FOOTWEAR ASSOCIATION

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Executive Summary

The International Labor Organization estimates that 18,970 deaths and 22.87 million occupation injuries are linked to excessive heat in the workplace. Heat stress morbidity and mortality in the workplace is primarily caused by exposure to radiant heat from machinery, strenuous work pace, dehydration, poor air, and lack of temperature regulation. This document provides factory-level guidelines for protecting workers in the apparel, footwear, and travel good industry from high heat stress by mitigating these factors in the workplace. Particularly, AAFA recommends that facilities:

- Set maximum thresholds for workplace heat;
- Implement structural mitigation strategies to help prevent and/or lower the incidence of a heat stress environment;
- Adjust workloads, water, and bathroom breaks in accordance with heat conditions;
- Establish heat stress education and medical monitoring programs to help workers, supervisors, and health staff identify and prevent heat-related illnesses;
- Implement a regular discussion mechanism between buyers and suppliers to work together not only to reduce the incidence of heat stress but share responsibility for the impact of heat stress and extreme heat days on the workers, suppliers, and buyers; and
- Improve adherence to regional and national labor and public health codes regarding workplace temperature, ventilation, humidity, and room capacity.

AAFA and the Heat Guidance Working Group will regularly review the *AAFA Guide to Protecting Workers from Heat Stress* to incorporate new or update information regarding heat related illness, best practices, or global standards to reflect the most up to date and accurate guidance. This review will culminate in a formal annual public review process that the Heat Guidance Working Group will open in January of each year that will lead to publication of an updated Guidance in April of each year. The updated AAFA Guide to Protecting Workers from Heat Stress will include a "Change Record" that will list all items that were updated, added, or deleted.

The *AAFA Guide to Protecting Workers from Heat Stress* is publicly-available and open source. We strongly encourage and hope the global industry will adopt the *AAFA Guide to Protecting Workers from Heat Stress*.

AAFA thanks AAFA Summer 2025 Policy Intern Jitey Ikuku, AAFA Fall 2025 Policy Intern Hope Kabura, & AAFA Spring 2026 Haley Roser, as well as the Heat Guidance Working Group, for all their work to update this guidance.

Introduction: Understanding Occupational Heat Stress

Protecting workers in the apparel, footwear, and travel goods industry from extreme heat is becoming increasingly important as global temperatures and the incidence of heat stress in the workplace continue to rise. A study by the Global Labor Institute examining apparel production centers found that, in the past two decades, 17 of the 23 examined centers recorded increases of over 10 percent in the average number of days with temperatures of 35°C (95°F) or more. Countries such as India, Pakistan, and Cambodia record an average of over a 100 annual days of temperatures at or greater than 35°C (95°F). Another study on garment workers in Cambodia found that "64% of the 100 surveyed workers recorded core temperatures over 38°C – considered an unhealthy body temperature – at least once within seven days of work".

The International Labor Organization (ILO) has described heat stress as "an invisible killer" because it leads to both sudden and severe illnesses (such as heat strokes) and chronic and debilitating diseases affecting the endocrine, respiratory, and cardiovascular systems. Independent reports indicate that heat stress morbidity rates are modest estimates because official statistics underreport heatstroke deaths and fatalities resulting from cognitive impairments caused by heat stress. Workers in the apparel, footwear, and travel goods industry are among the most exposed to rising temperatures due to poorly ventilated factory environments and inadequate workplace heat controls. In response, the American Apparel & Footwear Association provides recommendations to mitigate this risk for supply chain workers. This document details guidelines for mitigating the effects of occupational heat stress on workers, based on international standards, government policies, and academic research. The Heat Guidance Working Group acknowledges that many manufacturers may already have heat action plans in place such as ventilation and cooling systems, temperature monitoring, access to water, and medical response protocols. The Heat Guidance Working Group applauds these efforts. Due to the variation across the industry, the Heat Guidance Working Group seeks to build upon these efforts to develop a more universal, worker-involved application for the entire industry.

Implementing effective heat stress mitigation measures may, in some circumstances, affect production timelines or operating costs. Measures such as adjusted work schedules, extended rest periods, or temporary work stoppages during extreme heat events can reduce the number of workable hours in a given day and may contribute to delivery delays or increased production costs. These potential impacts should be recognized as part of responsible supply chain management. Open communication and collaboration between buyers and suppliers are therefore essential to plan for heat-related disruptions, adjust expectations where necessary, and ensure that commercial pressures do not undermine worker protection measures. While operational and cost considerations may arise, protecting worker health and safety must remain the paramount priority when responding to heat stress risks.

Effective heat stress mitigation requires shared responsibility across the supply chain. Brands, buyers, manufacturers, and intermediaries all play a role in ensuring worker protection measures can be implemented in practice. Without corresponding commitments from upstream commercial actors, compliance costs and operational pressures may fall disproportionately on factories in already low-margin sourcing environments. Recognizing shared accountability, particularly through responsible purchasing practices, reasonable lead times, and pricing, can support consistent and credible implementation.

Adherence to Legal Standards and Frameworks

While there is no global policy approach to address excessive workplace heat, many countries' official labor laws include provisions surrounding workplace temperature, ventilation, humidity, and room capacity. Adherence to these occupational safety, health, and labor codes is crucial to addressing heat stress.

See examples from Bangladesh, China, Cambodia, India, and Haiti*, among others.*

Additionally, an increasing number of countries have developed laws to address excessive heat in the workplace:

- Viet Nam: 2016 Technical Regulation on Microclimate
- Bangladesh: S.R.O. No. 291-Law/2015
- Malaysia: Guidelines on Heat Stress Management at the Workplace (2016) .
- El Salvador: Decreto No.89 Condiciones Generales de los Lugares de Trabajo (sections 137-148)
- Brazil: Anexo 3 da NR 9 e altera Anexos das NR nº 15 e nº 28
- Philippines: Labor Advisory No. 3, series of 2016
- India: State Action Plans on Climate Change or Heat typically feature sections on workers (see examples from Gujarat, other state plans are available through Global Heat Health Information Network)

These laws use Wet Bulb Global Temperature (WBGT) – *See Appendix* – calculations to provide limits on workers' exposure to heat and humidity in the workplace.

Furthermore, as the impacts of climate change intensify and grow, countries are revising their existing laws and also developing new specific regulations to protect workers from workplace heat stress, as well as punitive measures to encourage compliance. Countries must often develop policies and legislation quickly, to address rapidly evolving risks.
Employers should closely monitor and adhere to emerging regulations. Ongoing engagement with regulatory developments, new research, and compliance with emerging laws is essential to protect workers in the face of climate-related risk.

Additionally, factories should aim to meet international labor standards set by the ILO, as well as align with frameworks such as the UN Guiding Principles on Business and Human Rights as well as ILO Heat at Work: Implications for Safety and Health, which emphasize protecting worker health and safety as part of corporate responsibility.

Determining Excessive Heat Days

This section includes recommendations for businesses conducting operations in locations where excessive heat day thresholds are **not** determined by local governments. In this case, we recommend that businesses conduct their own analysis and determine their own thresholds for how and when to establish and operationalize excessive heat days.

Defining Excessive Heat

Excessive Heat Day refers to a day in which there is a high risk of heat-stress or heat-related illness with strenuous work. To determine whether heat stress is too high on any given day, and if an excessive heat day should be administered, employers should consider the job, the environment, and the worker. Maximum temperature thresholds for workplace safety vary within countries and industry. On average, global occupational guidelines permit maximum temperatures of 29°C to 30°C (84.2°F to 86°F) for high-intensity work, 30°C to 31°C (86°F to 87.9°F) for moderate-intensity work, and 31.5°C to 32.5°C (88.7°F to 90.5°F) for low-intensity work. Countries with cooler climates often adopt more conservative thresholds, as their populations tend to be less physiologically acclimatized to elevated temperatures. Note, however, that humidity must also be taken into account, as relatively high temperatures with low humidity could be considered safer, while lower temperatures with high humidity could be considered more dangerous.

Establishing an Excessive Heat Day Threshold Using the Heat Index

The best way to protect workers from excessive heat is to collect certain data on temperature and humidity from multiple locations within the factory/facility, particularly around processes/locations in the factory known to create significant heat, or that have poor ventilation. The best approach, in the long run, is to place Wet Bulb Global Temperature (WBGT) monitors at various locations around the factory/facility, collect and monitor that data over a series of years (usually five years), and then develop excessive heat thresholds based on that data that are not only specific to the factory/facility but to the most concerning processes/locations within that factory/facility.

AAFA recommends that factories/facilities start building this data set now. *See appendix for more information on how to get started.*

But workers face threats from heat stress today.

As brands work to collect the necessary data to create an accurate excessive heat day plan, it is vital to continue monitoring working environments and limit work in high-risk conditions.

In some countries, national or regional governments have already established by law excessive heat thresholds. For factories/facilities located in those regions/countries, AAFA recommends that the factory/facility adopt those thresholds, not only to be in compliance with the law, but to instead focus on mitigating worker exposure to those thresholds and protecting workers when those thresholds are met.

In the absence of national or local standards that are established by law, AAFA recommends that factories create a simple Heat Index from available local weather data. The Heat Index is measured using the local environment's air temperature (°C) and relative humidity (%).

We recommend consulting with local weather stations for the most accurate and up-to-date data for the relevant region or country. Organizations such as the World Bank also provide historical weather data, including average min, max, and mean temperatures and relative humidity for all countries across the globe. Users can also look up specific locations by province as well as by longitude and latitude. The portal provides future projections which can be useful for long-term risk analysis. If previous data is unavailable, record the necessary information as soon as possible. These measures are cross-referenced into a table produced by the National Oceanic and Atmospheric Administration (NOAA) to produce the final Heat Index Temperature (°C).

Brands should use the provided Heat Index information, and air temperature (°C) and relative humidity (%) data available at national or local meteorological organizations to create an extreme heat day monitoring and action plan as soon as possible.

Brands should determine the average Heat Index during the hot season over five years and use a 15 percent increase to determine the threshold for an excessive heat day. Below is the NOAA Heat Index chart and OSHA guidelines, for more information see appendix.

National Oceanic and Atmospheric Administration's (NOAA) National Weather Service Heat Index

TEMPERATURE (°C)

RELATIVE HUMIDITY (%)

	26.7	27.8	28.9	30	31.1	32.2	33.3	34.4	35.6	36.7	37.8	38.9	40	41.1	42.2	43.3
40	26.7	27.2	28.3	29.4	31.1	32.8	34.4	36.1	38.3	40.6	42.8	45.6	48.3	51.1	54.4	57.8
45	26.7	27.8	28.9	30.6	31.7	33.9	35.6	37.8	40	42.8	45.6	48.3	51.1	54.4	58.3	
50	27.2	28.3	29.4	31.1	32.8	35	37.2	39.4	42.2	45	47.8	51.1	55	58.3		
55	27.2	28.9	30	31.7	33.9	36.1	38.3	41.1	44.4	47.2	51.1	54.4	58.3			
60	27.8	28.9	31.1	32.8	35	37.8	40.6	43.3	46.7	50.6	53.9	58.3				
65	27.8	29.4	31.7	33.9	36.7	39.4	42.2	45.6	49.4	53.3	57.8					
70	28.3	30	32.2	35	37.8	40.6	44.2	48.3	52.2	56.7						
75	28.9	30	33.3	36.1	39.4	42.8	46.7	51.1	55.6							
80	28.9	31.7	34.4	37.8	41.1	45	49.4	53.9								
85	29.4	32.2	35.6	38.9	43.3	47.2	52.2	57.2								
90	30	32.8	36.7	40.6	45	50	55									
95	30	33.9	37.8	42.2	47.2	52.8										
100	30.6	35	39.4	44.4	49.4	55.6										

CAUTION

EXTREME CAUTION

DANGER

EXTREME DANGER

LIKELIHOOD OF HEAT DISORDERS WITH PROLONGED EXPOSURE OR STRENUOUS ACTIVITY

OSHA Heat Index Guidelines

HEAT INDEX	RISK LEVEL	PROTECTIVE MEASURES
Less than 32.8°C	Lower(Caution)	Basic heat safety and planning
32.8 to 39.4°C	Moderate	Drink ~4 cups of water/hour Take breaks as needed
39.4 to 46.1°C	High	Drink water every 15-20 minutes Take frequent breaks Schedule heavy work tasks when the heat index is lower
Greater than 46.1°C	Very hight to extreme	Drink water frequently Reschedule non-essential heavy work if possible Alert workers to heat index for the day and identify precations in place including who to call for medical help

This guidance is available online at www.osha.gov/SLTC/heatillness/heat_index

Example: Calculating Excessive Heat Thresholds Krong Koh Kong, Cambodia

Average readings over 5-year-period:
Air Temperature: 31.1°C
Relative Humidity: 70%
Heat Index: 37.8°C (WBGT 28)
Excessive Heat Index Threshold: 1.15 * 37.8°C = 43.5°C (approx. 31.1°C x 85% humidity)

In this example, when conditions where Heat Index readings **exceed 43.5°C**, operations should be **limited to light work**.
Source: Meteologix

Again, the Heat Index is a simple guide to mitigate heat stress and works well as a preliminary tool in doing so. Every manufacturing facility is different and eventually utilizing more facility specific measures should be phased in. As noted, the Wet Bulb Global Temperature (WBGT) is a more accurate measure of excessive heat but is more complex and costly to maintain. As an initial measure, the Heat Index is recommended, but eventually more specific measures like the WBGT should be implemented to be as accurate as possible, whilst also acknowledging the cost to manufacturers. For more information on the WBGT, *See appendix.*

Workload Factors and Affected Operations

In the event of an excessive heat day, workloads should not exceed a light workload. In determining which operations to permit on an excessive heat day, employers should consider the workload for each specific operation and take the following steps:

1. First measure the environmental heat using Heat Index (eventually WGBT) and determine whether an excessive heat day is in effect.
2. Next, estimate the workload as shown below.
3. Determine whether the worker is acclimatized to heat or not. Consult later sections on determining the acclimatization of workers.
4. Determine which specific operations exceed heat thresholds and what operations should be adjusted because of hazardous work environments.

Workloads

- *Rest (110 Watts)*: sitting, thinking.
- *Light (180 Watts)*: Sitting with minimal hand and arm work, sewing, writing or drawing, driving a car, occasional or slow walking, stooping, crouching, or kneeling.
- *Moderate (300 Watts)*: Pushing and pulling light carts, hammering nails, picking fruit or vegetables, continuous and repetitive movements, driving or operating mobile equipment, mopping or vacuuming floors
- *Heavy (415 Watts)*: Intense arm and trunk work, carrying loads, sawing or heavy carpentry, loading and unloading shelves, machines, or pallets, pushing and pulling heavy carts or wheelbarrows, machine assembly or repair.
- *Very heavy (520 Watts)*: Any activity done at near maximum pace; climbing stairs, ladder, or ramp; using an axe, intense shoveling or digging, sledgehammer use, stacking concrete.

The International Labor Organization highlights the importance of workload modifications. There is a risk of productivity loss in environments as cool as 16°C (60.8°F), which rises exponentially with every 1°C increase. At 33°C (91.4°F), the risk of harm and productivity loss is especially high, with most work capacity already lost. At 38°C (100.4°F), work becomes impossible unless risk mitigating strategies are implemented.

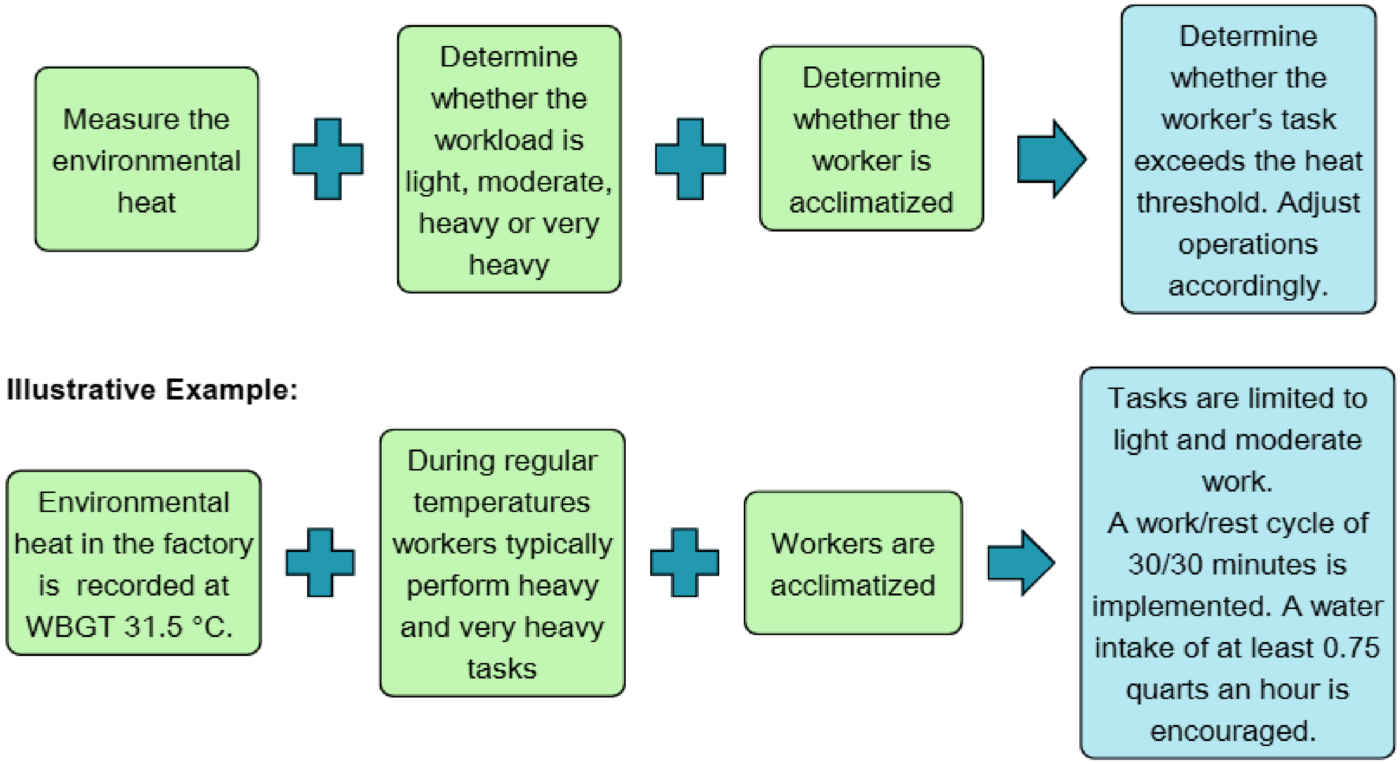


Figure 1: Step-by-step illustration of the decision-making process when faced with an excessive heat day. See Table 1 below for specific guidelines on work/rest cycles. Data adopted from: National Institutes of Health (NIH) *and the* American Conference of Government Industrial Hygienists.

Reporting and Monitoring Excessive Heat

Factories should implement a comprehensive heat injury and illness prevention plan that includes clear procedures for identifying and monitoring heat-related hazards. Employers should assess the need for formal heat stress management programs and consider aligning their practices with those found in the ILO Code of Practice on Safety and Health in Textiles Clothing and Footwear or Heat at Work: Implications for Safety and Health These programs should focus on a Heat Monitoring Program and a Heat Action Plan.

Monitoring Workplace Temperatures

Install temperature and humidity monitoring systems to track conditions.

Monitoring workplace temperatures should account for environmental heat. The four recognized factors that contribute to environmental heat and workforce heat stress are: temperature; humidity; radiant heat; and air movement. Therefore, the U.S. Occupational Safety & Health Administration (OSHA) recommends the use of a wet bulb globe temperature (WBGT) monitor, an instrument which measures all four factors, to measure workplace environmental heat. AAFA acknowledges these technologies require upfront capital investment, we would encourage brands to work with factories in their supply chains and collaborate on available options. As an initial and reliable indicator, utilizing the Heat Index to monitor workplace temperatures is acceptable, but more specific measures like WBGT are encouraged to be phased in steadily.

Reporting and Monitoring of Heat-related Illness

To evaluate and improve prevention and control measures for heat-related effects (including the need for exposure assessment), the following should be obtained and analyzed for each workplace:

- workplace modifications,
- identification of highly susceptible workers,
- data on the occurrence or recurrence of heat stress in the same worker,
- distribution in time, place, and person of heat-related adverse effects, and,
- environmental or physiological measurements related to heat.

Heat Stress Assessments

Evaluate work processes to identify heat exposure risks and mitigate them where possible. It is recommended that facilities identify operations where workers are exposed to high heat and humidity at any stage in the facility; and that all identified risks have the controls necessary to remove the hazard or reduce risks to the lowest practicable level. This begins by collecting the empirical data above, as well as engaging workers and their representatives to identify heat stress risk factors.

Transparent and open worker engagement should involve discussions regarding workplace policies, the tasks being performed, workloads and their duration, availability of hydration and bathroom facilities, and the overall environmental conditions such as air movement or humidity. This includes initial discussions to develop heat guidelines as well as periodical check-ins to revise and adapt the guidelines. The World Meteorological Organization indicates that involving workers throughout the process of developing heat guidance not only ensures that the guidance is tailored to the specific and unique needs of factories/facilities but also increases likelihood of worker compliance.

When workers are meaningfully engaged and offered the opportunity for agency in developing strategies for improvements in working conditions, outcomes are more effective. For example, the Fair Trade Certified™ model requires worker participation that allows workers to bring their individual and group experience to bear in designing strategies and solutions to the circumstances that they are more familiar with than other actors in the supply chain. Any system or framework that seeks to benefit workers will only be stronger for their direct engagement. Combining their 1st-person insight and solutions that they have already developed based on need with other best practices create more robust and impactful solutions. This approach has proven highly successful in reducing unintended consequences that can come from strictly top-down frameworks and requirements, while also boosting worker satisfaction and productivity.

Worker Medical Monitoring

Following ILO guidance, employers should establish medical monitoring programs for workers with exposure to occupational heat stress. The medical monitoring program should clearly inform workers about the physiological mechanisms and impact of heat stress and the rationale behind preventative measures such as medical screening, health surveillance, and self-regulation. The medical monitoring program should include elements of medical screening and health surveillance by a qualified healthcare professional, with the goal of early identification of signs or symptoms that may be indicators of heat-related illness. It is recommended that these check-ups are conducted regularly and by a medical professional as they can test for both ‘temporary’ signs of heat-stress such as dehydration as well as long-term and underlying impacts such as reduced kidney health. Details on identifying heat-related symptoms and illness, and the necessary actions to follow can be found in Table 1.

Maintaining the medical privacy of workers is an equally important aspect of the monitoring program. All medical data should be kept between individual workers and their respective healthcare professionals. Privacy and consent concerning medical wearable devices shall be left to the discretion of the worker. Medical monitoring should not be used punitively and is solely for the protection of a worker’s health. Medical professionals can advise employers about adjusted work practices/recommendations needed to accommodate the worker but not share their medical information.

Medical Monitoring Program Oversight

The program should include all workers exposed to hot environments as well as workers with personal risk factors, including medical conditions/and or a history of heat-related illness. The employer should assign responsibility for the medical monitoring program to a responsible healthcare provider. The responsible provider should be a qualified (as established by national law) healthcare professional who is informed and knowledgeable about the following:

- Potential workplace exposure to heat and hot environments;
- Administration and management of a medical monitoring program for occupational hazards;
- Identification and management of heat-related illnesses;
- Confidentiality of worker’s medical information; and
- Where respiratory protection is being used, the establishment of a respiratory protection program based on an understanding of the requirements of the national respiratory protection standard and types of respiratory protection devices available at the workplace.

Roles and Responsibilities

Brands/Buyers:

- Support responsible purchasing practices that allow suppliers to implement heat mitigation measures, including reasonable lead times and pricing that account for worker protection measures;
- Encourage and reinforce heat stress management programs within supplier facilities through supplier codes of conduct, guidance, low-cost financing, and capacity-building initiatives;
- Promote transparency and dialogue with suppliers regarding heat-related operational challenges and mitigation strategies;
- Align monitoring and compliance expectations with recognized occupational safety standards related to heat stress; and
- Collaborate with suppliers to address risks identified through monitoring, assessments, or worker feedback.

Manufacturers/ Suppliers:

- Implement workplace heat stress prevention programs, including monitoring temperatures/humidity via Heat Index or WBGT, identifying high-risk tasks, implementing heat mitigation strategies, and establishing heat action plans;
- Provide workers with appropriate protections, such as rest breaks, hydration, shaded or cooled rest areas, and access to medical support when needed;
- Conduct worker training and awareness programs to ensure employees can recognize symptoms of heat-related illness and know how to respond; and
- Engage workers and worker representatives in identifying risks, reporting concerns, and improving mitigation measures.

Table 1: Identifying Heat-Related Illnesses

The table below can serve as a resource for workers to identify serious heat-related illnesses and to understand the appropriate first aid and other necessary action. We recommend that charts are available to workers in both English and the local language. *(Adopted from ILO: Heat and Work, Table 10)*

Responsible guidelines to identify heat-related illnesses These are presented in order of increasing severity and urgency. One or more observations of a sign for a given diagnosis indicate a positive determination for that diagnosis.		
Mild heat exhaustion	**Workers may say they feel:** - Tired/Fatigued - Thirsty - Weak - Dizzy - Lightheaded - Likely to faint with change in posture or prolonged standing - Muscle cramps	**Actions to follow:** - Inform supervisor - Move worker to cool area for recovery - Encourage worker to drink water and consume electrolytes - If symptoms persist after 15 minutes, treat as severe heat exhaustion
Severe heat exhaustion	**Signs:** - Wobbly walking - Slow recovery time - Severe muscle cramps - Vomiting or collapse without any signs of heatstroke (*see heatstroke column below*) **Person may say they feel:** - Severe fatigue - Loss of appetite - Nausea - Headache - Blurred Vision	**Actions to follow:** - Move worker to cool/air conditioned area for recovery - Encourage worker to lie down, drink water and consume electrolytes - Cover head, neck, and shoulders with towels soaked in ice water and ensure the towels remain cold by resoaking them every 2-3 minutes - If no ice or cold water is available, cool the worker's body with the most effective method available - Watch for signs of heatstroke - If there is little improvement in 15 minutes, arrange for medical treatment and continue to watch for possible heatstroke
Heatstroke	**Signs:** - Collapse/fainting - Loss of consciousness - Vomiting - Erratic/irritable behavior - Confusion/disorientation - Garbled/gibberish speech - Hysteria/delirium/apathy - Shivering Convulsions **Person may say they feel:** - Severe fatigue - Nausea	**Actions to follow:** This is a situation requiring emergency response. Begin aggressive cooling (cover the worker's body in ice or place in cold/ice water bath). If ice-cold water or ice is not available, flush water over the person using a hose or shower or keep the skin wet and fan. It is vital to cool the worker's body with the most effective method available. Call emergency services and advise them that it is a heatstroke case.

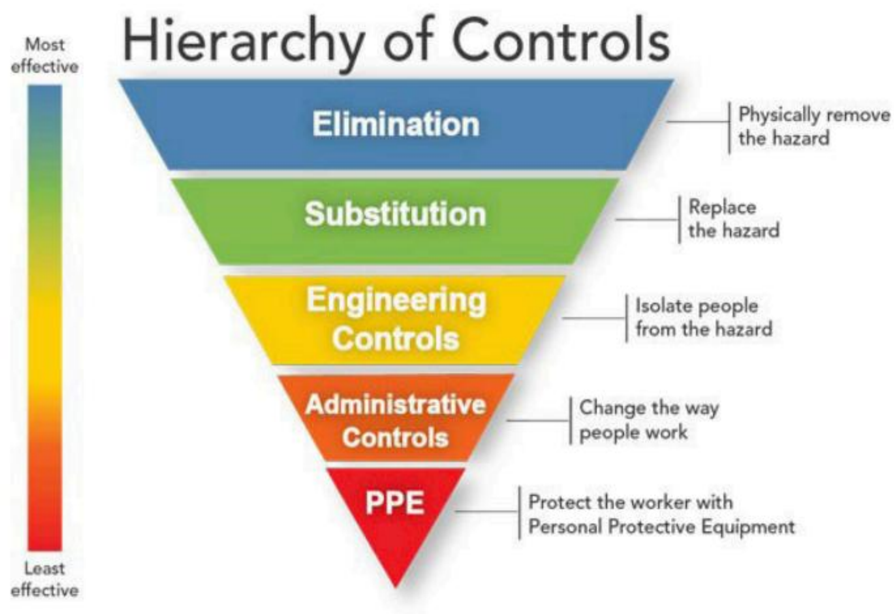
Additional Conditions to Consider

- **Dramatic Temperature Shifts:** Sudden temperature shifts, like random hot days in the cold season (Ex: 4°C average month with a 24°C weekend), pose a greater risk to heat stress. Even though the temperature may be safe in normal conditions, the sudden change means that workers are not acclimated and, in some cases, may have lost their heat adaptations, necessitating a renewed acclimatization process. It is also important to consider that extreme weather events, such as droughts, tropical cyclones, and storms, are often accompanied by drastic temperature shifts which may impact workers' heat adaptation as well as their overall health.
- **Dramatic Shifts in Humidity**: Similar to sudden temperature shifts, workers in facilities that experience large changes in relative humidity (%) in short periods of time are at a greater risk of heat stress than those with constant levels of humidity. The monsoon season and other heavy rain conditions can increase humidity on an hourly basis, as rain turns to vapor and ocean winds bring moisture. Facilities in regions that experience frequent storms during hot seasons or experience a monsoon season should take this into account, as workers will not be acclimated to such humidity and heat stress levels. Even relatively moderate temperatures can become dangerous when humidity is high.
- **Air Pollution and other outside factors:** Recent studies have demonstrated that the health risks posed by extreme heat or air pollution are multiplied when the two factors are combined. According to the European Environment Agency, 2023, "The increased mortality risk related to exposure to extreme heat was **6.1%** and for elevated [Air Pollutants] was **5.0%**, however the mortality risk for combined exposure to both extreme heat and [Air Pollutants] was estimated at **21%**". The ILO adds: "This cocktail of hazards has created serious health risks for 70 per cent of the world's workers."
    - Workers and factories that operate in environments with high levels of air pollution, like dense urban spaces, should include guidance on hydration, nutrition, and rest outside of working hours. Employers should also be cognizant of infrastructural disparities among workers. For instance, some regions are more prone to power outages and water shortages, limiting workers' ability to access potable water and cool environments outside of the workplace. Indeed, some companies encourage their workers to take clean portable water from their workplace to their homes. Heat-stress risk is cumulative; therefore, a holistic approach that encourages overall wellness, even outside of work, is essential to mitigate risk.
- **High Elevation:** At elevations above 1,500 meters, oxygen availability declines, and one's cardiovascular health is significantly impacted. These impacts are exasperated when a moderate to high amount of energy is being used, as the body will demand more oxygen. This risk can be mitigated through an extended acclimatization period to accustom workers' bodies to the thin air.
- **Gender:** On average, women account for the majority of deaths during heat waves. Women have lower aerobic capacity and lower whole-body sweat response, both of which significantly increase their risk to heat-stress relative to men in the same environment.
    - Pregnant workers are at an even greater risk because they have a higher metabolic heat output and need more fluids and food to maintain a healthy body and pregnancy. Heat exposure during pregnancy has been linked to the occurrence of stillbirth, preterm birth, congenital anomalies, and severe maternal health complications. These risks should be taken into account to avoid androcentric heat monitoring.
- **Clothing:** In factories where workers have mandated uniforms, it is important that the uniforms are loose-fitting and made from breathable natural fabrics that allow for air circulation and sweat evaporation, **not** synthetics which trap heat. It is equally important to keep in mind that some workers may prefer to dress modestly or wear traditional/religious clothes underneath the mandated uniforms; the required uniform should be lightweight and adaptable enough to accommodate this.
- **Individual Behavioral Risks:** Individual workers may engage in behaviors that increase their vulnerability to heat stress and damage their long-term cardiovascular health. Such behaviors could include smoking cigarettes, drinking large amounts of caffeine, or taking prescription drugs and other substances. While it is the worker's individual choice to engage in such activities outside of work hours, encouraging or enabling healthy practices can help mitigate heat-stress risks.

Hierarchy of Controls for Heat Stress Mitigation

The hierarchy of controls is a widely recognized occupational safety framework used to identify and prioritize measures to protect workers from hazards. The approach ranks control strategies from most to least effective: elimination, substitution, engineering controls, administrative controls, and personal protective equipment (PPE). Higher-level controls focus on removing or reducing the hazard at its source, while lower-level controls rely more heavily on worker behavior and protective equipment. In practice, effective heat stress prevention often requires a combination of these approaches to provide comprehensive protection.

In the context of occupational heat stress, elimination and substitution may be limited because work processes and climate conditions cannot always be fundamentally changed. However, engineering controls, such as improved ventilation, cooling technologies, or facility design, can significantly reduce workplace heat exposure. Administrative controls, including heat action plans, acclimatization programs, monitoring systems, and worker training, help manage exposure and ensure workers can recognize and respond to heat risks. Personal protective equipment (PPE) may also provide supplementary protection where other controls cannot fully eliminate risk. The following sections outline practical measures aligned with this framework to help facilities prevent and manage heat stress in the workplace. Below is a table made by OSHA outlining the Hierarchy of Controls, for more information click [here]:



Source: NIOSH.

Engineering Controls – ILO: Heat at Work

The most effective method for preventing heat stress, short of being able to change the weather, is to introduce engineering controls that can cool down the work environment. Such controls can also enhance the dissipation of heat from the worker's body to their environment. The aim of engineering controls is to address heat stress at its source, thereby enabling workers to perform their duties without facing the occupational safety and health risks arising from excessive heat.

- **Incorporating alternative building materials** with lower thermal conductivity, diffusivity, and absorptivity can be effective, particularly for buildings that are mainly used during the daytime. This is especially important where machinery generates a lot of heat.
- **Controlling the emission of heat radiation** can be achieved by installing surfaces that either reflect or absorb radiation at key workstations. Optimizing equipment layout by placing heat-generating machinery on the outskirts of the facility and placing local exhaust ventilation such as exhaust hoods near the machine can help trap and remove the hot air before it circulates. Smart sensors that activate cooling or reduce machinery power once optimal heat is reached can also be useful automatic tools to address heat from machinery. Increased ventilation and air circulation in rooms that have steam-generating processes would also help mitigate heat.
- **Providing mechanical and assistive tools for heavy work** like lifting or carrying can help reduce metabolic heat production.
- **Adopting nature-based solutions** can offer a sustainable approach using the cooling and shading benefits of natural elements. Planting trees and vegetation in and around workplaces can reduce ambient temperatures through shading and evapotranspiration, providing cooler environments for outdoor workers and reducing heat absorption by buildings, thus benefiting indoor workers as well. Geothermal and solar powered cooling systems can also be cost-effective and efficient sustainable solutions.
- **Active and increased general ventilation** involves the use of mechanical systems to bring outside air into the workplace, often coupled with an air purifier, to reduce workplace temperatures. This approach helps to keep the indoor environment fresh and cool by circulating external air.
- **Local air cooling** can be effectively implemented to lower air temperature in specific areas through the use of a cold room, which can either enclose a particular work area or serve as a recovery space close to jobs that involve excessive heat. Another example of targeted air-cooling includes placing fans at the level of buzz bars above sewing workstations and finishing lines i.e. work areas with minimal airborne particles. Providing workers with portable fans can also be beneficial.
- **Implementing evaporative cooling systems** and modifying the roof design to enhance natural ventilation can effectively lower the heat within a building and enhance air circulation.
- **Utilizing water sprays** in conjunction with fans can enhance airflow in the workspace, which is beneficial if the air temperature is lower than the worker's skin temperature.
- **Creating cooling down stations** that include potable water stations, shaded and cooled resting areas, and designated bathrooms.

Managing Extreme Heat

Heat Action Plan

OSHA and ILO recommend that employers create a written plan to prevent heat-related illness in hot weather conditions. The plan should be created in conjunction with workers. The completed plan should be shared with employees.

We must again emphasize the need for ongoing discussions between employers and workers, and between employers and buyers to manage possible trade-offs between reduced work intensity, productivity targets, and worker earnings. In often high stakes production environments, workload reductions could unintentionally shift economic risk onto workers or factories/facilities. Productivity planning, buyer flexibility, and wage protection mechanisms during excessive heat days must be built in to the Heat Action Plan to prevent adverse income impacts and production distortions.

Important elements to consider when creating the heat plan are:

- Who will provide oversight on a daily basis?
- What training will be provided to workers and supervisors?
- Who may be more susceptible to heat? For instance:
  - Pregnant workers or workers with a higher body mass have higher metabolic heat output, so they are more susceptible to heat stress.
  - Temporary and new workers are also more susceptible because they are not acclimatized to the heat. Workers returning from extended leave may also be at risk before they re-acclimatize.
  - Workers tasked with heat generating tasks like ironing, pressing, and dyeing are also more susceptible to heat stress.
- How will new and temporary workers gradually develop heat tolerance?
- How will heat stress be measured?
- How will the employer ensure that first aid is adequate?
  - How will they establish a protocol for summoning medical assistance in situations beyond first aid?
- What engineering and administrative controls will be used to reduce heat stress?
- How to respond when the country's weather service issues a heat advisory or heat warning?
- How will you determine if the total heat stress is hazardous?
- What additional environmental/local factors impact the risk of heat-related illness?

Heat Acclimatization and Maintenance

Acclimatization

Acclimatization is a physiological adaptation to a hot environment that occurs after incremental heat exposure. According to U.S. Centers for Disease Control and the National Institute for Occupational Safety and Health (CDC & NIOSH), workers should be acclimatized to their work environments during their onboarding process, especially when exposed to increased heat thresholds through the tasks that they carry out. The benefits of acclimatization include increased sweating efficiency; stabilization of circulation; work performed at lower core temperature and heart rate; and increased skin blood flow at given core temperature. These factors all contribute to a decreased risk of workforce heat stress. Effective acclimatization is a 7-to-14-day process that requires close observation and **cannot** be done through enduring to the point of heat exhaustion or even occasional air conditioning breaks.

Acclimatization Plan

Acclimatization plans should account for the following:

- Individuals with no or no recent exposure to excessive heat should be regarded as not acclimatized.
- Gradually increase exposure time in hot environmental conditions over a period of 7 to 14 days.
- For new workers, the schedule should be no more than 20 percent of the usual duration of work in the hot environment on day one, and no more than a 20 percent increase on each additional day.
- For workers who have had previous experience with the job, the acclimatization regimen should be no more than 50 percent of the usual duration of work in the hot environment on day one, 60 percent on day two, 80 percent on day three, and 100 percent on day four.
- Additional acclimation time is required for individuals with conditions that increase risk of heat related illness like heart and lung conditions, high body mass, pregnancy, and others.

Maintaining Acclimatization

Heat acclimatization can be maintained for a few days of non-heat exposure:

- Absence from work in the heat for a week or more results in a significant loss in acclimatization, leading to an increased likelihood of acute dehydration, illness, or fatigue.
- Acclimatization can be regained in two to three days upon returning to a hot job.
- Acclimatization appears to be better maintained by those who have greater cardiovascular health.
- Seasonal shifts in temperatures may result in additional difficulties.
- Working in hot, humid environments provides adaptive benefits that also apply in hot, desert environments, and vice versa.
- Air conditioning will not affect acclimatization.

Work/Rest Cycles; Shifts

The International Finance Corporation's Environmental, Safety, & Health (EHS) General Guidelines advises that temperature-related stress management procedures should include adjustment of work and rest periods according to temperature stress management procedures.

Factories should introduce work/rest cycles, allowing workers to cool down regularly in shaded or air-conditioned areas. Factories should also ensure that workers who have to wear personal protective equipment (PPE) have ample breaks and spaces where they can safely shed the protective gear in order to cool down. It is also recommended that workers have scheduled personal breaks, separate from lunch breaks, and in addition to regular discretionary bathroom breaks. According to several studies, many workers are pressured by management to drink less water so that they can keep working to meet production quotas. This is harmful to both their physical and mental health and reduces their work capacity and productivity. Numerous studies suggest that restful break cycles produce considerable increases in productivity that could make up for the work lost if breaks were not taken. Detailed work/rest cycles can be found in Table 2.

Water Conditions; Hydration Programs

- Employers should provide a means for appropriate hydration. This may include providing potable water at a cool temperature and making sure that it is accessible near the work area. Employers should encourage their workers to hydrate often and regularly.
    - It is also recommended that during prolonged sweating, lasting several hours, workers should have access to and drink hydration drinks that contain balanced electrolytes.
- We recommend that facilities post signs and reminders encouraging workers to drink water at regular intervals. Educational campaigns explaining the importance of hydration in the native language of the workers are effective.
- Misting with water has also been found to be an effective measure of mitigating heat stress, so plenty of water should be available to the worker for both consumption and cooling maintenance.

Table 2 – Recommendations for Fluid Replacement and Work/Rest Cycles

International Standard Organization (ISO) 7243 and NIOSH standards state that manufacturing industry workers average a work intensity of 300 watts (W). The National Institutes of Health (NIH) and the American Conference of Government Industrial Hygienists (ACGIH) provide Work/Rest and Fluid Intake Guidelines for acclimatized workers (adapted into the table below by AAFA). This Table should act as a guide for factories/facilities and their workers to follow while undertaking all tasks at work. See table below.

W = Watts: a measurement of power output; Watts (power) = Force × Velocity. For examples of tasks classified in each category, see the 'Workload' section above.

Recommendations for fluid replacement and work/rest cycles						
	Easy Work (117-233 Watts)		**Moderate (234 - 407 W)**		**Hard Work (408 W - 581 W)**	
WBGT	**Work/Rest (minutes)**	**Water Intake (qt/hr)**	**Work/Rest (minutes)**	**Water Intake (qt/hr)**	**Work/Rest (minutes)**	**Water Intake (qt/hr)**
78 - 81 °F (25.6 - 27.7 °C)	No limit*	0.5	No limit	0.75	40/20	0.75
82 - 84.9 °F (27.8 - 29.4 °C)	No limit	0.5	50/10	0.75	30/30	1.0
85 - 87.9°F (29.4 - 31.1 °C)	No limit	0.75	40/20	0.75	30/30	1.0
88 - 89.9°F (31.1 - 32.2 °C)	No limit	0.75	30/30	0.75	20/40	1.0
90°F + (32.2°C +)	50/10	1.0	20/40	1.0	10/50	1.0

**Fluid needs can vary based on individual preferences (±0.25 qt/hr) and exposure to full sun or full shade (±0.25 qt/hr.). Fluid intake should not exceed 1.5 qt/hr.; daily fluid intake generally should not exceed 12 quarts. This is not to suggest limiting fluid intake by highly conditioned persons, who may require greater than 12 quarts daily.*

Note: Rest = sitting or standing in an area with lower ambient temperatures

Worker Training, Awareness, & Monitoring Programs

Worker Training

Employers should also train workers to self-assess and mitigate early signs of heat stress in themselves and others. This heat-stress training program should include, at a minimum, the following:

- The risks of excessive heat, including the environmental and physiological factors that contribute to heat stress.
- Recognition, treatment, predisposing factors, signs, and symptoms of heat-related illness.
- Self-regulative methods of mitigating heat stress; this includes informing workers of their right to adjust work pace and remove themselves from dangerous situations without reprimand.
- Proactive health management: this includes giving techniques to decrease their susceptibility to heat stress. For instance, assessing urine color and appropriate charts in all workplaces lavatories to help workers improve their fluid intake.
- Employer responsibilities and worker duties in preventing heat stress, including maintaining shaded rest areas, scheduling adequate breaks, and adjusting workloads during high heat.
- Dangers of using recreational drugs, cigarettes, and alcohol in hot working environments.
- Guidance on the use of medications to manage health conditions when work involves exposure to excessive heat.
- Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation in such programs.

The training program should also be inclusive of and tailored to more vulnerable groups such as pregnant workers, workers with a higher body mass, those with chronic health conditions, temporary and new workers, newly acclimatized workers, and those workers assigned with heat-generating tasks.

An emergency preparedness and response plan should be developed to equip workers and supervisors with the skills to promptly identify early signs of heat-related illnesses, including: heat fatigue, malaria, or heat rash, heat syncope, heat cramp, heat edema, heat exhaustion, heat stroke, fluid/electrolyte disorders, cardiovascular impacts/disease, respiratory impacts/disease, and acute/chronic kidney injury.

During established dangerous heat conditions, workers shall maintain the right to refuse work without penalization or punitive action. Encouraging active engagement with workers in the development of heat protection plans can sponsor a collaborative relationship between employer and employee, where a worker is not punished for utilizing their own protections in refusing work. Any plan must also consider the potential impact on worker pay as well as production timelines.

Again, employers should partner with workers to develop the training itself. When workers are meaningfully engaged and offered the opportunity for agency in developing strategies for improvements in working conditions, outcomes are more effective. For example, the Fair Trade Certified model requires worker participation that allows workers to bring their individual and group experience to bear in designing strategies and solutions to the circumstances that they are more familiar with than other actors in the supply chain. Any system or framework that seeks to benefit workers will only be stronger for their direct engagement. Combining their 1st-person insight and solutions that they have already developed based on need with other best practices create more robust and impactful solutions. This approach has proven highly successful in reducing unintended consequences that can come from strictly top-down frameworks and requirements, while also boosting worker satisfaction and productivity.

Return to Work After Severe Heat Related Illnesses

The decision about when an individual can return to work after suffering a serious heat-related illness must be made by the responsible healthcare provider, based in part on contributions from the manager and the worker themself. Depending on the severity of the heat related illness – previous recommendations in this guidance suggest that workers should not resume full activity for at least one week after suffering from a minor heat-related illness. In cases of serious heat-related illness, a recovery period of up to 15 months may be necessary. There should be no retaliation against the worker for following responsible healthcare provider guidance. *See acclimatization.*

For workers who have suffered from heatstroke or severe heat exhaustion, it is advised that they refrain from any physical activities beyond those necessary for daily living, including regular work, for a period of two weeks. During this time, the worker should undergo weekly medical re-evaluations, which may include clinical and biochemical examinations and, if necessary, diagnostic imaging of any affected organs. Once all symptoms and signs have cleared, the worker should undergo a physical rehabilitation program, guided by an exercise specialist. This program should involve a gradual increase in physical exercise, not exceeding 60 minutes per day. If the exercise is well-tolerated and the worker shows no adverse reaction to physical work or heat (such as unexplained increases in heart rate or core body temperature, or abnormal liver and muscle enzyme levels), they can then be medically assessed for their readiness to return to work. For workers who have experienced heatstroke or severe heat exhaustion, the decision to return to work should be made on an individual basis following a thorough clinical assessment. This decision should be based on several key criteria:

- The worker should be symptom-free.
- The clinical examination should reveal no abnormalities.
- Laboratory tests should show no abnormal findings.

There should be a well-structured, progressively challenging physical heat-load test conducted under close monitoring. This test should closely mimic the worker's actual job tasks and the environmental conditions in which they work. The worker's ability to tolerate both physical work and the heat, as well as their cardiovascular stability and blood chemistry biomarkers, should be evaluated.

Again, there should be no retaliation against the worker during this process.

Additional Preventative Measures

The Buddy System

The buddy system is where two colleagues (the “buddies”) work closely together as a unit, allowing them to keep watch over and assist each other in quickly identifying signs of excessive fatigue and heat-related illnesses during their shifts. To implement this approach, workers and supervisors must first undergo a comprehensive heat stress education and training program.

Improving Workers’ Physical Fitness

The ILO recommends that improving worker’s physical fitness can help minimize the risk of heat-related illness, citing that individuals with an efficient cardiovascular system dissipate heat from the core of the body to the skin more easily, and enhance the body’s capacity to sweat, which is the most important method of heat dissipation from one’s body.

Job Rotations and Schedules

Administrative controls are essential in preventing workers from exposure to hot environments and can be achieved through work assignments. Alternating work assignments allow individuals who perform physically demanding tasks and/or work in hot areas of a worksite to spend time doing less intense work and in cooler areas during their shift. When feasible, work that is physically demanding and takes place in hot environments should be planned for cooler times of the day and regular maintenance or repair work in these hot areas should be arranged during the cooler seasons of the year.

Adjusting Working Hours

When considering changes to working hours, such as introducing night shifts to mitigate heat stress, it is crucial to address significant social and safety implications. In an industry with a predominantly female workforce, late-night hours pose serious safety risks. Additionally, night shifts can impact workers’ quality of life by infringing upon time allocated for family activities, domestic labor, and childcare. It may be beneficial to give workers the *option* of changing their working hours to avoid peak heat conditions; however, it may be counterproductive to mandate nightshifts. Moreover, night shift workers still require work/rest cycles.

PPE (Personal Protective Equipment) Adaptations

PPE should only be used in cases where it is not possible to implement any other control measures to prevent heat stress. Assessing which PPE solutions are available to facilities must take into account that some forms of PPE can increase the risk of heat stress (impermeable garments), and some respiratory equipment may not be suitable for hot environments. Simpler, lightweight forms of personal protective equipment (PPE) are often more practical, cost-effective, and have been shown to help reduce workers’ risk of heat stress but should be used as a last measure of mitigation.

Recommendations for PPE solutions may include:

- Water-cooled garments
- Air cooled garments
- Cooling vests
- Wetted overgarments

Establishing a Heat Alert Program

CDC guidelines recommend establishing a Heat Alert Program in the factory for preventative purposes. While these programs may differ in detail, depending on climatic and worksite conditions, they should serve the purpose of acknowledging and mitigating adverse risk situations. For example, if a heat wave is predicted for the next day or days, a state of Heat Alert for an excessive heat day is declared to make sure that measures to prevent heat casualties will be strictly observed. An effective heat alert program is described below:

- Establish a Heat Alert Committee, which may consist of a responsible healthcare provider, safety engineer, operation engineer, manager, and worker.
    - This Health Alert Committee could be incorporated into, or be a subcommittee of, an already existing Health & Safety Committee in the factory.
    - The Committee should arrange a training course for all involved in the Heat Alert Program that provides procedures to follow in the event a Heat Alert is declared.
    - The Committee should establish criteria for the declaration of a Heat Alert.
- Instruct supervisors to perform these tasks:
    - Ensure that there is greatest ventilating efficiency at places where high air movement is needed.
    - Check drinking fountains, misting options, fans, and air conditioners to make sure that they are functional.
    - Ensure that all facilities required to give first aid in cases of heat-related illness are in a state of readiness.
- Procedures to be followed during the state of Heat Alert are as follows:
    - Postpone tasks that are not urgent until the heat wave is over.
    - Increase the number of workers in each team in order to reduce each worker's heat exposure.
    - Increase rest and bathroom allowances.
    - Turn off heat sources that are not absolutely necessary.
    - Remind workers of the importance of staying hydrated.
    - Monitor Heat Index (or WBGT).
    - Exercise increased caution on the first day to ensure workers are not overexposed.
    - Send workers home who show signs of heat-illness, including minor ones, for medical evaluation.
    - Restrict overtime work.
    - Suspend piece-rate payment mechanisms.
    - Some companies have also partnered with trade unions and local government to pilot parametric insurance systems.

Action Items – Heat Stress Mitigation: Practical Action Checklist

For Manufacturers / Facilities

- Establish a heat threshold (e.g., WBGT or heat index) that triggers action
- Monitor and record daily temperature and humidity levels in work areas
- Implement a Heat Action Plan with clear triggers (e.g., rest breaks, schedule changes)
- Provide cool drinking water that is accessible at all times
- Ensure access to shaded or cooled rest areas
- Adjust work/rest schedules during high heat periods
- Implement or improve ventilation, fans, or cooling systems where feasible
- Conduct worker training on heat illness symptoms and response procedures
- Establish incident reporting systems for heat-related illness
- Develop emergency response protocols for heat stroke and severe illness
- Introduce acclimatization protocols for new or returning workers
- Engage workers in identifying heat risks and solutions

For Brands / Buyers

- Incorporate heat stress expectations into supplier codes of conduct
- Align lead times and production planning with seasonal heat risks
- Allow flexibility for adjusted work hours or reduced daily output during extreme heat
- Ensure pricing structures account for implementation of worker protection measures
- Engage suppliers in regular dialogue on heat risks and mitigation challenges
- Support capacity building (training, guidance, technical support) where needed
- Avoid practices that incentivize excessive overtime during extreme heat conditions

Shared Actions (Brands + Suppliers)

- Establish clear communication channels during extreme heat events
- Review heat-related incidents and data to improve prevention strategies
- Collaborate on long-term investments (e.g., cooling infrastructure)
- Commit to continuous improvement rather than one-time compliance

FAQ's – Frequently Asked Questions

Q: What should a facility do first to address heat stress?
A: Begin by identifying a heat threshold (e.g., heat index or WBGT), monitoring workplace conditions, and implementing a basic heat action plan that includes rest breaks, hydration, and worker training.

Q: What are the most critical protections for workers?
A: Access to drinking water, rest breaks, shaded or cooled recovery areas, and training to recognize heat illness symptoms are foundational measures.

Q: What if engineering controls are not immediately feasible?
A: Facilities should prioritize administrative controls such as adjusted schedules, increased rest periods, and acclimatization programs, while planning for longer-term improvements.

Q: How should brands support implementation?
A: Brands should align purchasing practices, including lead times and pricing, with the realities of heat mitigation, and maintain open communication with suppliers regarding heat-related disruptions.

Q: Will heat mitigation impact production timelines?
A: It may. Adjusted work hours or rest periods can reduce daily output, but these measures are necessary to protect worker health and prevent more severe disruptions, and sometime actually increase productivity.

Q: Who is responsible for ensuring compliance?
A: Responsibility is shared. Facilities implement on-the-ground protections, while brands and buyers must ensure their commercial practices enable and support those protections.

Q: How should facilities respond to extreme heat events?
A: Activate heat action plans, increase monitoring, adjust workloads, and, if necessary, temporarily halt operations to prevent serious health risks.

Quick Guide

Step 1: Determine the Threshold for Excessive Heat Days

- Maximum thresholds for workplace safety vary within countries.
- Utilize the Heat Index to monitor facility temperatures and humidity. Steadily phasing into Wet Bulb Global Temperature (WBGT) monitoring systems as resources increase to improve accuracy.
- Engage workers, their representatives, and managers to determine what specific operations should be adjusted when temperatures exceed certain thresholds.
- Consult regional and national labor and public health codes regarding workplace temperature, ventilation, humidity, and room capacity.

Step 2: Establish Heat Stress Monitoring Programs

Engage workers, their representatives, managers and local healthcare professionals to create three written plans: a Heat Action Plan, an Acclimatization Plan, and a Medical Monitoring Program. These plans should detail workplace modifications and daily controls to prevent heat-related illnesses.

We must again emphasize the need for ongoing discussions between employers and workers, and between employers and buyers to manage possible trade-offs between reduced work intensity, productivity targets, and worker earnings. In often high stakes production environments, workload reductions could unintentionally shift economic risk onto workers or factories/facilities. Productivity planning, buyer flexibility, and wage protection mechanisms during excessive heat days must be built in to the Heat Action Plan to prevent adverse income impacts and production distortions.

Heat Action Plan

Some questions to consider:

- Who will provide oversight on a daily basis?
- What training will be provided to workers and supervisors?
- Who may be more susceptible to heat? Include specific provisions for pregnant workers, temporary and new workers, workers with a higher body mass, and workers tasked with heat generating tasks like ironing, pressing, and dyeing etc.
- How will new and temporary workers gradually develop heat tolerance?
- How will heat stress be measured?
- How will the employer ensure that first aid is adequate?
    - How will they establish a protocol for summoning medical assistance in situations beyond first aid?
- What engineering and administrative controls will be used to reduce heat stress?
- How to respond when the country’s weather service issues a heat advisory or heat warning?
- How will you determine if the total heat stress is hazardous?
- What additional environmental/local factors impact the risk of heat-related illness?

Acclimatization Plan

This plan should detail the process of incrementally exposing workers to the environment in which they will work. Effective acclimatization is a 7-to-14-day process that requires close observation and cannot be done through enduring the point of heat exhaustion. *(see page 8-10 for specific guidelines)*

Medical Monitoring Program

This program:

- Clearly informs workers of the physiological mechanisms and impacts of heat stress;
- Educates workers about preventative measures such as medical screening, health surveillance, and self-regulation; and
- Assigns a qualified healthcare provider to conduct occasional medical screening and health surveillance with the goal of identifying signs and symptoms of heat-related illnesses early.

Step 3: Implement the Heat Action Plan

Ensure that:

- Workers are acclimatized.
- Workers are clearly informed about the physiological mechanisms, signs and symptoms, and impacts of heat stress; as well as preventative measures available in the workplace (e.g. the Medical Monitoring and Hydration Program) and outside.
- Facilities are engineered to keep the work environment cool, e.g. they conform to ventilation, humidity and room capacity codes; they have local air-cooling systems and/or provide mechanical and assistive tools for heavy manual work.
- The Heat Index (later WBGT) is monitored, and work, rest and hydration cycles –including workload and working hours modifications- are implemented accordingly.

Conclusion

Preventing occupational heat stress requires sustained engagement from workers, management, and supply chain partners alike. Workers play a critical role in identifying risks, reporting symptoms, and participating in training and prevention programs, while employers are responsible for ensuring that appropriate protections, monitoring systems, and response procedures are in place. Effective mitigation also benefits from collaboration across the supply chain, including brands, buyers, and manufacturers working together to support practical implementation of heat safety measures. Through shared commitment, open communication, and continuous improvement, industry can strengthen protections and help ensure that workers remain safe and healthy in increasingly hot working environments.

Appendix 1 – Heat Index

Below is a Heat Index developed by the U.S. National Oceanic and Atmospheric Administration (NOAA) that combines air temperature and relative humidity to estimate how hot conditions feel to the human body. The accompanying "effects of the heat index" table categorizes ranges of heat index values and identifies associated health risks, from fatigue and heat cramps at lower levels to heat exhaustion and heat stroke at more extreme conditions. These tools help illustrate how environmental conditions translate into escalating levels of heat-related risk for workers. See [here](#) for more information.

NOAA national weather service: heat index

Temperature / Relative humidity	80 °F (27 °C)	82 °F (28 °C)	84 °F (29 °C)	86 °F (30 °C)	88 °F (31 °C)	90 °F (32 °C)	92 °F (33 °C)	94 °F (34 °C)	96 °F (36 °C)	98 °F (37 °C)	100 °F (38 °C)	102 °F (39 °C)	104 °F (40 °C)	106 °F (41 °C)	108 °F (42 °C)	110 °F (43 °C)
40%	80 °F (27 °C)	81 °F (27 °C)	83 °F (28 °C)	85 °F (29 °C)	88 °F (31 °C)	91 °F (33 °C)	94 °F (34 °C)	97 °F (36 °C)	101 °F (38 °C)	105 °F (41 °C)	109 °F (43 °C)	114 °F (46 °C)	119 °F (48 °C)	124 °F (51 °C)	130 °F (54 °C)	136 °F (58 °C)
45%	80 °F (27 °C)	82 °F (28 °C)	84 °F (29 °C)	87 °F (31 °C)	89 °F (32 °C)	93 °F (34 °C)	96 °F (36 °C)	100 °F (38 °C)	104 °F (40 °C)	109 °F (43 °C)	114 °F (46 °C)	119 °F (48 °C)	124 °F (51 °C)	130 °F (54 °C)	137 °F (58 °C)	
50%	81 °F (27 °C)	83 °F (28 °C)	85 °F (29 °C)	88 °F (31 °C)	91 °F (33 °C)	95 °F (35 °C)	99 °F (37 °C)	103 °F (39 °C)	108 °F (42 °C)	113 °F (45 °C)	118 °F (48 °C)	124 °F (51 °C)	131 °F (55 °C)	137 °F (58 °C)		
55%	81 °F (27 °C)	84 °F (29 °C)	86 °F (30 °C)	89 °F (32 °C)	93 °F (34 °C)	97 °F (36 °C)	101 °F (38 °C)	106 °F (41 °C)	112 °F (44 °C)	117 °F (47 °C)	124 °F (51 °C)	130 °F (54 °C)	137 °F (58 °C)			
60%	82 °F (28 °C)	84 °F (29 °C)	88 °F (31 °C)	91 °F (33 °C)	95 °F (35 °C)	100 °F (38 °C)	105 °F (41 °C)	110 °F (43 °C)	116 °F (47 °C)	123 °F (51 °C)	129 °F (54 °C)	137 °F (58 °C)				
65%	82 °F (28 °C)	85 °F (29 °C)	89 °F (32 °C)	93 °F (34 °C)	98 °F (37 °C)	103 °F (39 °C)	108 °F (42 °C)	114 °F (46 °C)	121 °F (49 °C)	128 °F (53 °C)	136 °F (58 °C)					
70%	83 °F (28 °C)	86 °F (30 °C)	90 °F (32 °C)	95 °F (35 °C)	100 °F (38 °C)	105 °F (41 °C)	112 °F (44 °C)	119 °F (48 °C)	126 °F (52 °C)	134 °F (57 °C)						
75%	84 °F (29 °C)	88 °F (31 °C)	92 °F (33 °C)	97 °F (36 °C)	103 °F (39 °C)	109 °F (43 °C)	116 °F (47 °C)	124 °F (51 °C)	132 °F (56 °C)							
80%	84 °F (29 °C)	89 °F (32 °C)	94 °F (34 °C)	100 °F (38 °C)	106 °F (41 °C)	113 °F (45 °C)	121 °F (49 °C)	129 °F (54 °C)								
85%	85 °F (29 °C)	90 °F (32 °C)	96 °F (36 °C)	102 °F (39 °C)	110 °F (43 °C)	117 °F (47 °C)	126 °F (52 °C)	135 °F (57 °C)								
90%	86 °F (30 °C)	91 °F (33 °C)	98 °F (37 °C)	105 °F (41 °C)	113 °F (45 °C)	122 °F (50 °C)	131 °F (55 °C)									
95%	86 °F (30 °C)	93 °F (34 °C)	100 °F (38 °C)	108 °F (42 °C)	117 °F (47 °C)	127 °F (53 °C)										
100%	87 °F (31 °C)	95 °F (35 °C)	103 °F (39 °C)	112 °F (44 °C)	121 °F (49 °C)	132 °F (56 °C)										

Key to colors: Caution; Extreme caution; Danger; Extreme danger

Effects of the heat index (shade values) [edit]

Heat index	Notes
27–32 °C (81–90 °F)	Caution: fatigue is possible with prolonged exposure and activity. Continuing activity could result in heat cramps.
32–41 °C (90–106 °F)	Extreme caution: heat cramps and heat exhaustion are possible. Continuing activity could result in heat stroke.
41–54 °C (106–129 °F)	Danger: heat cramps and heat exhaustion are likely; heat stroke is probable with continued activity.
over 54 °C (129 °F)	Extreme danger: heat stroke is imminent.

Due to the varied nature of calculation and use of different measurements, academics warn that the Heat Index (HI) and WBGT are not exact equivalents, and WBGT is a more accurate measure of potential heat stress. On the ground research determined the relationship to be defined as:

WBGT(°C) = $-0.0110 \times \mathbf{HI}^2 + 1.336 \times \mathbf{HI} - 6.78$

Through this equation, AAFA staff has calculated the following Heat Index (HI) temperature approximate equivalent to upper Wet Bulb Global Temperature (WBGT) categories:
WBGT 28°C = HI 38°C
WBGT 30°C = HI 41.2°C
WBGT 32°C = HI 44.6°C

Appendix 2 – Wet Bulb Global Temperature (WBGT)

While the general weather temperatures from the Heat Index are helpful, they do not account for factory specific factors such as air circulation, cooling controls, and workloads. Thus, it is important for factories to develop their own specific temperature readings and thresholds for excessive heat days. AAFA recommends basing temperature readings on the Wet Bulb Global Temperature (WBGT) Index. The formula, according to the U.S. National Weather Service, is as follows:

$$WBGT = 0.7 \times Tw + 0.2 \times Tg + 0.1 \times Ta$$

Where:
Wet Bulb Temperature (Tw): *Measured by a thermometer with a wet cloth wrapped around the bulb, indicating the cooling effect of evaporation based on humidity levels.*
Globe Temperature (Tg): *Measured by a black globe thermometer, which absorbs radiant heat from the sun and surroundings.*
Dry Bulb Temperature (Ta): *The standard air temperature measured by a regular thermometer.*

In determining your WBGT work thresholds, AAFA suggests that factories collect data points on ***Tw, Tg, and Ta*** during the hot season in a country over a 5-year period to establish average readings for each measurable index. It is understood by climate scientists that by 2030, high temperatures and extreme weather will become an increasingly common experience, therefore any measurement after 2030 is at risk of ignoring the dramatic changes in climate and, in turn, heat stress at the workplace. To mitigate this risk, AAFA urges brands to start recording data as soon as possible.

Calculating Wet Bulb Global Temperature

To establish your thresholds, factories should use the formula above for WBGT, using the five-year average of ***Tw, Tg, and Ta***. Next, add a 15 percent increase to the result to establish **your specific threshold for an excessive heat day.**
Note that individual countries might have made their own recommendations. *See India Meteorological Department.*

Example: Calculating Excessive Heat Thresholds Krong Koh Kong, Cambodia
Average readings over 5-year period:

- **Wet Bulb Temperature (Tw):** 25°C
- **Globe Temperature (Tg):** - 34°C
- **Dry Bulb Temperature (Ta):** 30°C

Formula: $WBGT = 0.7 \times Tw + 0.2 \times Tg + 0.1 \times Ta$
1. Calculate the WBGT index:
   0.7 X 25°C + 0.2 X 34°C + 0.1 X 30°C = **28°C**
2. Calculate the Established Threshold:
   1.15 X 28°C = **32.2°C**
3. Interpret the Threshold:
   In conditions where WBGT readings **exceed 32.2°C**, operations should be **limited to light work**.

These numbers are illustrative. See section below on *Monitoring Workplace Temperatures* on how to obtain this information in the factory.

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