

## Limiting Heat Burden While Wearing PPE

### Can wearing personal protective equipment (PPE) increase the risk for heat-related illnesses?

Yes, wearing PPE and certain clothing ensembles can often increase your risk for heat-related illnesses.

PPE (i.e., waterproof aprons, surgical gowns, surgical caps, respirators, face shields, boots and gloves):

- Is often necessary and required in order to reduce or eliminate exposure to external hazards (chemicals, physical hazards and disease-causing organisms, i.e., viruses and bacteria)
- Reduces the body's normal way of getting rid of heat by sweating and other means.
- Holds excess heat and moisture inside, making the worker's body even hotter.
- Increases the physical effort to perform duties while carrying the extra weight of the PPE and can lead to the worker getting hotter faster (i.e., working muscle increases body heat production).

For additional information see 3.3 <https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf?id=10.26616/NIOSH PUB2016106> in the NIOSH Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments.

### What Steps Can be Taken to Protect Workers Wearing PPE from Heat-Related Illness?

Wearing certain types of PPE can increase core body temperature (i.e., internal temperature) more quickly than wearing other types of PPE in the same environment.

- Basic recommendations that can be applied to many different workplaces can be found on this link <https://www.cdc.gov/niosh/topics/heatstress/recommendations.html>
- If heat stress is a hazard at your workplace, consult with a safety and health professional and review the full recommendations provided in this link: <https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf?id=10.26616/NIOSH PUB2016106>
- Additionally, if PPE is a concern, consider the following when developing work/rest cycles:
  - Type of PPE
  - Length of time an individual can wear the PPE
  - Individual worker's actual work rate, fitness level, hydration level and acclimatization
  - Environmental conditions such as level of heat and humidity, radiant heat from sun if outdoors and wind speed if outdoors or using a fan indoors

### Are There Types of PPE That Can Be Worn to Protect Against Heat Exposures?

Yes, wearable PPE that protects against heat exposures are called auxiliary cooling systems or personal cooling systems (i.e., water-cooled garments, air-cooled garments, cooling vests and wetted overgarments) and can range in simplicity, cost and maintenance.

### Exceeding Recommended Occupational Exposure Limits

In situations where heat stress levels exceed the NIOSH recommended occupational exposure limit (RAL or REL), some form of heat-protective clothing or equipment should be provided.

### During Rest Breaks

Wearable personal cooling systems could also be used during a rest period where the worker is not actively engaged in work. Core body temperature decreases relatively slowly and simply stopping hard

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work will not result in an immediate decrease. Therefore, increasing the rate of heat removal from the body would reduce the risk for heat-related illness. Using wearable personal cooling systems could reduce the time required to lower core body temperature.

- Remove PPE and clothing ensembles
- While rehydrating, apply active (i.e., cold packs, cool, wet towels; wearable personal cooling system) or passive cooling methods (i.e., physical rest, move to a cool environment like an air-conditioned room or shaded area).

### **Limitations**

Wearable personal cooling systems have limitations within a work setting, such as:

- Ice vests are cheap, but their temperature cannot be controlled and they often do not stay cool long enough to be practical
- If the cooling system is too cold, this will result in reduced heat transfer from the body to the environment
- Water-cooled garments require that the worker be tethered to a system that circulates the cool water, which limits the person's range of operation
- Many of the wearable personal cooling systems are too heavy or too cumbersome to be practical in a work environment

[https://www.cdc.gov/niosh/topics/heatstress/heat\\_burden.html](https://www.cdc.gov/niosh/topics/heatstress/heat_burden.html)

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