

# How to Select the Right PPE Against Heat Stress



Each of the 5 kinds of heat stress PPE offer advantages and disadvantages.

Personal protective equipment (PPE) for heat stress sounds like a contradiction in terms. After all, donning extra equipment is the last thing anybody would want when temperatures, humidity and exertion levels are high. In fact, PPE can play a vital role in protecting workers from heat stress dangers. Here's a look at the 5 kinds of PPE available and the factors to consider in deciding whether to use each one at your workplace.

## 1. Reflective Clothing

Reflective clothing stops the skin from absorbing radiant heat. Forms range from aprons and jackets to suits that completely enclose the worker from neck to feet. **Downside:** Reflective clothing typically doesn't allow air exchange through the garment.

**Should You Use It'** Don't use reflective clothing as PPE for heat stress unless you can verify that the reduction of radiant heat more than offsets the loss in evaporative cooling. You can also minimize the evaporative cooling losses by having workers wear their reflective clothing as loosely as possible. If radiant heat is high, you can use one or more of the auxiliary cooling systems under reflective clothing.

## 2. Ice Vests

Most forms of heat stress PPE work directly on the body by helping it cool. One of the most commonly used auxiliary cooling systems is the ice vest which can be filled with water or dry ice (carbon dioxide).

**Should You Use Them'** Ice vests are a nice solution because they're commercially available, relatively cheap and easy to use. They're also fairly light and don't encumber mobility. **Downside:** Their cooling effects last only a couple of hours at moderate to heavy heat. So, you must ensure that the liquid coolant is replaced frequently especially in really hot conditions.

### 3. Wetted Clothing

Wetted clothing involves more than just dumping water over your overalls. It requires the use of specially designed clothing like wetted terry cloth coveralls or wetted two-piece, whole-body cotton suits.

**Should You Use It'** Like ice vests, wetted clothing is simple, cheap and easy to use. It's also generally most effective for high temperatures when humidity is low, where evaporation from the wetted garment isn't restricted. Workers can also use it while wearing reflective or other impermeable protective clothing.

### 4. Water-Cooled Garments

Such garments range from hoods which cool only the head, to vests and 'long johns' which cool the entire body. Use of this equipment requires a battery-driven circulating pump, liquid-ice coolant and container.

**Should You Use Them'** The weight of the components used in water cooled garments systems forces you to choose between mobility and length of the cooling period. Loading the system with ice weighs the worker down but allows for longer use; less ice increases mobility but limits duration of the cooling effects. The heat transfer rate in liquid cooling systems may limit their use to low-activity jobs; even in such jobs, their service time is only about 20 minutes per pound of cooling ice. To keep outside heat from melting the ice, an outer insulating jacket should be an integral part of these systems.

### 5. Circulating Air Systems

These systems direct compressed air around the body from a supplied air system. One type, which is used in combination with respiratory protection, forces exhaust air from a supplied-air hood ("bubble hood") around the neck and down inside an impermeable suit. The air then escapes through openings in the suit. Air can also be supplied directly to the suit without using a hood via a:

- Single inlet;
- Distribution tree; or
- Perforated vest.

You can also use a vortex tube to reduce the temperature of circulating air with cooled air from the tube flowing under the clothing or into a bubble hood. The use of a vortex tube separates the air stream into a hot and cold stream. The tubes also can be used to supply heat in cold climates.

**Should You Use Them'** Circulating air systems are the most effective personal cooling system, especially when circulating air is used with impermeable garments or double cotton overalls. **Downside:** In addition to being complicated to use, these systems are noisy and require a constant source of compressed air supplied through an attached air hose. Systems that use an attached air hose may also limit workers' mobility. Another potential problem is getting air to the work area itself. So, you should only use these systems in work areas where workers aren't required to climb or move around much.

**POINTER:** The other thing you need to guard against is to dehydration. The cool, dry air makes workers feel comfortable and may conceal the dehydration they're experiencing. So, you need to constantly remind workers using the system to

drink liquids.