

Why Most Fire Departments Do Not Follow Their Thermal Rehab Guideline, NFPA 1584

4.1.17

Polar Breeze

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Since 1896, the National Fire Protection Association (aka NFPA) has set the standards and guidelines for the Health & Safety of the men and women of all Fire Departments in North America.

Those standards include NFPA #1584, the guidelines for Thermal Rehab, which covers the what, when, and how a firefighter is to be thermally cooled down when he or she is helping to put out a multi-alarm fire.

Each year approximately 100 firefighters die on the job from Cardiac Arrest and or Heatstroke.¹ There are studies that show the direct correlation between heatstroke and cardiac arrest.² In 2015, there were over 70,000 fire department injuries that were attributed to the hazardous conditions resulting from fighting fires.³

Currently, there are **no known studies** that conclusively attribute the causes of the tens of thousands of injuries to firefighters. Our contention is that a significant portion of those injuries are attributed to non-optimum physical conditions (i.e., dehydration and an elevated core body temperature).

It isn't a leap of faith to assume that a firefighter's diminished stamina and peak physical performance are directly related to the stress imposed upon his or her body due to dehydration, and or, his core body

temperature being elevated from normal to 101 or 102+ degrees F. This diminished stamina and physical strength is to some degree directly connected to the annual 70,000 plus injuries that firefighters incur in the line of duty.³

But that said, one can safely assume that if the firefighter is able to perform his job with stamina and at peak physical performance rather than with an elevated core body temperature, then those trips, slips and falls and even deaths might very well be **greatly minimized**.

Per our observation, well in excess of 65% of all fire departments do not adhere to the ideal recommendations of NFPA 1584.

And, why is that?

Is it laziness? No!

Is it a lack of financial resources? Not really!

While it is true that budget restraints are problematic, money can almost always be found when there is a high certainty that firefighter injuries, deaths **and the hundreds of millions of dollars of workers compensation claims** associated with those injuries and deaths might have been prevented.

This white paper **EXPLAINS** what we believe is the major reason **WHY** the well established guidelines of NFPA 1584 are not being adhered to.

We firmly believe that the existing devices, machines and modalities that are being relied upon to lower core body temperature simply do not live up to the ideals embodied in NFPA 1584.

For the record, those ideal standards require a device, machine or modality that will quickly, safely and very effectively bring down the firefighter's core body temperature.

When a firefighter exits a raging fire to cool down and has the option to either sit under a big shade tree **or use the existing devices** (i.e., misting fans, cooling chairs, cooling vests and/or even air-conditioned pods) – **firefighters are opting for the shade tree and water.**

And here is why...

Misting fans blow very fine droplets of water in a moving airstream from the fan to the person being cooled. The water droplets landing on the individual pick up some of their skin body heat before evaporating under the force of the blown air.

The heat absorbed by the water droplet is thereby removed from the skin and you feel 'cooler'. Anything that can improve the evaporation of water from the skin, such as very low humidity as in the deserts of the Southwestern US, tend to improve the efficiency of the evaporation and therefore

the ability of the misting fan to produce cooling of an area.

However, in humid climates, the gradient for the evaporation of water is greatly decreased, and so too is the effectiveness of the cooling.

Summers, especially in Florida, render misting fans nearly useless. The reason being that at 70-80% humidity the misting fans only have a cooling lowering effect of 5 to 7 degrees. But, when the humidity is above 80%, misting fans actually add to the retention of body heat!

This is because **misting fans only have some positive effect as long as there is moving air** to drive the moisture from the skin. But, as soon as you move out of the direction of the moving air into still air, your own body heat will cause any skin moisture inside your clothes to evaporate up to the point that the humidity inside your clothes approaches 99%.

And here is where it gets worse:

This humid air is then heated to body heat temperature (98.6F). The resultant effect being the heat index (feel like) temperature inside your clothes can approach 167 degrees F. (That number is correct! It is not a typo.)

This is why in humid conditions, you always feel much hotter upon leaving a misting fan area.

Note: a misting fan at best only partially cools the face, head, arms and chest of a firefighter representing under 36% of the (BSA) Body Skin Surface Area.

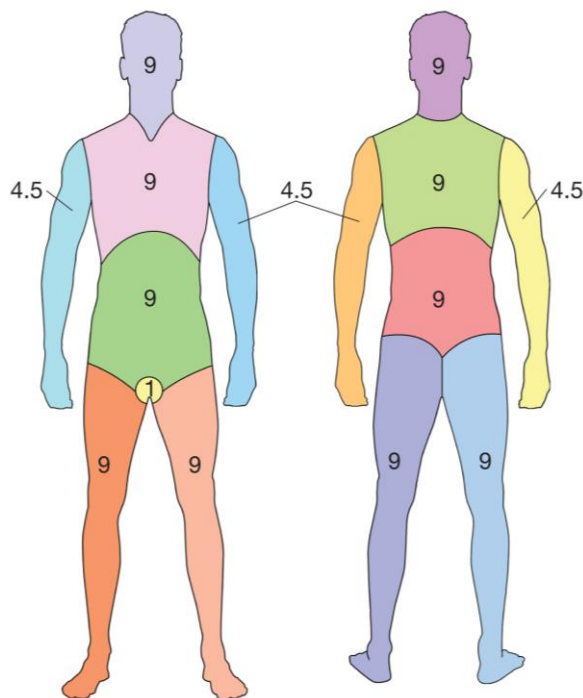
Cooling Chairs – cooling typically only the arms.

Let's look at the math on this one.

An entire upper body extremity (front and back) comprises 50% of one's total **body skin surface area** (BSA).

One forearm and hand comprise less than 4.5% of the BSA. **Even if both forearms are immersed in ice that is only 9% of the body surface area (hands and forearms up to the elbows).**

See below the Medical Rule of 9's diagram that shows Skin Surface Area.



Medical Rule of 9's

The natural response to ice water immersion is vascular constriction, which decreases blood flow in varying degrees, depending on body fat percentage (BMI). Ice water immersion slows blood flow through such an immersed extremity.

Now, compare misting fans and cooling chairs to the **Polar Breeze®** machine. A state of the art revolutionary device that lowers core body temperature one degree F. every two minutes (in preliminary studies). It cools both externally and internally, approximately 45% of the Skin Surface Area from the top of the head to the waist and the entire Lung Surface Area.



The shirt of the firefighter above looks inflated – it is – **due to the half-moon front and back collar of the Polar Breeze Hood** that is under the firefighter's shirt.

Note: The lung surface area of the average human adult body has 37 1/2 times more surface area than the skin surface area. The lungs have 75 sq. meters of lung surface area (which is half the size of a tennis court) and approximately 1,500 miles of airways with 300 to 500 million alveoli. ⁴

Compared to the entire skin surface area of the body (which is 2 sq. meters or half the size of a ping pong table).

The internal cooling of the lungs has **ZERO INSULATING FAT**. So there is no inhibition of the cooling process of the bloodstream.

No other known machine, device or modality exists today, that can do this!

This means Polar Breeze is *more than 250 times more effective than misting fans and 400 times more effective than cooling chairs.*

And what about **air-conditioned spaces** (tents, pods or thermal rehab ambulances)? Aren't they just as good, or better than the Polar Breeze?

When it comes to thermal cooling with air conditioners; those with relatively low cooling tonnage usually have an air differential of between 20 to 22 degrees F. This means that if the outside air temperature is 100 degrees F., at the very best, that air cooled tent or thermal rehab air-conditioned pod will produce a 78 to 80 degrees F. temperature. But, if that ambulance or tent is shared with five to ten 200 pound firefighters, their body heat can raise the temperature in that tent / pod or ambulance by 5 to 10 degrees, thus making it even more humid or less effective.

The fact that the above methods have never satisfied or lived up to the ideals set by NFPA 1584 is the major reason that the majority of the fire departments in North America fail to use misting fans, cooling chairs, vests or even air-conditioned spaces.

Instead they keep opting for that big old shade tree!

The existing thermal rehab modalities are simply not fast or effective enough to satisfy firefighters.

So what is the solution?

We believe the answer is the Polar Breeze, (www.PolarBreeze.net). It's considered a **"disruptive technology"**. In other words, it **obsoletes all of the existing devices.**

Invented by an emergency room physician with several patents and manufactured by the Whirlpool Corporation's largest subsidiary, Embraco, this device will allow NFPA's 1584 Thermal Rehab guidelines to now be practiced by the vast majority of our country's fire departments.

-- The Polar Breeze is totally portable, weighs 65 lbs., is 16" x 16" x 20" and runs off of a standard 120V outlet at 8.6 amps.

-- The Polar Breeze has two methods of cooling.

- a) In a normal rehab situation, the cooling hoses are directly used to cool the head, chest, back area and groin area where the femoral arteries are.
- b) When in a heightened state of core body temperature OR an emergency (stage 4 or 5 of heat illness, i.e., heat exhaustion or heat stroke) the Polar Breeze Hood is deployed and attached to one of the cooling hoses while the other hose is placed below the waste band to cool the femoral arteries. Doing so, the individual is then fully cooled both internally and externally.

Please go to the home page of our website www.PolarBreeze.net and watch the testimonials.

The **Polar Breeze®** is the leading Thermal Rehab device on the market when it comes to safe, effective lowering of the core body temperature.

It obsoletes all existing devices.

Call **877-474-2841** or email **Ben@PolarBreeze.net** to arrange a no obligation demonstration. Seeing and feeling the difference that this machine can make will convince you of its superiority.

Respectfully,

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Footnotes:

¹ Report: NFPA's "[Firefighter Fatalities in the United States - 2015](#)" (PDF, 417 KB)
Author: Rita F. Fahy, Paul R. LeBlanc and Joseph L. Molis, Issued: June 2016

² Firefighter Fatalities and Injuries: The Role of Heat Stress and PPE – University of Illinois, July 2008

³ What Causes Slips, Trips, and Falls on the Fireground? A Survey.
Matthew N. Petrucci, Brett Harton, Gavin P. Horn, Elizabeth T. Hsiao-Weckler: University of Illinois, Urbana, IL, USA;
Karl S. Rosengren: Northwestern University, Evanston, IL, USA.
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⁴ Wikipedia – Lungs - <https://en.wikipedia.org/wiki/Lung>