



**New Jersey State
Firemen's Mutual Benevolent
Association**

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Heat Stress

Care must be taken during the warm weather months to avoid heat related injuries. Firefighters and Emergency Medical Technicians are particularly at risk for these types of injuries. The following is a guidance document that should assist members in the identification of, and the avoidance of conditions that may cause injury and/or death.

Health Effects

Heat Stroke, Heat Exhaustion, Heat Cramps, Heat Rash, Sunburn

Heat Stroke

Heat stroke occurs when the body is unable to regulate its temperature. The body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided.

Recognizing Heat Stroke

Warning signs of heat stroke vary but may include the following:

An extremely high body temperature (above 103°F, orally)

Red, hot, and dry skin (no sweating)

Rapid, strong pulse

Throbbing headache

Dizziness

Nausea

Confusion

Unconsciousness

What to Do

If you see any of these signs, you may be dealing with a life-threatening emergency. Have someone call for immediate medical assistance while you begin cooling the victim. EMS MUST BE SUMMONED IMMEDIATELY.

Do the following:

Get the victim to a shady area.

Cool the victim rapidly using whatever methods you can. For example, immerse the victim in a tub of cool water; place the person in a cool shower; spray the victim with cool water from a garden hose; sponge the person with cool water; or if the humidity is low, wrap the victim in a cool, wet sheet and fan him or her vigorously.

Monitor body temperature, and continue cooling efforts until the body temperature drops to 101-102°F.

If emergency medical personnel are delayed, call the hospital emergency room for further instructions.

Do not give the victim fluids to drink.

Get medical assistance as soon as possible.

Sometimes a victim's muscles will begin to twitch uncontrollably as a result of heat stroke. If this happens, keep the victim from injuring himself, but do not place any object in the mouth and do not give fluids. If there is vomiting, make sure the airway remains open by turning the victim on his or her side.

Heat Exhaustion

Heat exhaustion is a milder form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. It is the body's response to an excessive loss of the water and salt contained in sweat. Those most prone to heat exhaustion are elderly people, people with high blood pressure, and people working or exercising in a hot environment.

Recognizing Heat Exhaustion

Warning signs of heat exhaustion include the following:

Heavy sweating	Fainting
Paleness	Nausea or vomiting
Muscle cramps	Headache
Tiredness	Dizziness
Weakness	

The skin may be cool and moist. The victim's pulse rate will be fast and weak, and breathing will be fast and shallow. If heat exhaustion is untreated, it may progress to heat stroke. Seek medical attention immediately if any of the following occurs:

Symptoms are severe

The victim has heart problems or high blood pressure

Otherwise, help the victim to cool off, and seek medical attention if symptoms worsen or last longer than 1 hour.

What to Do

EMS MUST BE SUMMONED IMMEDIATELY.

Cooling measures that may be effective include the following:

Cool, nonalcoholic beverages

Rest

Cool shower, bath, or sponge bath

An air-conditioned environment

Lightweight clothing

Heat Cramps

Heat cramps usually affect people who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture. The low salt level in the muscles may be the cause of heat cramps. Heat cramps may also be a symptom of heat exhaustion.

Recognizing Heat Cramps

Heat cramps are muscle pains or spasms—usually in the abdomen, arms, or legs—that may occur in association with strenuous activity. If you have heart problems or are on a low-sodium diet, get medical attention for heat cramps.

What to Do

If medical attention is not necessary, take these steps:

Stop all activity, and sit quietly in a cool place.

Drink clear juice or a sports beverage.

Do not return to strenuous activity for a few hours after the cramps subside, because further exertion may lead to heat exhaustion or heat stroke.

Seek medical attention for heat cramps if they do not subside in 1 hour.

Sunburn

Sunburn should be avoided because it damages the skin. Although the discomfort is usually minor and healing often occurs in about a week, a more severe sunburn may require medical attention.

Recognizing Sunburn

Symptoms of sunburn are well known: the skin becomes red, painful, and abnormally warm after sun exposure.

What to Do

Consult a doctor if the sunburn affects an infant younger than 1 year of age or if these symptoms are present:

- Fever
- Fluid-filled blisters
- Severe pain

Also, remember these tips when treating sunburn:

Avoid repeated sun exposure.

Apply cold compresses or immerse the sunburned area in cool water.

Apply moisturizing lotion to affected areas. Do not use salve, butter, or ointment.

Do not break blisters.

Heat Rash

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather. It can occur at any age but is most common in young children.

Recognizing Heat Rash

Heat rash looks like a red cluster of pimples or small blisters. It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.

What to Do

The best treatment for heat rash is to provide a cooler, less humid environment. Keep the affected area dry. Dusting powder may be used to increase comfort.

Treating heat rash is simple and usually does not require medical assistance. Other heat-related problems can be much more severe.

http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp

Safe Work Practices

Implement response and staffing levels that takes into account the excessive heat.
Implement staffing levels that satisfy NFPA 1710.

Establish Rehab Sector in accordance with NFPA 1584

Plan activities so that they are not performed during the hottest part of the day.

Rotate personnel ensure that exposure and risk of injury is reduced.

During extreme heat incidents, limit/eliminate outdoor, non-emergency activities.

Drink Plenty of Fluids

During hot weather you will need to increase your fluid intake, regardless of your activity level. Don't wait until you're thirsty to drink. During heavy exercise in a hot environment, drink two to four glasses (16-32 ounces) of cool fluids each hour.

Warning: If your doctor generally limits the amount of fluid you drink or has you on water pills, ask how much you should drink while the weather is hot.

Don't drink liquids that contain alcohol, or large amounts of sugar—these actually cause you to lose more body fluid. Also avoid very cold drinks, because they can cause stomach cramps.

Replace Salt and Minerals

Heavy sweating removes salt and minerals from the body. These are necessary for your body and must be replaced. If you must exercise, drink two to four glasses of cool, non-alcoholic fluids each hour. A sports beverage can replace the salt and minerals you lose in sweat. However, if you are on a low-salt diet, talk with your doctor before drinking a sports beverage or taking salt tablets.

Wear Appropriate Clothing and Sunscreen

Wear as little clothing as possible when you are at home. Choose lightweight, light-colored, loose-fitting clothing. Sunburn affects your body's ability to cool itself and causes a loss of body fluids. It also causes pain and damages the skin. If you must go outdoors, protect yourself from the sun by wearing a wide-brimmed hat (also keeps you cooler) along with sunglasses, and by putting on sunscreen of SPF 15 or higher (the most effective products say "broad spectrum" or "UVA/UVB protection" on their labels) 30 minutes prior to going out. Continue to reapply it according to the package directions.

Personal Protective Equipment

The inclusion of shorts has become an industry norm in reducing the heat and thermal stresses that a firefighter may experience when operating during his/her tour.

Professional Departments large and small, urban and suburban have implemented the modified uniform as a way of reducing the effects of Excessive Heat Conditions and the

effects that firefighting in our protective equipment has on our bodies. On average nearly twenty percent of all firefighter injuries are due to overexertion, of the 11,000 injuries sustained by NJ firefighters in 2001, over 2000 were due to overexertion, and consistently each year the number one cause of firefighter deaths is heart attack and stroke. The two statistics cannot be viewed as mutually exclusive, the NFPA reported that in 2005 there were 47 stress related deaths. According to the NFPA: Stress and overexertion, which usually results in heart attacks or other sudden cardiac events, continue to be the leading cause of fatal injury. Always remember that the proper use of personal protective equipment is mandatory in protecting the firefighter.

Relevant Standards

New Jersey Fire Fighter Standard NJAC 12:100-10.1

The uniform of the career firefighter is set forth in the New Jersey Fire Fighter Standard NJAC 12:100-10.1 http://www.state.nj.us/health/eoh/peoshweb/ff_standards.pdf the use of shorts is not disallowed or prohibited.

NFPA 1500 Standard on Fire Department Occupational Safety and Health Program

NFPA 1521 Standard for Fire Department Safety Officer

NFPA 1584 Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises

NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments

Organizations

New Jersey Firemen's Mutual Benevolent Association

www.njfmba.org

Centers for Disease Control and Prevention

<http://www.cdc.gov/Features/ExtremeHeat/>

New Jersey State Department Health, Public Employees Occupational Safety and Health

<http://www.state.nj.us/health/eoh/peoshweb/>

New Jersey State Department Health, Division of Environmental and Occupational

Health Services Right to Know Program

<http://www.state.nj.us/health/eoh/rtkweb/>

National Fire Protection Association

www.nfpa.org

National Institute of Occupational Safety and Health

<http://www.cdc.gov/niosh/homepage.html>

National Safety Council

<http://www.nsc.org/>

Occupational Safety and Health Administration

<http://www.osha.gov>

Heat Index Charts

Heat Index Chart (Temperature & Dewpoint)																
Dewpoint (° F)	Temperature (° F)															
	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
65	94	95	96	97	98	100	101	102	103	104	106	107	108	109	110	112
66	94	95	97	98	99	100	101	103	104	105	106	108	109	110	111	112
67	95	96	97	98	100	101	102	103	105	106	107	108	110	111	112	113
68	95	97	98	99	100	102	103	104	105	107	108	109	110	112	113	114
69	96	97	99	100	101	103	104	105	106	108	109	110	111	113	114	115
70	97	98	99	101	102	103	105	106	107	109	110	111	112	114	115	116
71	98	99	100	102	103	104	106	107	108	109	111	112	113	115	116	117
72	98	100	101	103	104	105	107	108	109	111	112	113	114	116	117	118
73	99	101	102	103	105	106	108	109	110	112	113	114	116	117	118	119
74	100	102	103	104	106	107	109	110	111	113	114	115	117	118	119	121
75	101	103	104	106	107	108	110	111	113	114	115	117	118	119	121	122
76	102	104	105	107	108	110	111	112	114	115	117	118	119	121	122	123
77	103	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125
78	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125	126
79	106	107	109	111	112	114	115	117	118	120	121	122	124	125	127	128
80	107	109	110	112	114	115	117	118	120	121	123	124	126	127	128	130
81	109	110	112	114	115	117	118	120	121	123	124	126	127	129	130	132
82	110	112	114	115	117	118	120	122	123	125	126	128	129	131	132	133

Note: Exposure to full sunshine can increase HI values by up to 15° F

Heat Index Chart (Temperature & Relative Humidity)

RH (%)	Temperature (° F)															
	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
90	119	123	128	132	137	141	146	152	157	163	168	174	180	186	193	199
85	115	119	123	127	132	136	141	145	150	155	161	166	172	178	184	190
80	112	115	119	123	127	131	135	140	144	149	154	159	164	169	175	180
75	109	112	115	119	122	126	130	134	138	143	147	152	156	161	166	171
70	106	109	112	115	118	122	125	129	133	137	141	145	149	154	158	163
65	103	106	108	111	114	117	121	124	127	131	135	139	143	147	151	155
60	100	103	105	108	111	114	116	120	123	126	129	133	136	140	144	148
55	98	100	103	105	107	110	113	115	118	121	124	127	131	134	137	141
50	96	98	100	102	104	107	109	112	114	117	119	122	125	128	131	135
45	94	96	98	100	102	104	106	108	110	113	115	118	120	123	126	129
40	92	94	96	97	99	101	103	105	107	109	111	113	116	118	121	123
35	91	92	94	95	97	98	100	102	104	106	107	109	112	114	116	118
30	89	90	92	93	95	96	98	99	101	102	104	106	108	110	112	114
<i>Note:</i> Exposure to full sunshine can increase HI values by up to 15° F																

<http://www.ncdc.noaa.gov/oa/climate/conversion/heatindexchart.html>

References:

Extreme Heat: A Prevention Guide to Promote Your Personal Health and Safety

http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp

Heat Stress, Brochure

http://www.fs.fed.us/fire/safety/fitness/heat_stress/hs_pg1.html

Heat Index Charts

<http://www.ncdc.noaa.gov/oa/climate/conversion/heatindexchart.html>

National Fire Protection Association

NFPA 1500 Standard on Fire Department Occupational Safety and Health Program

<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1500>

NFPA 1521 Standard for Fire Department Safety Officer

<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1521>

NFPA 1584 Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises

<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1584>

NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments

<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1710>

