HEAT STRESS AGENDA

» OVERVIEW
» RISK AWARENESS
» COSTS OF NOT TAKING ACTION
» REGULATIONS, STANDARDS, AND BEST PRACTICE
» SOLUTIONS
A REAL PROBLEM

Land & Ocean Temperature Percentiles Jan–Dec 2017
NOAA’s National Centers for Environmental Information
Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0

Record Coldest
Much Cooler than Average
Cooler than Average
Near Average
Warmer than Average
Much Warmer than Average
Record Warmest

Tue Jan 16 07:02:31 EST 2018
Heat stress can, and does, result in death

- #1 weather-related killer in the U.S.
- Each year heat kills an average of 650 people in the U.S.
- 39 occupational heat-related fatalities in 2016, reported by the Bureau of Labor Statistics (BLS)

{Table from Bureau of Labor Statistics}
{Other sources: **aafp.org, noaa.gov
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6331a1.htm }
FACTS

FATALITIES DUE TO ENVIRONMENTAL HEAT

IN THE U.S. IN 2015 THERE WERE 39 OCCUPATIONAL HEAT-RELATED FATALITIES FROM EXPOSURE TO ENVIRONMENTAL HEAT. 18 IN 2014.

46% OF OCCUPATIONAL HEAT-RELATED FATALITIES OCCURRED IN CONSTRUCTION.

30% OF OCCUPATIONAL HEAT-RELATED FATALITIES OCCURRED IN SERVICE PROVIDING.

XXXVI
THE TOP FIVE YEARS OF TENACITY
FACTS
INJURIES DUE TO ENVIRONMENTAL HEAT

2016 NONFATAL OCCUPATIONAL INJURIES IN THE UNITED STATES

4,000+ HEAT EXPOSURE INJURIES

74% OF OCCUPATIONAL HEAT RELATED INJURIES OCCURRED AFTER 12:01 PM

46% OF HEAT INJURIES INVOLVED AT LEAST 3 DAYS AWAY
2008-2014
FATALITIES DUE TO ENVIRONMENTAL HEAT

Date: 07/18/2011
Region: 5
City/State: Mendota Heights, MN
Industry: Landscaping
Inspection No.: 315719534
Summary of Report: Worker collapsed while trimming bushes and raking, and later died. Possible heat stress fatality.

Date: 07/13/2011
Region: 4
City/State: Charlotte, NC
Industry: Roofing Contractors
Inspection No.: 315685446
Summary of Report: Worker was working on a roofing project. He was cleaning up roofing materials on the ground. He fell unconscious and died. Possible heat stress fatality.

https://www.osha.gov/SLTC/heatillness/map.html
HEAT STRESS OVERVIEW
OVERVIEW

HEAT STRESS

• Defining Heat Stress
  • Ability to control internal body temperature starts to fail
  • Body temps rise above 99.7°F (37.6°C)
  • Severe illness occurs when body temperature reaches 104°F (40°C)
HEAT STRESS

WHAT IS A HEAT-RELATED ILLNESS?

• Heat-Related Illness (HRI)
  • Heat Rash
  • Heat Cramps
  • Heat Exhaustion
  • Heat Stroke
HEAT RASH

SIGNS: Red blister-like eruptions/bumps. Itching sensation.

TREATMENT: Rest in cool place. Allow skin to dry.

PREVENTION: Shower after working in hot environment. Keep skin dry. Training and education.
**Heat Cramps**

**Signs:** Painful spasms usually in legs or abdomen. Possibly heavy sweating.

**Treatment:** Apply firm pressure and massage cramped area. Rest in cool place and drink water. Seek medical attention if cramping is severe.

**Prevention:** Adequate water and salt intake. Training and education.

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**Treatment:** Rest in cool place. Allow skin to dry.

**Prevention:** Shower after working in hot environment. Keep skin dry. Training and education.
HEAT EXHAUSTION

**SIGNS:** Headaches, weakness, mood change, feeling sick. Extreme sweating, pale clammy skin.

**TREATMENT:** Move to cool, shaded area and loosen heavy clothing. Drink cool water/electrolytes.

**PREVENTION:** Acclimatization. Drink plenty of water/electrolytes. Training and education.

HEAT CRAMPS

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**TREATMENT:** Apply firm pressure and massage cramped area. Rest in cool place and drink water. Seek medical attention if cramping is severe.

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HEAT RASH

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**Heat Stroke**

- **Signs:** Pale skin, nausea, vomiting, confusion. Fever 104° or higher.
- **Treatment:** Medical emergency. Call 911. Remove heavy clothing. Drink small amounts of water/electrolytes.
- **Prevention:** Acclimatization. Drink plenty of water/electrolytes. Medical screening, training, and edu.

**Heat Exhaustion**

- **Signs:** Headaches, weakness, mood change, feeling sick. Extreme sweating, pale clammy skin.
- **Treatment:** Move to cool, shaded area and loosen heavy clothing. Drink cool water/electrolytes.
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RISK AWARENESS

CONTRIBUTING FACTORS

PERSONAL

- Age, weight, and personal fitness
- **Dehydration and loss of electrolytes**
- Illness // Fever
- Medical conditions
- Certain medicines
- Diet // Alcohol
- Acclimatization
RISK AWARENESS

CONTRIBUTING FACTORS

ENVIRONMENTAL

- High temperatures
- Direct sunlight
- Humidity
- Limited air movement
- Hot equipment
- Heat reflected from ground, water or objects
- Physical exertion
- Clothing // PPE
COSTS OF NOT TAKING ACTION
COSTS OF INACTION

1. Worker Injury or Fatality
2. Property Loss or Damage
3. Productivity Loss

= ALL resulting in potential monetary loss
INJURY OR FATALITY

AVERAGE COST FOR A MEDICALLY CONSULTED INJURY: $42,000

AVERAGE COST FOR A FATAL ACCIDENT: $1.45M

9 FATALITIES IN 2015 X $1.45M = $56.55 MILLION

NOT ALL INDIRECT COSTS INCLUDED. *NATIONAL SAFETY COUNCIL INJURY FACTS 2016 EDITION
• Fine motor skills are often impaired when the body is under stress.
COSTS
LOSS OF PRODUCTIVITY

• A stressed body cannot work at optimum speed or performance
• 65% of workers either don’t want to work or work at a much slower pace in heat and humidity

*USA Today
REGULATIONS, STANDARDS, AND BEST PRACTICE
OSHA
HEAT STRESS STANDARDS

• No federal regulation
• OSHA-approved state plans
• California with most notable and heat illness standards
  • Water
  • Rest
  • Shade
  • Acclimatization
  • High-heat procedures
OSHA
NO LACK OF ENFORCEMENT

• The General Duty Clause: 5(A)(1) OSHA 1970
• The Recordkeeping regulation
• The Sanitation standard
• The Medical Services and First Aid standard
• The Safety Training and Education standard
• The Personal Protective Equipment standard
REGULATION
OSHA CAMPAIGN

• CAMPAIGN FOCUS:
  • 1. WATER
  • 2. REST
  • 3. SHADE
INDOOR
STICK TO YOUR PLAN

• Heat stress can still occur in indoor working environments

• Include these 5 actions in any indoor heat stress prevention plan:
  • Frequent drinking of water
  • Rest in cooler areas
  • Give time to acclimatize
  • Recognize signs & symptoms
  • Know emergency steps
HEAT-RELATED ILLNESS IS 100% PREVENTABLE
HEAT STRESS CONTROLS

MOST EFFECTIVE

ELIMINATE
- Physically remove the hazard

SUBSTITUTE
- Replace the hazard

ENGINEERING CONTROLS
- Isolate people from the hazard

ADMINISTRATIVE CONTROLS
- Change the way people work

PERSONAL PROTECTIVE EQUIPMENT
- Protect the worker with personal protective equipment

LEAST EFFECTIVE

{*CDC.com // NIOSH*}
• Air conditioned break areas
• Shelters provide a place for workers to get out of the sun
• Canopies, umbrellas, and other temporary structures or devices may be used to provide shade*

{*Cal/OSHA Employees should have access to shade for a period of no less than 5 minutes whenever they need it.}
HYDRATION
BOTTOMS UP

• Dehydration is a MAJOR factor contributing to heat stress
• 78% of the workers suffering from heat illnesses were dehydrated*
• Workers may not recognize that they need water

{*Cal/OSHA}
HYDRATION

WATER MAKES UP...

- 60% BODY WEIGHT
- 80% BRAIN
- 75% MUSCLE

CALORIES BURNED PER DAY

AVERAGE WOMAN: 2,200 CALORIES
AVERAGE MAN: 2,900 CALORIES

CUPS OF WATER PER DAY

WOMEN: 9 CUPS
MEN: 12 CUPS
HYDRATION

Aim for a hydrated stream. Transparent urine may indicate over hydration.

Severely dehydrated

Dehydrated

Hydrated

Over hydrated
HYDRATION
TIPS TO STAY HYDRATED

• Start and end your day with a glass of water.
• Keep a bottle of water with you (and drink it!) throughout the day.
• Enhance your water intake with an electrolyte solution.
• Drink water before, during and after your shift, regardless of if you are indoors or outside.

{Excepts taken from familydoctor.org & http://www.kendrickfincher.org/hydration_facts.htm}
HEAT INDEX CHART

HOW TO USE HEAT INDEX
Locate today’s predicted high temperature across the top line (air temp.) Down the left side (relative humidity) locate today’s predicted humidity. Follow across and down to find “Apparent Temperature” or “What it feels like.” Keep in mind, this chart was devised for shady, light wind conditions, so exposure to full sun can increase values by up to 15°. Strong winds, particularly with hot, dry air can be extremely hazardous.

Source: National Oceanic & Atmospheric Association & OSHA

<table>
<thead>
<tr>
<th>Relative Humidity</th>
<th>70°F</th>
<th>75°F</th>
<th>80°F</th>
<th>85°F</th>
<th>90°F</th>
<th>95°F</th>
<th>100°F</th>
<th>105°F</th>
<th>110°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>64°/18°</td>
<td>69°/21°</td>
<td>73°/23°</td>
<td>78°/25°</td>
<td>83°/28°</td>
<td>87°/30°</td>
<td>91°/33°</td>
<td>95°/35°</td>
<td>99°/37°</td>
</tr>
<tr>
<td>10%</td>
<td>65°/18°</td>
<td>70°/21°</td>
<td>75°/24°</td>
<td>80°/26°</td>
<td>85°/29°</td>
<td>90°/32°</td>
<td>95°/35°</td>
<td>100°/38°</td>
<td>105°/41°</td>
</tr>
<tr>
<td>20%</td>
<td>66°/18°</td>
<td>72°/22°</td>
<td>77°/25°</td>
<td>82°/27°</td>
<td>87°/30°</td>
<td>93°/34°</td>
<td>99°/37°</td>
<td>105°/41°</td>
<td>112°/44°</td>
</tr>
<tr>
<td>30%</td>
<td>67°/19°</td>
<td>73°/23°</td>
<td>78°/25°</td>
<td>84°/28°</td>
<td>90°/32°</td>
<td>96°/35°</td>
<td>104°/40°</td>
<td>113°/45°</td>
<td>123°/51°</td>
</tr>
<tr>
<td>40%</td>
<td>68°/20°</td>
<td>74°/23°</td>
<td>79°/26°</td>
<td>86°/29°</td>
<td>93°/34°</td>
<td>101°/36°</td>
<td>110°/43°</td>
<td>122°/50°</td>
<td>137°/58°</td>
</tr>
<tr>
<td>50%</td>
<td>69°/21°</td>
<td>75°/24°</td>
<td>81°/27°</td>
<td>88°/31°</td>
<td>96°/35°</td>
<td>107°/42°</td>
<td>120°/49°</td>
<td>135°/57°</td>
<td>150°/66°</td>
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<td>70%</td>
<td>70°/21°</td>
<td>77°/25°</td>
<td>85°/29°</td>
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<td>106°/41°</td>
<td>124°/51°</td>
<td>144°/62°</td>
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</tr>
<tr>
<td>80%</td>
<td>71°/22°</td>
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<td>136°/58°</td>
<td>157°/69°</td>
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</tr>
<tr>
<td>90%</td>
<td>71°/22°</td>
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<td>88°/31°</td>
<td>102°/39°</td>
<td>122°/50°</td>
<td>150°/66°</td>
<td>170°/77°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td>72°/22°</td>
<td>80°/26°</td>
<td>91°/33°</td>
<td>108°/42°</td>
<td>133°/56°</td>
<td>166°/74°</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Likelihood of heat disorders with prolonged exposure or strenuous activity:
- Caution
- Extreme Caution
- Danger
- Extreme Danger

HEAT INDEX

<table>
<thead>
<tr>
<th>HEAT INDEX</th>
<th>RISK LEVEL</th>
<th>PROTECTIVE MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 91°F (32°C)</td>
<td>Lower (Caution)</td>
<td>Basic heat safety and planning</td>
</tr>
<tr>
<td>91°F to 103°F (32°C to 39°C)</td>
<td>Moderate</td>
<td>Implement precautions and heighten awareness</td>
</tr>
<tr>
<td>103°F to 115°F (39°C to 46°C)</td>
<td>High</td>
<td>Additional precautions to protect workers</td>
</tr>
<tr>
<td>Greater than 115°F (46°C)</td>
<td>Very High to Extreme</td>
<td>Triggers even more aggressive protective measures</td>
</tr>
</tbody>
</table>

XXXVI
THIRTY-FIVE YEARS OF TENACITY
• Multi-climate workwear apparel that helps transport moisture, accelerating evaporation process to keep you cool.

• Wear personal protective gear like light clothing to reduce direct sun exposure.*

• UV protection of 50+ for extra sun blockage.

{Adapted from OSHA’s Heat-related Illness Prevention Training Guide}
Evaporative cooling occurs when water and air flow combine.
  - Air flow circulates the water molecules to create a cooling effect

Place an evaporative cooling product on an area where large blood vessels are located near the surface of the skin.
The average person’s skin has 2.6 million sweat glands!

Terry cloths, sponges, elastics, and high-performance technical fabrics trap or move sweat to keep it out of your eyes and off your hands.
PHASE CHANGE COOLING

• Utilizes substances that maintain a constant temperature for an extended period of time – regardless of outside environment.

• Typically works for longer periods of time without needing to be recharged.
Heat-related illness and death are 100% preventable.

EDUCATION IS KEY!

KNOWLEDGE IS POWER
Heat Stress is recognized by major OH&S organizations as a real occupational hazard, so take action & be prepared!

Ergodyne can provide an abundance of heat stress resources and product solutions to help you stay safe this summer.

- In-house trainings
- Webinars
- Informational cards
- Technical white papers
- Heat Stress Poster
- Hazard Site Surveys
- Sample Prevention Plans
- Hydration Stickers
- Website Collections
- Ergodytes
- Unique, patented PPE solutions
- …and more to come!
QUESTIONS?

For more heat stress resources and information, please contact Ergodyne Customer Service at 800-225-8238 or orders@ergodyne.com.

For more information on where to purchase heat stress PPE and solutions, visit www.ergodyne.com.