What Factors Lead to Heat Stress

Stress Personal Factors
- Dehydration
- Lack of experience wearing personal protective equipment
- Being overweight or underweight
- Alcohol or drug use
- Medical conditions
- Medication use

Environmental factors
- High humidity
- Direct sunlight or other heat source
- Lack of air movement

Working Conditions
- Prolonged shifts
- Infrequent rest breaks
- No access to drinking water
- Heavy clothing

How to Combat Heat Stress

Hydrate
Adequate hydration is the most important step to combating heat stress. When the heat index is high, workers should drink copious amounts (1 quart every hour) frequently throughout the work shift. They should consume at least one cup every 15 minutes or a pint every half hour, in order to stay properly hydrated. Workers should be trained not to wait until they feel thirsty to drink; if they are thirsty, they may already have lost 2 percent of their body’s water. The onset of heat exhaustion can begin after losing 3 percent of the body’s water and heat stroke occurs once 8 percent is lost. The bottom line is, if a worker is not regularly urinating or has dark urine, they are dehydrated and at risk for heat illnesses!

Assess
Assess the relative danger of the worksite. Be aware that high heat, high humidity, low air circulation all create a more dangerous working environment. Any time more than one of these variables is present, the danger is compounded. Wearing occlusive non-breathable clothing in combination with heavy exertion compounds these worksite risks and can alone lead to heat illness.

Acclimate
If an employee is new to a job or is returning after time away: ease them back into full-time work over the course of five days. Starting at half time (50 percent effort) and increasing to full time (increase by 10 percent each day) can greatly reduce the employee’s susceptibility to heat stress.

Heat Stress Resources
- WA Labor and Industries: http://www.lni.wa.gov/safety/topics/AtoZ/heatstress/
- OR OSHA: http://www.cbs.state.or.us/external/osha/subjects/heat_stress.htm
- OSHA: http://www.oshagov/SLTC/heatstress/
- CDC: http://www.bt.cdc.gov/disasters/extremeheat/
- WA SHARP Program: http://www.lni.wa.gov/Safety/Research/Focus/default.asp

Regulations
WAC 296-62-09013 Temperature, radiant heat, or temperature-humidity combinations

Many workers spend some part of their working day in a hot environment, which poses special hazard to safety and health. This hazard is known as heat stress, which occurs when heat is absorbed from the environment faster than the body can get rid of it.

High Temperature + High Humidity + Physical Work = Heat Stress

Normal Cooling Mechanism
Working in very hot areas, our bodies get rid of excess heat by sweating, increasing blood circulation and increasing the blood flow to the skin. When this works well, the body temperature drops or stabilizes at a safe level. However, if the body cannot cool off quickly, various forms of heat illness can develop.

In the United States, “According to the National Centers for Health Statistics (NCHS), 7,046 deaths were attributed to excessive heat exposure from 1979-1997, or an average of 371 deaths occurred per year.” Understanding the risk factors, signs, symptoms and the seriousness of heat illness is of utmost importance for prevention.

Symptoms such as: dizziness, headaches, fatigue and a lack of thirst can be indications of heat-related illness. The five major heat illnesses are:
- Heat Rash
- Heat Cramps
- Heat Syncope
- Heat Exhaustion
- Heat Stroke
Heat Rash
Heat rash is a common condition in which areas of the skin itch intensely and often feel prickly, or sting, due to overheating. Heat rash looks like tiny bumps surrounded by a zone of red skin.

Symptoms
A brief loss of consciousness. In a worker who is performing any physical labor, consider it HEAT STROKE, call 911 and cool down immediately by any means necessary.

Treatment
Keep the individual lying down with feet raised, provide fluids and then move to a cooler location. Do not return to work and refer for medical evaluation.

Heat Cramps
Heat cramps are muscular spasms that occur when the body loses too much salt during profuse sweating.

Symptoms
Rapid heart-beat, hot, sweaty skin, dizziness, cramping of abdominal muscles, nausea.

Treatment
Rest briefly and cool down, drink clear juice or a sports drink, practice gentle, range-of-motion stretching and gentle massage of the affected muscle group, don’t resume strenuous activity for several hours or longer after heat cramps go away. Call your doctor if your cramps don’t go away within one hour or so.

Heat Syncope (Fainting)
Heat syncope is the pooling of the blood in the lower extremities in unacclimatized workers who are required to stand in the heat for long periods of time.

Symptoms
Caution
Extreme Caution
Danger
Extreme Danger

Apparent temperature is how hot the heat-humidity combination makes it feel.

Heat Exhaustion
Heat exhaustion is an early indicator that the body’s cooling system is becoming overwhelmed.

Symptoms
Include headaches, dizziness, light-headedness or fainting, weakness and clammy or moist skin, mood changes such as irritability or confusion; upset stomach or vomiting. It can lead to heat stroke if ignored.

Treatment
Includes moving the person to a cooler place, and if the person is conscious, providing small amounts of cool water to drink. Fan the victim to circulate the air while applying water with a cool cloth.

Heat Stroke
Heat stroke, may cause death, is the most severe form of all heat illness caused by the failure of the body’s cooling system. It can occur even in people who are not exercising if the weather is hot enough.

Symptoms
Include dry, hot skin with no sweating; mental confusion or losing consciousness; seizures or fits.

Treatment
Includes all of the elements for heat exhaustion and contacting 911 immediately for medical assistance. The values in the chart below are for measurements taken in the shade. When working in direct sunlight – add 15 degrees.

Heat and Humidity Chart
Air Temperature (Degrees Fahrenheit) Relative Humidity (Percent)
40 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
140 125
135 130 128
130 117 122 131
125 111 116 123 131 141
120 107 111 115 123 127 135 145 151
115 103 107 111 115 120 127 135 143 151
110 99 102 105 108 112 117 123 130 137 143 150
105 95 97 100 102 105 109 113 118 123 129 135 142 149
100 91 93 95 97 99 101 104 107 110 113 117 124 130 136
95 87 88 90 91 93 94 96 98 101 104 107 110 114 119 124 130 136
90 83 84 85 86 87 88 90 91 93 95 96 98 100 102 104 107 110 113 117 124
85 78 79 80 81 82 83 84 85 86 87 88 89 90 91 93 95 97 99 101 103 105
80 73 74 75 76 77 77 78 79 79 80 81 81 81 82 83 85 86 87 87 89 91
75 69 69 70 71 72 73 74 74 75 76 76 77 77 78 79 79 80 81 81 82 82
70 64 64 65 66 66 67 67 68 68 69 69 70 70 70 71 71 71 71 72 72

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Humidity</th>
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<tbody>
<tr>
<td>40°F</td>
<td>5%</td>
</tr>
<tr>
<td>50°F</td>
<td>10%</td>
</tr>
<tr>
<td>60°F</td>
<td>15%</td>
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<tr>
<td>70°F</td>
<td>20%</td>
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<tr>
<td>80°F</td>
<td>25%</td>
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<tr>
<td>90°F</td>
<td>30%</td>
</tr>
<tr>
<td>100°F</td>
<td>35%</td>
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