Hot Environments

Temperature Conditions - Hot

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Is there a maximum temperature to which workers can be exposed at work?

In most cases, not really. Legislation is not always specific about what is an acceptable range for temperature conditions at work, especially when working outdoors.

In some cases, legislation does provide a range of acceptable temperatures for specific circumstances. The Threshold Limit Values® (TLVs®) for heat stress as published by the American Conference of Governmental Industrial Hygienists (ACGIH) have been formally adopted as occupational exposure limits in some jurisdictions, while jurisdictions use the TLVs® as guidelines. See the OSH Answers Temperature Conditions - Legislation for a list of legislation from each jurisdiction.

This document focuses on work done in hot conditions. Please also see the OSH Answers Temperature Conditions - Cold, Thermal Comfort For Office Work, and Humidex Rating and Work for more information on about work in other conditions.

What are the warning signs of heat stroke?

In a very hot environment, the most serious health and safety concern is heat stroke. Heat stroke can be fatal if medical attention is not available immediately. Heat exhaustion and fainting (syncope) are also types of heat related illnesses which are not fatal but can interfere with a person's ability to work.

The victims of heat stroke are unable to notice the symptoms when they are happening to themselves, and therefore, their survival depends on co-workers' ability to identify symptoms in others, and to get medical help.

While symptoms can vary from person to person, the warning signs of heat stroke can include complaints of sudden and severe fatigue, nausea, dizziness, lightheadedness, and may or may not include sweating. If a co-worker appears to be disorientated or confused (including euphoria), or has unaccountable irritability, malaise or flu-like symptoms, the worker should be moved to a cool location and get medical help immediately.

For more information please see our OSH Answers documents on Hot Environments - Health Effects and First Aid.

Why is there no maximum temperature limit in the regulations?

Occupational exposure limits or guidelines for exposure to high temperatures actually depend on a number of factors, not just the temperature. These other factors include:

- relative humidity
- exposure to sun or other heat sources
- amount of air movement
- work demands - i.e. how physically demanding the work is
- is the worker acclimatized or unacclimatized to the work load under the conditions of work
- what clothing is worn (including protective clothing)
- what is the work-rest regimen (% time work vs. % time rest break).

Are there any general guidelines about temperature?

Yes. Two types of exposure limits are often used: occupational exposure limits and thermal comfort limits.

Occupational exposure limits are to protect industrial workers from heat-related illness. For non-office workplace situations, occupational health and safety jurisdictions generally use the TLVs® for Heat Stress as published by the ACGIH. As mentioned above, some Canadian jurisdictions have adopted these TLVs as occupational exposure limits and others use them as guidelines to control heat stress in the workplace.

These limits are given in units of WBGT (wet bulb globe temperature) degrees Celsius (°C). The WBGT unit takes into account environmental factors namely, air temperature, humidity and air movement, which contribute to perception of hotness by people. In some workplace situations, solar load (heat from radiant sources) is also considered in determining the WBGT. Only qualified professionals, whether they are in-house staff, consultants, or from the local occupational health and safety jurisdiction, should perform the measurement. More information about WBGT is available in the OSH Answers document Working in Hot Environments - Control Measures.

Thermal comfort limits are for office work to ensure productivity and quality of work. Please see the OSHAnswers Thermal Comfort for Office Work for more information on indoor temperatures.

What are the exposure limits for working in hot environments?

The ACGIH publication 2017 TLVs® and BEIs® (or the most current booklet) provides recommended screening criteria for heat stress exposure for workers (Table 1). The publications 2017 TLVs® and BEIs® (or most current) and Documentation of TLVs® and BEIs® should be consulted for more detailed information on these screening criteria, categories of work demands, guidelines for limiting heat strain and heat strain management.

Table 1
ACGIH Screening Criteria for Heat Stress Exposure (WBGT values in °C)
for 8 hour work day five days per week with conventional breaks

Allocation of Work in a Work/Rest Cycle	TLV®				Action Limit			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75-100%	31.0	28.0	--	--	28.0	25.0	--	--
50-75%	31.0	29.0	27.5	--	28.5	26.0	24.0	--
25-50%	32.0	30.0	29.0	28.0	29.5	27.0	25.5	24.5
0-25%	32.5	31.5	30.5	30.0	30.0	29.0	28.0	27.0

Notes:

Table is intended as a screening tool to evaluate if a heat stress situation may exist. ACGIH states that this table is more protective than the TLV® or Action Limit. Because the values are more protective, they are not intended to prescribe work and recovery periods.

Assumes 8-hour workdays in a 5-day workweek with conventional breaks.

TLVs assume that workers exposed to these conditions are adequately hydrated, are not taking medication, are wearing lightweight clothing, and are in generally good health.

See the TLV® booklet for more guidance notes and documentation.

Examples of work loads:

Rest - sitting

Light work - sitting or standing to control machines; performing light hand or arm work (e.g., using a table saw); occasional walking; driving

Moderate work - sustained moderate hand and arm work; light pushing or pulling; walking at a moderate pace; or moderate arm, leg, and trunk work.

Heavy work – intense arm and trunk work; pick and shovel work, digging, carrying, pushing/pulling heavy loads; walking at fast pace

Very Heavy - very intense activity at fast to maximum pace

Adapted from: 2017 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH), 2017, p.238.

What about humidex?

The weather broadcast service of Environment Canada uses the humidex scale to inform the public about hot weather conditions. The humidex scale quantifies human discomfort due to perceived heat taking into account the effect of air temperature and relative humidity. For a given temperature, the humidex increases as the relative humidity (moisture content) of the air becomes higher.

Please see the OSH Answers Humidex Rating and Work for more information.

What should be done when it is very hot and/or humid?

Employers have a duty to take every reasonable precaution to ensure the workplace is safe for the worker. This duty includes taking effective measures to protect workers from heat stress disorders if it is not reasonably practicable to control indoor conditions adequately, or where work is done outdoors.

Certain steps can be taken to reduce discomfort. These include:

- using fans or air conditioning
- wearing light, loose fitting clothing
- taking more frequent rest breaks
- drinking cold beverages (ones that do not have caffeine or alcohol)
- allowing flexibility to permit less physically demanding activities during peak temperature periods.
- using screens or umbrellas to create shade.

More information about ways to control heat stress is available in the OSH Answers document Hot Environments - Control Measures.

Where can I find more information?

Please see the following OSH Answers documents:

- Temperature Conditions - Cold
- Temperature Conditions - Legislation
- Hot Environments - Health Effects and First Aid
- Hot Environments - Control Measures
- Humidex Rating and Work
- Thermal Comfort for Office Work

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