

Working in high temperatures

IMCA members conduct operations in various parts of the world which have a very hot and humid climate during the summer season. In such places, the ambient temperature at times can exceed 40 °C along with periods of very high humidity. Such conditions are potentially dangerous to those who are working under direct sun or in environments such as enclosed or confined spaces or engine rooms and compartments etc. where air movement may be limited, and even in poorly ventilated office buildings.

Heat stress is an occupational and safety issue. With high heat stress levels, mental confusion can develop and predispose workers to perform unsafe acts. The risk of incidents increases with extremes of temperature; hence it is important that we have appropriate heat stress guidelines.

This Information Note summarises for members and their crews some of the risks involved in hot and humid climates and some proven mitigation measures.

1 Working in hot conditions

The normal range of a human body's "core" temperature is between 36 °C and 38 °C. When that temperature is lower than 35 °C (hypothermia) or higher than 40 °C (hyperthermia), severe problems can result. The brain regulates a stable internal body temperature by triggering changes in muscle tone, blood vessels, and sweat gland function in order to maintain a balance between heat production and heat loss. Heat gain or loss by the body involves conduction, convection, radiation, and evaporation. If air in the surroundings is cooler than the body, it is easier to pass heat to the environment and hence cool down. If the surrounding air is hotter than the body, particularly if humidity is high, this can lead to problems keeping cool.

Working in hot conditions can increase the risk of incidents, due to:

- ◆ slipperiness of sweaty palms
- ◆ dizziness
- ◆ fogging of safety glasses
- ◆ hot surfaces/steam, leading to possible burns and scalds
- ◆ lower mental alertness and individual physical performance
- ◆ physical discomfort promotes irritability, anger, and other emotions.

Heat-related health challenges can include heat cramps, heat stroke, fatigue, heat exhaustion and physical collapse.

2 What are the danger signs?

- ◆ Sweating heavily can affect your skin, causing a rash which may be itchy or sore. This is called 'prickly heat'.
 - Washing during the shift and at the end of the shift, drying your skin, using heat rash prevention cream and putting on a clean/dry coveralls can help to prevent this.
- ◆ Dry mouth, headache, feeling weak, tiredness, cramps, dizziness, nausea

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- Losing fluid and overheating can put your health and safety at risk.
- ◆ Exhaustion, loss of coordination or concentration, fast heart rate or breathing, a feeling of ‘burning up’, fainting or collapse
 - These signs indicate that you (or someone working with you) may be suffering from a more serious heat illness.

3 Who is at risk?

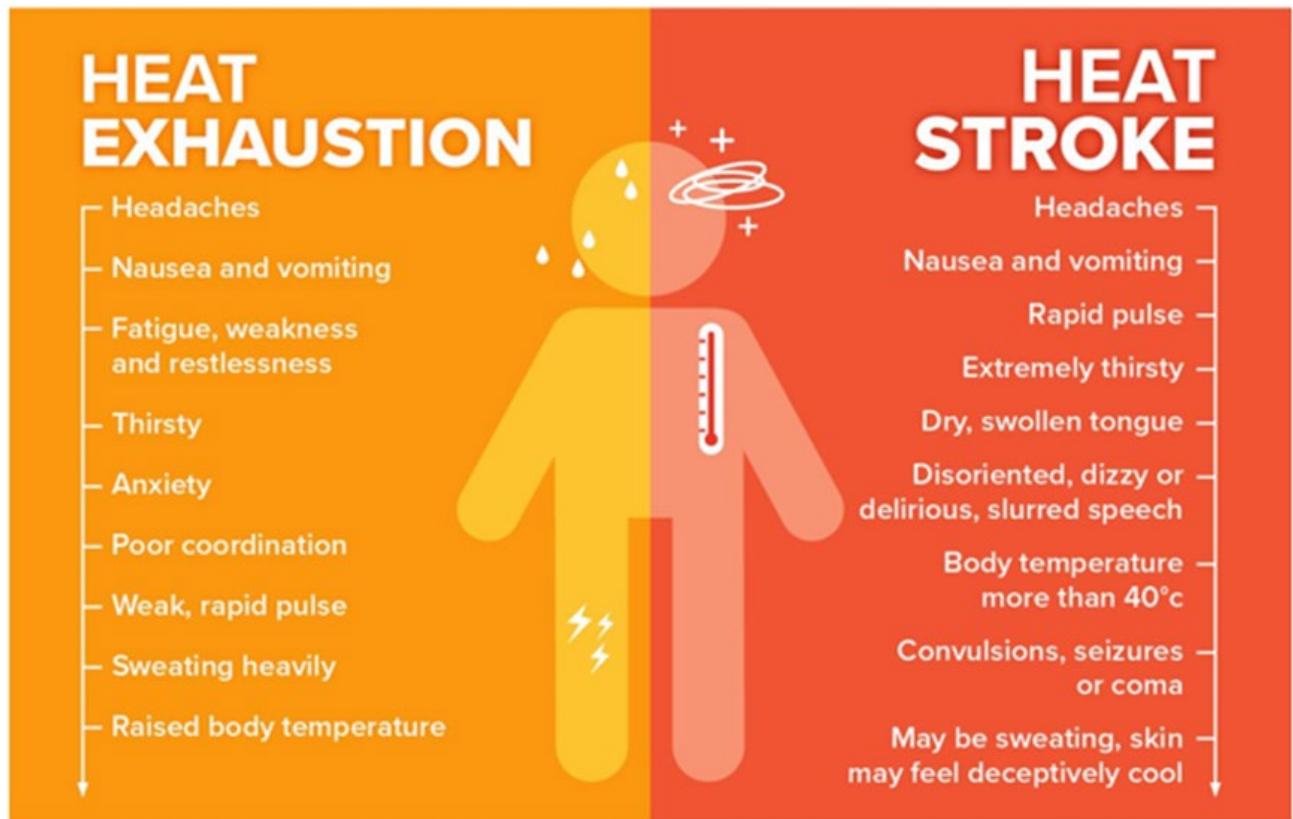
- ◆ People who are not acclimatised to heat.
- ◆ People working without adequate rest & fluid intake.
- ◆ People who are overweight or who are physically unfit.
- ◆ People not sleeping well.
- ◆ People suffering from heart disease.
- ◆ People with pre-existing medical conditions or who use certain medications (e.g. diuretics).
- ◆ People who take a lot of caffeine-based, sugary or alcohol drinks (diuretic).
- ◆ The very young and the aged.

4 Reducing risk

- ◆ STOP what you are doing immediately.
- ◆ If you can, get into the shade – rest in a cool place.
- ◆ Remove / loosen heavy clothing when it is safe to do so.
- ◆ Report any symptoms to your work mates and your supervisor.
- ◆ Drink water slowly.
- ◆ Call Emergency Services as appropriate.
- ◆ DO NOT DRIVE VEHICLES.

Heat disorders and health effects:

- ◆ **Heat rash:** appears as raised red spots, sometimes in areas where the clothing is restrictive.
- ◆ **Sunburn:** is the result of direct exposure to sun and appears as red, hot skin with moderate skin burn.
- ◆ **Heat cramps:** result from electrolytes imbalance due to excessive sweating without replacement of fluid and appears as sustained muscle spasm.
- ◆ **Heat exhaustion:** when the body temperature exceeds 38.3 °C due to excessive fluid loss from sweating; usually appears as headaches, nausea, vomiting, weakness, dizziness, and fatigue.
- ◆ **Heat stroke:** occurs when the body’s system of temperature control fails, and the body temperature rises to a critical level. Heat stroke is a medical emergency. The primary signs and symptoms of a heat stroke are confusion, irrational behaviour, loss of consciousness, convulsion, a lack of sweating and a body temperature of > 41 °C.



5 Prevention of heat stress

Prevention is the best way to manage heat stress. Suggestions to prevent heat stress include:

- ◆ Drink plenty of fluids – drink water to the point where your urine is a light-yellow colour. This generally means drinking two to three litres of water per day but may be more depending on heat, humidity, and physical activity. Drinking too much water (e.g. over 10 litres in a single day) can be dangerous too.
- ◆ A good rule of thumb is:
 - Minimum Water per Day – body weight in kg x 30 ml, e.g. 75 kg x 30 ml = 2.25 litres / day
 - Optimum Water per Day – body weight in kg x 45 ml, e.g. 75 kg x 45 ml = 3.375 litres / day
 - Avoid alcohol, “soft” or fizzy drinks, coffee, tea, or other sugary high-caffeine sport drinks.
- ◆ Whilst salt is needed for the body to function correctly, the routine use of salt tablets is NOT recommended, as your diet should contain sufficient amount of salt already.
- ◆ **Cover up!** So far as is practical, keep your shirt or other top on, especially while you are working around midday. Don’t be tempted to leave it off, even if your skin tans easily and does not burn. To help evaporation of sweat, wear lightweight, light-coloured, loose, porous clothes and a hard hat.
- ◆ **Protect yourself outside:** Use a high-factor sun cream, as sunburn limits the body’s ability to cope with heat.
- ◆ **Stay cool indoors:** If you don’t have air conditioning, use fans and damp towels etc. to stay cool.
- ◆ Avoid exposure to heat:
 - Minimise exposure to direct sunlight if possible.
 - Spend as much time as possible in air-conditioned buildings.
- ◆ Wear safety (sun) glasses when going outdoors.

- ◆ **Acclimatisation:** It can take days or even weeks in some cases to acclimatise to a hotter climate. Avoid strenuous activities during this period.

Additional measures to be taken on site:

- ◆ Ensure there is fresh drinking water available at various locations.
- ◆ Shaded areas should be available (with or without air conditioning).
- ◆ Include heat stress in the induction to show the importance of preventing it.
- ◆ Conduct regular toolbox talks about heat stress and what can be done to prevent it.
- ◆ Schedule outdoor activities carefully:
 - try to restrict your outdoor activities to cooler parts of the day (in the mornings and evenings), or
 - take short shifts with regular scheduled rest periods in a shaded / cooled area.

6 A word on urine colour

If the water in the body is balanced, urine should be a pale straw colour. When water loss from the body exceeds water intake, the kidneys need to conserve water, making the urine much more concentrated with waste products and subsequently darker in colour. In most cases, darker more concentrated yellow urine is usually an indicator that an individual is dehydrated, and that water (containing electrolytes) consumption needs to be increased.

- ◆ Production of small quantities of dark-coloured urine is an early sign of a low water intake and dehydration. An indication of urine colour may be seen in the chart at the end of this document.
- ◆ Dehydration will ultimately have the same effects on the body whether it occurs over one or several days.

7 In summary

- ◆ DO REST regularly
- ◆ DO KEEP COOL
- ◆ DO start your shift with at least 2 glasses of water and drink water regularly during the shift
- ◆ DO drink at least 6 litres of water per shift and 500 ml of electrolyte drink when working in hot conditions
- ◆ DO REST AND DRINK sufficient immediately after a physically demanding job or after high heat exposure
- ◆ DO eat healthily
- ◆ DO REPORT if you are under medication or if you have any known chronic medical condition
- ◆ DO REPORT early signs of heat stress
- ◆ DO NOT substitute water with coffee and tea or energy drinks
- ◆ DO NOT eat heavy / extra spicy meals
- ◆ DO NOT skip meals
- ◆ DO NOT work alone

URINE COLOUR CHART

The general rule of adequate hydration is that the clearer and lighter the urine the better.

