# Workers protection against high temperatures and exposure to solar radiation

Many employment in the extractive industry may be exposed to excessive heat and solar radiation.

Heat and solar radiation, particularly ultraviolet (UV) radiation, can cause burns, skin diseases and eye injury. Heat can also produce heat stress.

When the weather outside is unfavourable, such as when summertime or a heatwave arrive, these effects can be increased.

## Why is it important to protect workers against high temperatures and exposure to solar radiation?

### Risk factors

#### Related to workplace

- Season of the year.
- High temperatures and relative humidity.
- Incident solar radiation.
- Altitude (solar UV radiation increases with altitude in the atmosphere).
- Reverberation of the sun on surfaces, especially lighter ones (e.g. limestone fronts, ...).
- Ozone depletion.
- Point sources of radiant heat (convection or conduction).
- Insufficient airflow. Due to the accelerated convection and evaporation of heat, heat sensation reduces as air speed increases.
- Absence of shaded areas in strategic locations.

#### Related to work

- Lack of water supply points outside.
- Performance of Intense physical work.
- Work task and working posture that favours exposure of parts that may be unprotected such as the face, back, neck, head, etc.
- Task duration, intermittency and aspects of change.
- Insufficient recovery breaks, implying that the employee won´t be in a good health condition to continue with the activity.
- Use of inadequate PPE that prevents the necessary evaporation of sweat (work clothes, safety boots, mask, helmet, etc.).

In the extractive industry, some studies suggest that the most exposed jobs are drilling operator, gunner and treatment plant operator.

### Associated with the worker

- Individual sensitivity (people respond to exposure in different ways).
- Loss of heat acclimation and time to re-establish acclimation. Acclimatisation can clearly increase heat tolerance. It is achieved within 7 to 15 days but disappears in just one week.
- Physical conditions (previous cardiovascular diseases, diabetes, kidney failure, etc.).
- Photosensitive medications.
- Consumption of alcohol or caffeine.
- Overweight: overweight people require more effort in their movements and therefore generate more heat.
- Older age: as people get older, there is a greater risk of dehydration, because the mechanism of thermoregulation changes, leading to a significant decrease in thirst.

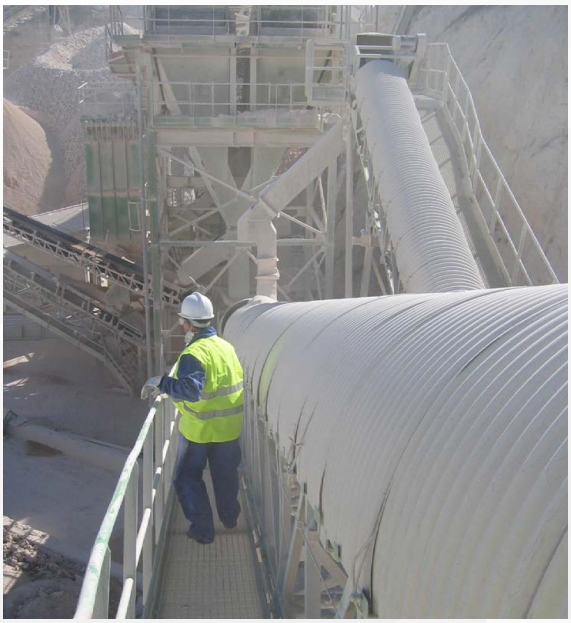
| PHOTOTYPE | PHYSICAL CHARACTERISTICS | TAN SKIN CONDITION | RISK | CLASIFICATION |
|---|---|---|---|---|
| I | Fair-skinned, light eyes and hair. May have freckles. | It always burns, it never tan skin. Sensitive. | Very high | Very High risk of melanoma |
| II | White skin, blue and brown eyes, and blond or reddish hair. | Burns easily and little tan skin. Sensitive | High | High risk of melanoma |
| II | White skin, brown eyes and brown hair. | Burns moderately. Gradual tan skin. | Moderate | Medium risk of melanoma |
| IV | White or lightly tanned skin and dark eyes | Occasionally burns. Always tan skin. | Low | Low risk of melanoma |
| V | Brown skin or dark brown | Never burns. | Extremely low | Extremely low risk of melanoma |
| VI | Black pleople | Occasionally burns. Always tan skin. | Extremely low | Extremely low risk of melanoma |

## Risk of heat stress

The human body can withstand high temperatures, but only for a very short periods of time. When it is exposed to an environment of high thermal sensation – which usually happens when the thermometer reaches high temperatures (more than 40 °C) - vital functions begin to suffer and, beyond certain limits completely stop and the person can suffer from heat stress due to high temperatures.

Symptoms of heat stoke include: cramps, exhaustion, heat stroke, fainting, etc.

The risk of heat stress is one of the most important emerging risks.



## Diseases or effects due to high exposure to solar radiation

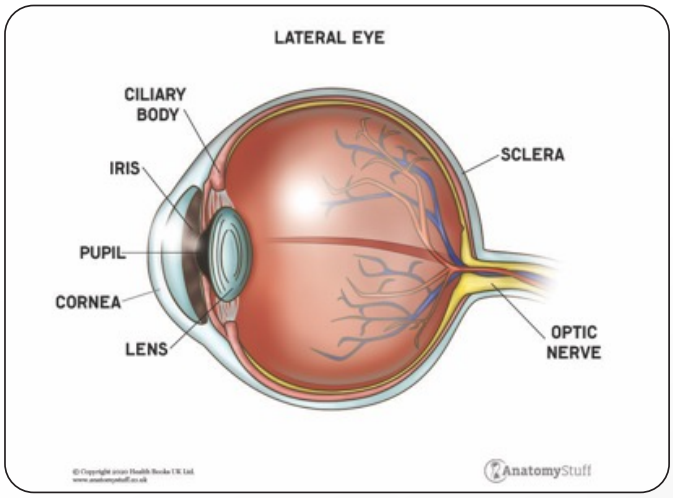
Working in the extractive industry often entails daily exposure to the sun and UV rays. If it is carried out for too long and without the necessary protection, it can lead to skin diseases, conditions of disorder (burns or skin cancer, etc).

The effects of exposure to solar radiation are related to the wavelength and time of exposure. Workers working outdoors can receive many times higher doses of UV radiation than workers working indoors.

Skin diseases are the second most common work-related health problem in Europe. They account for more than 7% of all occupational diseases and are one of the emerging risks.

In addition, damage to the eyes can occur which can lead to partial or total loss of vision. This damage can be:

- Acute effects: corneal injury or cataract formation.
- Chronic effects:
  - Pterygium or pterygium (fibrous growth of the cornea that makes it opaque).
  - Pingueculum or pinguecula (non-malignant connective tissue tumour in the conjunctiva)
  - Keratitis (inflammation affecting the cornea that can cause intense eye pain, redness of the anterior pole of the eye, tearing and photophobia).

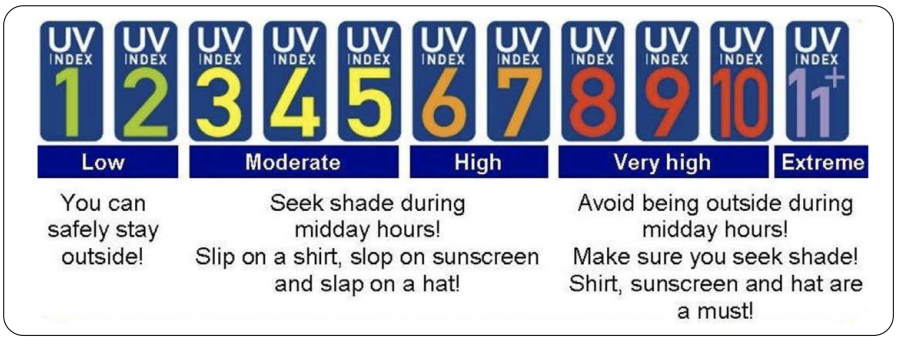



# What should employees do?

## Collective protective measures

As temperatures and the intensity of solar radiation increase, preventive measures must be intensified.

Work above 25 degrees Celsius must be planned. Likewise, as the UV index increases.




- Check weather conditions. Regularly check the weather forestcast and the UV sensor in the area where the site is located. The website of The State Meteorological Agency has maps and charts of radiation and temperatures according to weather stations. Choose the closed one.
- Plan your work before the start of the working day: avoid performing difficult tasks during the hottest hours. Plan harder work for colder weather, change schedules if necessary.
- Limit difficult tasks that require a lot of energy. If possible, get mechanical aids to handle loads or tools to make work easier.
- Limit exposure time or intensity and change task whenever there are areas with less exposure.
- Condition of equipment and offices. Mobile equipment must have tinted glasses with UV protection and offices must have areas that keep the heat sensation within the tolerance limits of the body.
- Install material barriers. Shading should be provided whenever possible, especially in open areas where workers are exposed for long periods of time to avoid direct sunlight.
- Establish an adequate acclimatisation program to reduce the risk of heat-related illnesses. If you leave work in hot conditions, such as holidays or sick leave, you will need to reacclimatise when you return to work.

## Individual preventive measures

- Use appropriate Personal Protective equipment (PPE): apply sunscreen (factor 30 or more) and use PPE that provides high protection against solar radiation: suitable work clothes (special textile), UV protection glasses. A helmet protects the head protection. Wear headgear or hats unless required by established work instructions.
- Increase the frequency of breaks to hydrate and recover.
- If possible, avoid individual work and prefer group work to facilitate mutual supervision of workers and thereby identify possible symptoms of heat stress. Alternatively, a communication system can be established.
- Eat a balanced diet and drink plenty of fluids: avoid heavy meals, and drink water throughout the workday to stay hydrate.
- Check your health. Carry out regular checks to ensure that you are healthy and, if necessaty, assess your susceptibility to these risks. If you feel dizzy or tired, ask for help and, if you notice spots on your skin, see a specialist immediately.
- Get informed and trained. Make sure you are informed and trained about the risks associated with heat, its effects and the preventive measures, work instructions and procedures, use of personal protective equipment and the first aid measures.
- If you notice symptoms of heat stress or notice reddening of the skin notify the supervisor immediately.
- Although these risks are easily avoidable e, take them seriously.

| Typical signs of heat stroke are | Action Plan for heat stress |
|---|---|
| • Loss of consciousness leading to delirium, convulsions or coma.<br>• Very high body temperature (40 – 41°C).<br>• Very hot and dry skin, because it no longer sweats<br>• Severe headache | The most important thing is to quickly reduce the temperature of the sick body and this must be done before transferring to the hospital. Do this:<br>1. Place the worker near to the shade area and in a cool place, unclothed and cooled with whatever is available.<br>2. If the worker is conscious, give cold water to drink. If the worker is unconscious, place the employee in a lateral position with the head turned slightly to the side.<br>3. Contact a doctor and, if possible, take the employee to hospital as soon as possible. |

# EXAMPLES

**National Examples**
**(non exhaustive list):**

**ARGE FORUM Mineral Raw Materials, Austria:**
Austrian companies benefit from a wide range of resources when it comes to safety measures for the construction workers badweather, provided by the government:
- Arbeitsrechtliche Grundsatzfragen bei Hitze auf Baustellen
- Hitze bei Bauarbeiten

**Mineral Products Association (MPA), United Kingdom:**
English companies benefit from a wide range of resources when it comes to safety measures for temperature in the workplace, provided by HSE (link).

**HeidelbergCement Group, United Kingdom:**
- Tool Box Talk. Summer Weather Working, July 2022
- Risk Assessment Method Statement: Working in Extreme Heat Warning Met Office Advised.

**Federación de Áridos (FdA), Spain:**
- Recommendations of Workers protection against high temperatures and exposure to solar radiation toolbox:


**Union Nationale des Producteurs de Granulats (UNPG) & Union Nationales des Industries de Carrières et Materiaux de Construction (UNICEM), France:**
- Information note «Heatwave: adopt the right habits»

## Find out more

### EU law

Framework Directive: 89/391/EEC Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01989L0391-20081211 (23 languages).

Directive: 89/654/EEC of 30 November 1989 of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31989L0654 (23 languages).

Directive: 89/655/EEC of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work (second individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC) https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31989L0655 (23 languages).

Directive: 89/656/EEC of 30 November 1989 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace (third individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01989L0656-20070627 (23 languages).

Directive: 2003/88/EC of the European Parliament and of the Council of 4 November 2003 concerning certain aspects of the organization of working time: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32003L0088 (23 languages).



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