

Working in extreme heat and heatwaves: what legislation and preventive measures at international level?



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Glossary

AAA	Association d'assurance accident - Accident Insurance Association (Luxembourg)
ACGIH	American Conference of Governmental Industrial Hygienists (United States)
ADEM	Agence pour le développement de l'emploi - Agency for the Development of Employment (Luxembourg)
AMHP2012	Administrative Measures on Heatstroke Prevention (China)
AMR	Arbeitsmedizinische Regel - Occupational Health Rule (Germany)
ArbMedVV	Verordnung zur arbeitsmedizinischen Vorsorge - Ordinance on Occupational Medical Precautions (Germany)
ArbStättV	Arbeitsstättenverordnung - Workplace Ordinance (Germany)
ASR	Technischen Regeln für Arbeitsstätten - Technical Rules for Workplaces (Germany)
AStV	Arbeitsstättenverordnung - Workplace Ordinance (Austria)
BSchEG	Bauarbeiter-Schlechtwetterentschädigungsgesetz - Construction Workers Bad Weather Compensation Act (Austria)
CCOHS	Canadian Centre for Occupational Health and Safety (Canada)
CFST	Commission fédérale de coordination pour la sécurité au travail - Federal Coordination Commission for Occupational Safety (Switzerland)
CGTP	Confederação Geral dos Trabalhadores Portugueses - General Confederation of Portuguese Workers (Portugal)
COHSR	Canada Occupational Health and Safety Regulations (Canada)
EMY	Εθνική Μετεωρολογική Υπηρεσία - Hellenic National Meteorological Service (Greece)
ETUC	European Trade Union Confederation
EU	European Union
GBH	Gewerkschaft Bau-Holz - Union of Construction and Wood Workers (Austria)
GHG	Greenhouse gas
HI	Heat Index
HIPP	Heat Illness Prevention Plan (United States)
HSE	Health and Safety Executive (United Kingdom)
HSWA	Health and Safety at Work Act (New Zealand)
HTSs	High Temperature Subsidies (China)
ILO	International Labour Organization
INAIL	Istituto nazionale per l'assicurazione contro gli infortuni sul lavoro - National Institute for Insurance against Accidents at Work (Italy)
INPS	Istituto nazionale della previdenza sociale - National Institute for Social Security (Italy)
ISO	International Organization for Standardization
JIS	Japan Industrial Standards (Japan)

JISHA	Japan Industrial Safety and Health Association (Japan)
KOSHA	Korea Occupational Safety and Health Agency (South Korea)
MSST	Médecins et autres spécialistes de la sécurité au travail - Doctors and other occupational safety specialists (Switzerland)
NIOSH	National Institute for Occupational Safety and Health (United States)
OAR	Oregon Administrative Rules (United States)
ÖGB	Österreichischer Gewerkschaftsbund - Austrian Trade-Union Federation (Austria)
OHCOV	Occupational Health Clinics for Ontario Workers Inc. (Canada)
OHS	Occupational Health & Safety Authority (Malta)
OPA	Ordonnance sur la prévention des accidents et des maladies professionnelles - Ordinance on the Prevention of Accidents and Occupational Illnesses (Switzerland)
OSH / OHS	Occupational safety and health / Occupational health and safety
OSHA	Occupational Safety and Health Administration (United States)
PPE	Personal protective equipment
TLVs	Threshold Limit Values (TLVs)
TUC	Trades Union Congress (United Kingdom)
UFCW	United Food and Commercial Workers (Canada)
UNEP	United Nations Environment Programme
WAC	Washington Administrative Code (United States)
WBGT	Wet-Bulb Globe Temperature
ZAMG	Zentralanstalt für Meteorologie und Geodynamik - Central Institution for Meteorology and Geodynamics (Austria)
ZSSS	Zveza svobodnih sindikatov Slovenije - Slovenian Association of Free Trade Unions (Slovenia)

Editorial

As temperatures continue to rise due to global warming, and heatwaves become more frequent and intense, working in these conditions represents a major challenge.

Workers in various sectors (construction, agriculture, manufacturing, transport, etc.), who are often unavoidably exposed to high temperatures, are likely to face increasingly extreme working conditions.

Prolonged exposure to high temperatures, combined with excessive humidity, can lead to serious health problems, from heat exhaustion to fatal heatstroke.

Faced with these risks, various players around the world - governments, social partners and professional organisations - have taken initiatives to protect the health and safety of workers during extreme heat and heatwaves.

Produced at the suggestion of the OPPBTP and the Occupational Accident and Illness Insurance Scheme with a view to informing those involved in occupational risk prevention, the EUROGIP report presents an overview of these initiatives: adoption of standards and regulations to control risks, provision of appropriate personal protective equipment, adaptation of working hours, improved ventilation and insulation of workplaces...

Awareness-raising campaigns and prevention training for employers and workers are also more frequent and aim to provide precise information on the risks associated with heat, workers' symptoms to watch out for, adaptation measures and best practices to follow.

Lastly, technological innovation can make an effective contribution to the development of monitoring and early warning systems, particularly by geographical zone, advanced protective equipment, cooling systems adapted to the specific needs of workers exposed to heat, etc.

On the basis of the research proposed in this report, the OPPBTP published a guide of recommendations in June 2023, entitled "Extreme heat and the effects of heatwaves on construction sites". We are delighted to have been able to combine the skills and expertise of our organisations on such a topical issue.

Paul DUPHIL

Managing Director

OPPBTP

Raphaël HAEFLINGER

Director

EUROGIP

Report summary

In recent years, society has often been confronted with increasingly high outdoor temperatures, particularly during the summer months. Nevertheless, working in high temperatures is rarely regulated at national level, either in Europe or anywhere else in the world.

At European Union level, there is no maximum acceptable temperature at work. No European legislative act deals with this subject in detail. This lack of a precise framework - leaving a wide margin of manoeuvre to each European State as to whether or not to set limits - has recently been strongly criticized by European trade unions, who are calling for urgent action (more precisely, a European Directive) in this area to fill the existing gaps.

Admittedly, setting a maximum temperature at work that can be applied to the entire working population is a complex undertaking. Indeed, even for the scientific community, objectively assessing heat tolerance - a factor that depends on a multitude of factors and is likely to vary from one person to another - is difficult.

When working in high temperatures, **in addition to the air temperature, other factors influence heat tolerance.** This involves analysing environmental, personal and working conditions, such as:

- air humidity,
- air circulation/speed,
- solar and thermal radiation from objects or surfaces in the vicinity of the work,
- physical intensity (particularly workload) and duration of work,
- the physical fitness of workers, in particular the existence of conditions, medical history or illnesses that increase the risk of heatstroke,
- the acclimatisation of workers to working conditions, particularly the heat,
- clothing worn when working in high temperatures.

There are indices that try to combine some of these elements, such as the **WBGT (Wet-Bulb Globe Temperature) Index**, the corrected effective temperature, the **Heat Index** used in the United States, the **Humidex** used in Canada, etc.

Therefore, some of the few countries that have regulated high temperatures in the workplace do not use air temperature alone in their legislation, but instead use these indices, in particular the WBGT.

There are different approaches at national level to regulating work in the heat.

Below are some of the findings for the European countries (EU or non-EU) analysed in this report: **France, Italy, Spain, Portugal, Greece, Cyprus, Slovenia, Austria, Germany, Belgium, Luxembourg, Latvia, Malta, the United Kingdom and Switzerland.**

- Upstream, it is important to remember the obligation - in accordance with Directive 89/391/EEC, known as the Framework Directive on health and safety at work - for all employers in the EU to carry out a risk assessment, on the basis of which to organise and put in place prevention measures. In occupations exposed to the risk of heat, the assessment must take this into account. Nevertheless, it is worth pointing out that **Belgium** and **Spain** have laws that clarify and detail the factors to be taken into account in risk assessment in the event of adverse weather conditions (including heatwaves) and explicitly mention the preventive measures to be taken in the event of high temperatures in the workplace (including

outdoors). In **Switzerland**, the main occupational accident insurer, Suva, has provided employers with a specific checklist for outdoor work in very hot weather, to help them carry out the risk assessment.

- Several European countries - **Spain, Latvia, Portugal, Slovenia, Austria, Germany** – have precise legislative maximum values for air temperature (and sometimes humidity too). However, these limits only refer to enclosed premises, an area that can be easily “controlled” by the employer, who can intervene by introducing air conditioning and fans, for example.
 - In **Germany**, the temperature considered dangerous inside premises is 35°C. We are not talking about “absolute” limits, because the thresholds of 26, 30 and 35°C mentioned in a “para-regulatory” document (which is not a real law) trigger specific preventive measures, but not an automatic suspension of work activity.
 - In the other countries mentioned above, laws stipulate precise degrees of air temperature, which can lead to fines for employers who fail to comply with such values in enclosed workplaces.
- **Belgium, Cyprus** and - most recently - **Spain** would be the rare European countries to also regulate **high temperatures in more detail when working outdoors**. **Belgium** has maximum values that apply both indoors and outdoors, expressed according to the WBGT Index and differentiated by workload. **Cyprus** has maximum values for indoors and others for outdoors. For outdoor work, tables combine air temperature, humidity and workload. If the reference limits are exceeded, **Belgium** and **Cyprus** propose that measures (organisational and technical) be put in place to try to reduce and eliminate heat stress at work. If this objective cannot be achieved, then tables will be used which dictate in detail a **precise alternation between work and rest periods**, depending on the environment and the workload in question. For Cyprus, the tables used suggest that at certain combination levels (for example, where temperature and humidity are too high), rest must be 100% within the space of an hour, meaning work activity must be temporarily suspended.

In **Spain**, a recent law has been approved concerning, amongst other things, adverse weather (including heatwaves) at work. It does not introduce a maximum temperature value above which outdoor work must be prohibited. It does, however, introduce a specific prevention obligation relating to the occupational risks associated with working in extreme heat, the measures for which would be triggered primarily when orange **heatwave alerts** (air temperatures between 37 and 40°C) or red heatwave alerts (between 40 and 44°C) are issued by the State Meteorological Agency. If the protection for workers' health cannot be effectively guaranteed, a reduction in work activity is then required.
- Whether the limits are indoors or outdoors, **Latvia, Austria, Spain, Belgium and Cyprus** differentiate **maximum values according to workload**. Latvia, which only regulates the temperature and humidity of enclosed premises, provides for different values depending on the season (cold or hot).
- It is also worth highlighting the existence in some countries of **the "adverse weather" unemployment scheme**. This is not an obligation, but a possibility, for the employer to

temporarily (from a few hours to a few weeks) stop work due to adverse weather and to allow employees to receive technical unemployment benefits during this period. Adverse weather often refers to meteorological episodes that prevent the normal performance of work outdoors, such as snow, heavy storms, etc. In recent years, some countries have expressly **included heatwaves under the concept of "adverse weather"**, with temperature and/or humidity thresholds that trigger the possibility of accessing this short-time working mechanism (as in **Italy, Austria and Luxembourg**).

- In the absence of specific maximum temperature values enshrined in law, **collective agreements** can be highly relevant tools for providing practical solutions at sectoral and/or local level. They make it possible to target working conditions **as closely as possible to the sector**. In some countries, for example, collective agreements specify heat exposure limits. These are often in the sectors most affected by the risk of heat exhaustion because they are outdoors during the summer months. Examples include the building and public works agreements in **Spain**, which set timetables prohibiting work in the afternoon during 1 or 2 summer months, or other collective agreements in **Greece** which prohibit work during the hottest hours of the day when certain air temperature levels are reached.
- Lastly, in virtually all EU countries (and other European countries), efforts are being made at various levels to **prevent the risks associated with excessive exposure to heat**, particularly during work performed **outdoors in summer**. Examples of initiatives in terms of national plans, communication campaigns and the provision of tools by ministries of Health, Labour, social protection institutions or occupational injury insurers are worth mentioning. This report analyses prevention tools and developments in **France, Switzerland, Spain, Italy, Greece, Malta and the United Kingdom**.

Finally, this report aims to provide an overview of the regulation of work in high temperatures on **continents other than Europe**. From the countries analysed - **Australia, New Zealand, the United States, Canada, South Africa, the Gulf States, China, Japan and South Korea** - the following findings emerge:

- In **Australia and New Zealand**, there are no maximum temperatures at work. However, many tools, documents and checklists developed by national occupational health and safety agencies are designed to help employers control the risk of heat at work. In Australia, in the event of a heatwave, the government agency *Safe Work Australia* states that employers must carry out additional risk assessments and implement heat risk control measures.
- In **the United States and Canada**, a distinction must be made between federal regulations and those at state (USA) or provincial (CA) level. In both countries, at central government level, there is no specific legislation concerning high temperatures at work, with the exception, in Canada, of certain limits expressed in terms of the Humidex Index in enclosed public service workplaces.
In **the United States**, only Minnesota, California, Washington and Oregon regulate exposure to heat:
 - **Minnesota**: the measures adopted concern only enclosed workplaces. The law provides

for limits expressed in terms of the WBGT Index (in degrees Fahrenheit) which vary according to the workload.

- The measures introduced in California, Washington and recently Oregon are similar. **California** and the **State of Washington** have **specific regulations for outdoor workplaces**, while **Oregon's regulations** apply to **both indoor and outdoor workplaces**. In these three States, local law does not set a precise temperature value above which work must be stopped. Instead, **certain heat thresholds make it compulsory for employers to put in place specific preventive measures**, particularly in terms of access to drinking water, access to shaded areas and acclimatisation of workers to the heat, setting up an emergency response plan and specific measures in the event of a heatwave, training employees and supervisors, and drawing up the *Heat Illness Prevention Plan* (HIPP), in which the employer must detail how it will ensure compliance with all the heat prevention provisions.
- In **California** and the **State of Washington**, preventive measures are mandatory when the **air temperature** exceeds a certain threshold: 80°F in California, while in Washington State there is a table with Fahrenheit values differentiated according to the type of clothing worn by the worker. In **Oregon**, the **Heat Index** is used (in degrees Fahrenheit), and care must be taken when it exceeds 80°F and 90°F in the workplace.

In **Canada**, some Provinces and Federal Territories have adopted more specific measures concerning heat stress. Some in particular (**British Columbia, Manitoba, Newfoundland and Labrador, New Brunswick, Nova Scotia, Prince Edward Island, Northwest Territories and Nunavut**, the latter two only in the case of work in mines) **have made it compulsory to comply with maximum heat stress values** as described by the *American Conference of Governmental Industrial Hygienists* (ACGIH). These Threshold Limit Values (TLVs) use the WBGT Index (expressed in °C); they also take into account the workload and distinguish between workers acclimatised and not acclimatised to heat. As in Cyprus and Belgium, the ACGIH proposes a table that shows a **precise alternation between work and rest times** when certain levels of WBGT combined with workload are reached. During the rest period, the worker can be assigned other (lighter) tasks, but particular attention must be paid to activities associated with high levels of fatigue that would prevent the body from cooling down properly. **Quebec** differs from the other Provinces in that it does not follow the values indicated by the ACGIH. It applies its own table with WBGT Index values expressed in °C, which are combined with the workload. However, this table also proposes alternating work and rest times when certain WBGT levels are reached.

- In **South Africa**, there is no absolute maximum temperature at which work is prohibited. However, the law stipulates that if the temperature in the workplace exceeds a specific value (30°C WBGT), the employer is obliged to try to reduce it and, if this is not possible, to **put in place specific preventive measures if hard manual work is carried out**. These measures include: ensuring that each employee is certified as fit to work in such an environment by a registered medical practitioner; ensuring that each employee is acclimatised to the working environment before being required or permitted to work in such an environment; informing each employee of the need to drink at least 600ml of water per hour; training employees in the precautions to be taken to avoid heatstroke; and providing the means by which each employee can receive prompt first aid in the event of heatstroke.

- The **Gulf Cooperation Countries - Saudi Arabia, Bahrain, the United Arab Emirates, Kuwait, Qatar and Oman** - have particularly difficult climatic conditions, with very high air temperatures (up to 55°C), high humidity levels (that can be over 80%) and very little rainfall. Over time, all these countries **have adopted work bans, which prohibit people from working outdoors at specific times of the day and during specific periods of the summer**. The bans generally concern few hours of the day (the hottest part of the day, often between midday and 3pm) and their application (in terms of timetable and calendar, the measure generally concerns the months of July and August) varies slightly from one country to another. This approach is similar to that used in some Spanish collective agreements in the building and public works sector: it involves **a limit on exposure to the sun and heat, set regardless of the air temperature and humidity of the day, or the workload of workers**.

In 2021, **Qatar** made a number of important changes to its *work ban*, for example extending the daily window and the calendar for application: from now on, outdoor work activity must be suspended between 10am and 3.30pm from 1 June to 15 September. Another key innovation in Qatar was the **introduction of a work suspension, regardless of the time of day or month, if the WBGT Index exceeds 32.1°C in the workplace**.

- In **China**, administrative measures to prevent heatstroke were introduced in 2012. The text (AMHP2012) lays down obligations for employers, including the introduction of special measures for work activities carried out in high temperatures during the summer period. Among other things, **employers must provide different solutions for three different air temperature ranges**:
 - If the temperature reaches 40°C, outdoor activities must be stopped for the whole day.
 - If the temperature is between 37°C and 40°C, the employer must ensure that the employees do not work outdoors in the open air for more than 6 hours in total throughout the day, and continuous working time must not exceed national regulations; in addition, the employer must not organise work outdoors in the open air during the 3 hours of the highest temperature period of the day.
 - If the temperature is between 35°C and 37°C, the employer must adopt measures such as rotating shifts to shorten workers' continuous working time, and must not organise overtime for workers working outdoors.

It should be noted that in the event of suspension or reduction of working hours, the employer does not have to reduce the workers' pay. However, the same text allows the employer to also grant **wage compensation** when workers perform outdoor work with temperatures above 35°C and effective measures cannot be taken by the employer to lower the temperature of indoor workplaces below 33°C. This possibility reveals a certain ambiguity inherent in this regulation. The stated aim would be to prevent employers from exposing workers to heat that is harmful to their health; but these measures provide for the possibility of compensating employees exposed to such a risk. The low cost of this compensation could encourage employers to prefer to pay the subsidy rather than reduce working hours.

- In **Japan** and **South Korea**, there are no statutory maximum temperatures at work. However, major preventive efforts are being made:
 - In **Japan**, the fight against heatstroke in the workplace is an integral part of the National Occupational Safety & Health Programme, which is approved every 5 years. One of the

ways of achieving this objective is to make the **Japanese standard on thermal stress at work** widely available in the workplace. This standard requires employers to comply with a table setting out maximum WBGT values in the workplace, differentiated according to workload. If these values are exceeded, the employer should implement specific measures to reduce and eliminate the heat risk. Various tools (annual prevention campaigns, documents, brochures, specific websites created by the ministries, company testimonials) are available to employers.

- In **South Korea**, in a similar way, campaigns are being run among employers to promote the use of the "**Guide to implementing the 3 basic rules for preventing heatstroke**", the three rules referring to: drinking water, protecting oneself in the shade and taking regular breaks. This Guide contains recommendations for working outdoors. As the air temperature rises (the document talks in particular about four ranges: 31-33°C; 33-35°C; 35-38°C and over 38°C), the employer should provide sufficient quantities of water, shade, modify the work schedule and even stop work during the hottest hours of the day (at least from 2pm to 5pm).
- With regard to **these non-European countries**, it is interesting to note that in the laws of the Canadian provinces and the State of Washington, as well as in the Japanese standard concerning thermal stress, tables adjust the maximum heat exposure values according to the **clothing worn by the worker**.

In conclusion

The study shows that **regulatory approaches to exposure to high temperatures vary**, ranging from restrictive measures (such as legislation) to simple prevention advice. Also, the reference values used at national level are not the same; some countries use **air temperature thresholds**, while others apply more complex **heat stress indices**. The values are also sometimes adjusted according to the **workload**, the **acclimatisation of workers** to working conditions in the heat, and the **clothing** worn.

It is often noted that, in the various legislations, **in the event of high temperatures at work, there are rarely absolute limits**: when certain values are exceeded, **specific prevention obligations** are triggered, with - among other things - the obligation to modify working hours or to alternate work and rest periods.

With the climate crisis and global warming, it will be necessary to find solutions to the legislative gaps that exist in the area of heat stress at work, especially for occupations that are carried out outdoors during the summer season and are therefore the most exposed to heatwaves. It should be noted that **legislative work** in this area is underway in countries such as Greece, the United States, Canada and the United Kingdom (at different stages of progress, ranging from simple legislative proposals to texts already being negotiated within national parliaments).

The State of Oregon introduced heat stress provisions into its law in 2022, after witnessing a deadly heatwave in 2021, with peaks of 46.6°C. Spain also decided to legislate in this area in May 2023, no doubt in view of the increasingly severe heatwaves it has experienced in recent years.

1. Introduction

The impact of rising temperatures and climate change on the world of work

In recent years, society has often had to contend with **increasingly high outdoor temperatures**, particularly during the summer months. For example, according to data from Météo France¹, the summer of 2022 was "the second hottest summer observed in France since at least 1900, with a difference of +2.3°C compared with the 1991-2020 average". Between June and August, France was hit by three heatwaves, with a total of 33 days for the first time since 1947 (compared with 22 days in 2003).

In 2022, France was hit by two other waves outside the summer season: in May and September/October (the latter being "the hottest ever recorded in Europe, with average temperatures almost 2°C above the 1991-2020"²).

While 2022 was particularly affected by these heat phenomena, the situation could well get worse in the future, due to climate change.

The **United Nations Environment Programme (UNEP)**, in its Emissions Gap Report 2022³, indicates that, on the basis of current environmental policies and without further action, the **planet is likely to experience global warming of +2.8°C by 2100**.

Although international commitments now exist (notably the 2015 Paris Agreement⁴) where signatory countries set themselves the main objective of limiting global warming to below 2 degrees Celsius (preferably 1.5) above pre-industrial levels, UNEP highlights the inadequacy of measures taken to date to address the climate crisis, noting that progress has been very limited in reducing the huge emissions gap⁵ by 2030.

In order to limit global warming to +1.5°C by the end of the century, UNEP estimates that annual global greenhouse gas (GHG) emissions would have to be

Climate change & EU

The European Union as a whole (EU-27) is one of the seven largest contributors to global greenhouse gas emissions, along with China, India, Indonesia, Brazil, Russia and the United States.

As part of its "European Green Deal" and in order to achieve the objectives of the Paris Agreements, the EU has presented its long-term strategy for reducing emissions and its climate plans. Among the key points, the EU has committed to:

- reducing its emissions by at least 55% below 1990 levels by 2030;
- achieving climate neutrality by 2050.

These commitments have been made legally binding on Member States under EU Climate Regulation 2021/1119, approved in June 2021.

1 <https://meteofrance.com/actualites-et-dossiers/actualites/changement-climatique-lete-2022-et-ses-extremes-meteorologiques>

2 https://www.lemonde.fr/planete/article/2022/11/08/l-annee-2022-a-connu-le-mois-d-octobre-le-plus-chaud-jamais-enregistre-en-europe-selon-copernicus_6148972_3244.html

3 <https://www.unep.org/resources/emissions-gap-report-2022>

4 <https://unfccc.int/process-and-meetings/the-paris-agreement>

5 The expression "emissions gap" is used here to refer to the difference between projected emissions under current policies and the emissions reductions required to achieve the temperature target set out in the Paris Agreement.

"reduced by 45% in just eight years compared to projected emissions under current policies". While the economic crisis linked to COVID-19 led to a significant reduction in global GHG emissions in 2020 (down by around 4.7% in 2019), the data shows how, by 2021, the rate of global coal emissions had already far exceeded that of 2019.

The rise in average global temperatures is just one aspect of the complex phenomenon of the climate crisis. This crisis is accompanied by exceptional meteorological phenomena (including heatwaves, but also more severe cold snaps), rising sea levels and the loss of ecological balance and biodiversity.

Aside from the increase in outside temperatures and heatwaves (especially in summer), there is the question of the consequences for the world of work.

As the European Trade Union Confederation (ETUC)⁶ points out, today **there are still very few studies and research concerning the effects of climate change on employment in the EU**. A 2014 analysis by Triple E Consulting for the European Commission, "*Assessing the Implications of Climate Change Adaptation on Employment in the EU*"⁷, attempts to quantify the consequences of climate change on the world of work in Europe on the basis of three scenarios, ranging from the worst-case scenario (i.e. in which no new adaptation measures are put in place by the Member States) to the most ambitious scenario (in which countries and companies put in place effective adaptation measures). In the most negative scenario, it is estimated that **around 410,000 jobs will be lost in the EU by 2050 as a result of climate change**. As a result, the number of structurally unemployed individuals would increase by around 2%.

More recently, in 2019, the International Labour Organization (ILO) published a study with a rather emblematic title: "Working on a warmer planet – The impact of heat stress on labour productivity and decent work"⁸. This report focuses on the difficulties and consequences of having to work in an increasingly hot world, with episodes of heatwaves and extreme heat inevitably affecting the majority of people working outdoors, in sectors such as agriculture, construction, environmental goods and services (natural resource management), waste collection, urgent repair work, transport, tourism and sports.

The ILO points out that **excessive heat constitutes an occupational hazard**, affecting the health and safety of workers: it limits their capacity, physical functions and productivity. At temperatures above 24-26°C, there is an initial reduction in work productivity. At 33-34°C, a worker doing moderate-intensity work loses 50% of his working capacity. Finally, exposure to excessive heat levels can lead to heat stroke, which can be fatal.

In this study, the ILO asks how much employment (measured in hours worked) would be lost as a result of a rise in global temperature. In an optimistic scenario (i.e. with a temperature rise of 'only' 1.5°C between now and 2100 and considering that outdoor work in agriculture and construction is carried out in the shade⁹), **in 2030 2.2% of total hours worked worldwide would be lost due to high temperatures**, resulting in a loss of productivity equivalent to **80 million full-time jobs**. Considering more pessimistic (and perhaps more realistic) scenarios in which agricultural and construction workers work under the sun, the ILO estimates that the loss of total working hours in

6 In its 2020 Guide for trade unions entitled "Adaptation to Climate Change and the world of work".
https://www.etuc.org/sites/default/files/publication/file/2020-08/ETUC-adaptation-climate-guide_EN.pdf

7 https://climate.ec.europa.eu/system/files/2016-11/climate_change_employment_eu_en.pdf

8 https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_711919.pdf

9 The ILO explains the reason for this as follows: "this assumption is based partly on the fact that in tropical countries about 40 per cent of days are cloudy, not sunny, and partly on the fact that some tasks, especially in subsistence agriculture, can often be moved to times of the day when it is less hot".

2030 would amount to **3.8%, or the equivalent of 136 million full-time jobs**. At the same time, the economic losses in 2030 due to heat stress at work would be around **2,400 billion US dollars**, a figure significantly higher than the losses in 1995 due to the same cause (estimated at 280 billion dollars).

The impact would be greater, the ILO continues, in lower middle-income and low-income countries. In particular, the regions of South Asia and West Africa are expected to be hardest hit by the social and economic consequences of extreme heat. **Europe**, in general, is likely to experience a lesser impact (with a loss of productivity of less than 0.1%), but the health, social and economic consequences could be substantial **during more frequent heatwaves of unusual intensity**.

Finally, the ILO estimates that the sectors most affected in terms of lost working hours would be agriculture (-60%) and construction (-19%) due to heat stress by 2030. Most of the working hours lost in **North America, Europe** (Northern, Southern and Western) and the **Arab States** would be concentrated in **the construction sector**.

No EU framework on maximum temperatures at work

At European level, there are no maximum temperature limits at work. No European legislative act deals with this subject in detail. Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace¹⁰ merely states (Annex I) that: "during working hours, **the temperature in rooms containing workplaces must be adequate for human beings**, having regard to the working methods being used and the physical demands placed on the workers".

This wording does not give a precise degree, nor does it seem to cover outdoor workplaces (in sectors such as agriculture and construction), in view of the expression "rooms containing workplaces".

This lack of a precise framework - leaving a wide margin of manoeuvre to each EU Member State as to whether or not to set precise limits - has recently been strongly criticised by European trade unions. In July 2022, during a summer marked by particularly intense heatwaves, **the European Trade Union Confederation (ETUC)** issued a press release¹¹ **denouncing the urgent need for European legislation on maximum working temperatures** to protect workers from the consequences of climate change.

Following yet another episode of heatstroke (resulting in the deaths of two Spanish workers), the ETUC has issued a reminder of the link between accidents at work and extreme temperatures: "**when temperatures rise above 30°C, the risk of workplace accidents increases by 5-7% and, when temperatures exceed 38°C, accidents are between 10% to 15% more likely**".

This is a dangerous situation which, according to the unions, requires immediate action by the European institutions. The ETUC "is calling on the European Commission to close the gaps in protection of workers with a directive on maximum working temperatures", considering that, in this area, "advice is not sufficient".

10 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31989L0654> . This is the first individual directive within the meaning of Article 16 (1) of the European Framework Directive on OSH (Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work).

11 <https://www.etuc.org/en/pressrelease/climate-crisis-requires-eu-law-maximum-working-temperatures>

The ETUC had already stated its position in a 2018 Resolution on the need for European action to protect workers from high temperatures¹². It stressed that "**workers in Europe should never have to work in temperatures that place their health at risk**. As the world's leading trading bloc, the EU should lead the way in working conditions by ensuring workplaces with safe temperatures. In an era of climate change in which difficult weather conditions are likely to be more frequent and more extreme, it is essential that there are the appropriate legislative instruments in place to protect workers with clear roles and responsibilities for policy-makers, employers and trade unions representatives".

In October 2020, the Confederation adopted a new Resolution¹³ containing proposals for the development of the EU Strategy on Climate Change Adaptation, in which it:

- reiterates its call for a legislative initiative to protect workers from climate change, in particular from exposure to high temperatures;
- calls on the EU to recognise the **increased risk** that extreme temperatures pose to workers and to provide a framework for the protection of workers.

However, when this European Strategy¹⁴ was published in February 2021, the ETUC regretted¹⁵ that "**the strategy does not include new protections for workers from exposure to high temperatures** or concrete proposals for active labour market policies needed **to prevent job losses** in the most affected sectors".

A hard-to-identify boundary: air temperature is not enough

Often (see Chapters 2 and 3), there are no specific temperature limits for working (either indoors or outdoors) **in the various national legislations**, and even fewer limits linked solely to air temperature.

In addition to air temperature, **other factors need to be taken into account**, making it difficult to identify a single limit that can be applied across a country.

*Safe Work Australia*¹⁶, the Australian Agency for Health and Safety at Work, clearly sums up why there are no maximum temperature limits at work in that country: "**A single 'stop work' temperature cannot account for all the factors** that make working in heat hazardous, including **humidity, air flow, physical intensity and duration of the work**, and **whether workers are physically fit and acclimatised** to the conditions".

Humidity is a central element to be considered when setting limits on exposure to heat at work. It is taken into account, for example, in the legislation on maximum temperatures at work in Cyprus (see Chapter 2) and in the weather-related layoff scheme in Italy (see Chapter 2).

A high air temperature could be tolerated with a low level of humidity. On the other hand, a lower temperature could become unbearable (or even fatal) in the presence of high humidity. To survive,

12 <https://www.etuc.org/en/document/etuc-resolution-need-eu-action-protect-workers-high-temperatures>

13 <https://www.etuc.org/en/document/etuc-resolution-new-eu-adaptation-climate-change-strategy-world-work>

14 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. "Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change". <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN>

15 Press release dated 24 February 2021 <https://www.etuc.org/en/pressrelease/climate-change-adaptation-strategy-fails-protect-workers>

16 <https://www.safeworkaustralia.gov.au/safety-topic/hazards/working-heat/frequently-asked-questions>

the human body needs to be able to keep its temperature at a constant level (thermoregulation process). When there is heat in the environment, sweat helps to cool the body. However, this cooling is only possible when sweat is removed from the skin by evaporation. In conditions of high humidity, evaporation of sweat is reduced and the body's efforts to maintain an acceptable body temperature can be considerably hampered. In other words, the higher the humidity, the slower the evaporation of sweat.

This is why legislation on working temperatures in certain countries - such as Belgium (see Chapter 2) and South Africa (see Chapter 3) - uses temperature limits expressed in terms of **the Wet-Bulb Globe Temperature Index (WBGT)** instead of air temperature alone. This index measures heat stress by taking into account **air temperature, humidity, wind speed and solar radiation**¹⁷.

The WBGT Index, which must be measured by specific equipment and is expressed in degrees Celsius or Fahrenheit, must not be confused with the air temperature: an air temperature of 35°C does not correspond to 35°C WBGT.

The WBGT Index will therefore determine the "felt temperature", over and above that of the air. There are other indices that aim to establish the temperature felt, such as the Humidex Index used in Canada (see chapter 3), but the WBGT Index is the only one that also takes solar radiation into account.

Even if this index were applied, other parameters such as **workload** and **duration of exposure** would have to be taken into account when determining any thresholds. Similarly, the **clothing worn** by workers influences heat tolerance: tables adjusting maximum values according to the type of clothing and/or personal protective equipment (PPE) exist, for example, in the legislation of some Canadian provinces and in the State of Washington in the United States (see Chapter 3).

So, there are many factors to consider when introducing maximum temperature limits at work, and they cannot be reduced to simply measuring the air temperature, especially for occupations with a heavy workload that are carried out outdoors.

17 More information on the WBGT Index and how it works is contained in ISO 7243: 2017 "Ergonomics of the thermal environment - Assessment of heat stress using the WBGT (wet bulb globe temperature) index".

2. Regulation and prevention at work in the heat in fifteen European countries

As far as Europe is concerned, this report covers the following countries: **France, Italy, Spain, Portugal, Greece, Cyprus, Slovenia, Austria, Germany, Belgium, Luxembourg, Latvia, Malta, the United Kingdom and Switzerland.**

The practices, limits and methods used to set temperature limits vary considerably from one country to another.

Several tools can be put in place, ranging from binding measures to simple prevention advice (**laws**, negotiations at **collective agreement level** or at **company level** to target more specifically the working conditions of certain professions particularly affected by high temperatures, **prevention actions** carried out by governments and national institutes responsible for OSH).

This chapter focuses on a number of **European countries** and **provides examples** for each of the instruments mentioned, trying - as far as possible - to focus on outdoor work and the construction sector.

This report does not deal with any existing regulations for jobs carried out in cold environments. The expression "maximum temperatures" therefore refers to work in the heat.

Legislation and regulations governing heat: is there a maximum temperature for working?

Some European countries have set limits in their legislation for maximum permissible temperatures at work.

However (with the exception of Belgium and Cyprus), these values often refer to **enclosed workplaces**, such as offices. This points to the difficulty of imposing temperature limits that can be applied to the outdoors, a workplace where the temperature does not depend on the employer.

That said, national legislation does not generally set a temperature above which work must be stopped. Often, they specify temperature values above which work can continue, **provided that specific OSH measures are put in place** (as in Cyprus or Germany).

It should be remembered that - in accordance with the European Framework Directive on OSH¹⁸ - the employer remains responsible for the OSH of his workers; **a risk assessment is always necessary**. Exposure to high temperatures is certainly a constant risk in certain occupations, which must be included in the assessment and for which preventive activities must be carried out.

Some countries have specific provisions in their legislation on temperatures at work, as well as specific obligations to be applied in the case of work carried out in excessively hot conditions.

In addition to the legal texts, certain **"para-regulatory" documents** were also analysed as part of this study: these do not necessarily have any binding value, their main aim being to help companies to implement the prevention requirements in practice, in the knowledge that other means of prevention may be put in place if they provide "the same degree" of OSH. However, in

18 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31989L0391>

the event of accidents, inspections or other situations, **failure to apply the measures set out in these "para-regulatory" documents**, unless compensated for by equivalent appropriate measures, **may expose companies to penalties or increase their civil or criminal liability**.

Spain

Annex III of Royal Decree 486/1997¹⁹, which lays down minimum health and safety requirements for the workplace, contains information on the temperature of workplaces ("Environmental conditions of workplaces"). This Annex stipulates that in **enclosed workplaces** (*locales de trabajo cerrados*) the temperature must be between:

- 17 and 27°C for sedentary work (office work and the like);
- 14 and 25 °C for light work.

Although these limits do not apply outdoors, Annex III nevertheless specified that "**in open-air workplaces** and in workplaces which, because of the activity carried out, cannot be enclosed, **measures must be taken** to enable workers to protect themselves, as far as possible, from inclement weather", without however specifying the measures in question.

We should also mention Royal Decree 1561/1995²⁰, which opens up the possibility of reducing the working day in the event of specific risks to workers' health and safety. Article 23 states that "the limitation or **reduction of exposure times to particularly harmful environmental risks** is applicable in cases where, despite compliance with the applicable legal provisions, the performance of the ordinary working day entails a particular risk to workers' health due to the existence of exceptional circumstances of arduousness, danger, unhealthiness or toxicity, without it being possible to eliminate or reduce the risk by adopting other appropriate protective or preventive measures".

In these situations, and **without prejudice to the provisions of collective agreements**, in the event of disagreement between the company and the workers or their representatives, the Labour Authority may, "on the basis of a report from the Labour and Social Security Inspectorate and after obtaining the opinion, where appropriate, of the technical bodies for the prevention of occupational risks, agree on the appropriateness and scope of limiting or reducing exposure times". It should be noted that if the working day is reduced, the **wages of the workers concerned will not be reduced**.

In addition, Article 24 introduces an additional measure for **work carried out outdoors in agriculture** (*trabajo en el campo*): "in **tasks which require extraordinary physical effort** or in which there are circumstances of particular difficulty due to **abnormal conditions of temperature or humidity**, the ordinary **working day may not exceed six hours and twenty minutes** per day and thirty-eight hours per week of actual work".

However, **on 11 May 2023**, Spain made significant changes to this legislative framework concerning work in very hot weather, with the publication of a new Royal Decree.

19 Real Decreto 486/1997, de 14 de abril, por el que se establecen las disposiciones mínimas de seguridad y salud en los lugares de trabajo. <https://www.boe.es/buscar/act.php?id=BOE-A-1997-8669>

20 Real Decreto 1561/1995, de 21 de septiembre, sobre jornadas especiales de trabajo. <https://www.boe.es/buscar/act.php?id=BOE-A-1995-21346>

The Royal Decree 4/2023²¹ aims to respond to a number of current challenges, including drought, difficulties in the agricultural sector as a result of the war in Ukraine, and worsening weather conditions due to climate change. With regard to this last point, Royal Decree 4/2023 lays down more precise provisions for the **prevention of occupational risks in the event of high temperatures**, thus filling the gaps that existed in this area, particularly for jobs carried out outdoors.

The new Royal Decree amends, among other things, the aforementioned Annex III of Royal Decree 486/1997: firstly, by deleting the paragraph relating to outdoor workplaces, and secondly, by adding a new supplementary provision specifically covering "**Environmental conditions for outdoor work**".

So now, in Spain:

1. When work is carried out outdoors and in workplaces which, due to the activity carried out, cannot be enclosed, **adequate measures must be taken** to protect workers against all adverse weather events (*fenómenos meteorológicos adversos*), including **extreme temperatures**.
2. These "**adequate measures**" must result from the **assessment of occupational risks**, which must take into consideration, in addition to meteorological phenomena (adverse weather), the characteristics of the **work task** to be performed and the **personal characteristics or known biological condition of the worker**. In accordance with article 23 of the aforementioned Royal Decree 1561/1995 on special working days, preventive measures also include **prohibiting the performance of certain tasks during the hours of the day** when adverse weather phenomena occur, in cases where adequate protection of the worker cannot be guaranteed in any other way.
3. Finally, it is established that if the **State Meteorological Agency** (or, where applicable, the corresponding regional body in the Autonomous Communities that have such a service) **issues an orange or red warning of adverse weather conditions** and the aforementioned preventive measures do not guarantee the protection of workers, **the adaptation of working conditions is obligatory**, including the reduction or modification of the hours of the scheduled working day.

As far as heat is concerned, the State Meteorological Agency's orange alert corresponds to an air temperature of between **37 and 40°C**, and the red alert to a temperature of between **40 and 44°C**. The precise temperature values for these alert levels vary depending on the Autonomous Community²².

In Spain, when it comes to working outdoors, there is no real temperature limit beyond which work must be stopped. Instead, the law now provides for a **specific prevention obligation** relating to the occupational risks associated with working in very hot weather, the **measures for which would be triggered mainly when orange or red heatwave alerts are issued** by the State Meteorological Agency. **If the protection for workers' health cannot be effectively guaranteed, a reduction in work activity is then required**. Spain has thus become one of the few European countries to have legislated in greater detail on working conditions in extreme heat outdoors.

21 *Real Decreto-ley 4/2023, de 11 de mayo, por el que se adoptan medidas urgentes en materia agraria y de aguas en respuesta a la sequía y al agravamiento de las condiciones del sector primario derivado del conflicto bélico en Ucrania y de las condiciones climatológicas, así como de promoción del uso del transporte público colectivo terrestre por parte de los jóvenes y prevención de riesgos laborales en episodios de elevadas temperaturas.*
<https://www.boe.es/buscar/act.php?id=BOE-A-2023-11187>

22 More information on the website of the State Meteorological Agency (AEMET):
https://www.aemet.es/documentos/es/eltiempo/prevision/avisos/plan_meteoalerta/METEOALERTA_ANX1_Umbrales_y_niveles_de_aviso.pdf

Latvia

Cabinet of Ministers Regulation No. 359²³ of 28 April 2009 on "Occupational protection requirements in the workplace" states in Appendix 1 that the air **temperature in the workroom** must be within:

1. during the warm period of the year between:

- 20°C and 28°C for category 1 work (with little or no physical effort)
- 16°C and 27°C for category 2 work (with moderate or high physical effort)
- 15°C and 26°C for category 3 work (with very high levels of constant physical effort).

2. during the cold period, between:

- 19 °C and 25 °C for category 1 work
- 16 °C and 23 °C for category 2 work
- 13 °C and 21 °C for category 3 work

Relative humidity should be between 30 and 70% during both the hot and cold periods of the year.

The Regulation (Article 2) specifies that these temperature limits do not apply to certain workplaces: motor, river, sea, air and rail vehicles; the mining industry; fishing vessels; **agricultural and forestry** undertakings, if the workplaces are not located in the buildings of these undertakings; temporary and mobile workplaces, including **construction sites**.

In Latvia, unlike in the refrigeration sector, **the law does not regulate the working hours and rest periods allowed** when working outdoors during periods of extreme heat²⁴.

Slovenia

Article 25 of the "Regulation on requirements to ensure the safety and health of workers at work"²⁵ states that "the employer must ensure that the **temperature of the air in the workplace** during working hours corresponds to the physiological needs of the workers, taking into account the nature of the work and the physical load of the workers at work, except in cold rooms, where the criteria for working in the cold are taken into account".

The article specifies that the **air temperature in working rooms must not exceed 28°C**. In the case of hot workspaces, where the air temperature may exceed 28°C (e.g. in the presence of ovens), the employer must at least ensure that the air temperature in equipment rooms, corridors and stairways connected to hot workspaces does not exceed 20°C.

These limits do not apply to all workplaces. Article 3 explicitly excludes workplaces: on means of transport used outside the undertaking; on **temporary or mobile construction sites**; in the extraction of minerals and non-metals in the extractive industry; on fishing boats and in fields,

23 *Ministru kabineta noteikumi Nr.359, Darba aizsardzības prasības darba vietās*. <https://likumi.lv/ta/id/191430-darba-aizsardzibas-prasibas-darba-vietas>

24 <https://lvportals.lv/skaidrojumi/276344-darba-nav-nedz-jasalst-nedz-japarkarst-2016>

25 *Pravilnik o zahtevah za zagotavljanje varnosti in zdravja delavcev na delovnih mestih*. <http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV418>

forests and similar land forming part of an **agricultural or forestry undertaking** and located away from the employer's buildings.

According to the Slovenian Association of Free Trade Unions (*Zveza svobodnih sindikatov Slovenije*, ZSSS), which is affiliated to the ETUC, these regulations are inadequate, especially in the light of climate change and rising summer temperatures. The ZSSS considers²⁶ that there is a lack of "regulations governing the protection of people working outdoors during heatwaves". This situation prompted it to send a **letter²⁷ to the Ministry of Labour** in June 2022 requesting an amendment to the above-mentioned regulations to introduce measures to protect the health of workers during heatwaves, both for those working indoors and outdoors. This follows action taken in October 2021, when ZSSS called for a new chapter on safe working environments during climate change heatwaves to be introduced into the above Regulations²⁸.

Portugal

Decree-Law 243/86²⁹ sets temperature limits in the workplace. Article 11 ("Temperature and humidity") states that "workplaces and common facilities must offer good temperature and humidity conditions in order to ensure the well-being and protect the health of workers". Accordingly, "the **temperature of workplaces should, as far as possible, be between 18°C and 22°C**, except in certain climatic conditions, when it may be as high as 25°C". The text also deals with humidity: "the humidity of the working atmosphere must be between 50% and 70%". In addition, "where natural ventilation does not provide a working atmosphere in accordance with the preceding paragraphs, artificial ventilation and heating or cooling systems, as appropriate, shall be used".

In the Portuguese case too, these limits do not apply to external premises. The Decree-Law deals with health and safety at work in **commercial, office and service establishments**, in both the private and public sectors. Its aim is to adapt the principles of ILO Convention No. 120 on health and safety in commerce and offices.

Furthermore, as the General Confederation of Portuguese Workers (*Confederação Geral dos Trabalhadores Portugueses*, CGTP) points out³⁰, **Portuguese law does not always specify the type of measures that companies must take** in the event of high temperatures.

Generally speaking, at present Portuguese law does not contain **any concrete situation associated with extreme weather conditions** in which a person would be obliged to stop work. Admittedly, employers are obliged - as in other European countries - to look after the OSH of their workers, but in practice "there is **no legislation stipulating that work must be stopped when certain temperatures are reached**"³¹.

26 <https://zssszaupnikvzd.si/novice/delovna-inspekcija-o-potrebni-ukrepih-delodajalca-ob-visokih-temperaturah-na-delovnem-mestu-17-6-2022/>

27 <https://zssszaupnikvzd.si/wp-content/uploads/2022/06/Poziv-na-MDDSZ-za-dopolnitev-pravilnika-za-zascito-v-casu-vrocinskih-valov.pdf>

28 <https://zssszaupnikvzd.si/wp-content/uploads/2022/06/Poziv-na-MDDSZ-za-dopolnitev-pravilnika-za-zascito-v-casu-vrocinskih-valov.pdf>

29 *Decreto-Lei n.º 243/86, de 20 de agosto.* <https://dre.pt/dre/detalhe/decreto-lei/243-1986-219080>

30 <https://cnnportugal.iol.pt/calor/direitos-calor/posso-recusar-me-a-trabalhar-se-estiver-muito-calor-o-que-dizem-os-especialistas/20220722/62d698620cf2f9a86eadf262>

31 <https://www.publico.pt/2022/07/17/azul/noticia/direitos-trabalhadores-calor-aperta-2013795>

Austria

The Workplace Ordinance³² (abbreviated to AStV) states (Article 28) that it is necessary to ensure that the **air temperature in work premises is:**

- between 19 and 25°C for work involving low physical stress;
- between 18 and 24°C for work involving normal physical effort;
- at least 12°C for work involving high physical stress.

In addition, it must be ensured that **during the warm season:**

1. if there is an air conditioning or **ventilation** system, the air temperature does not exceed 25°C as far as possible,
2. or if not, **other measures are taken** to lower the temperature as far as possible.

Paragraph 3 of Article 28 gives details of the air velocity in work premises.

However, these measurements would **not refer to external locations**, as Article 28 actually deals with the "indoor climate in workrooms " (*Raumklima in Arbeitsräumen*).

Germany

The Workplace Ordinance³³ (abbreviated to ArbStättV) merely states that workplaces must be provided with "an **ambient temperature conducive to health** during use, taking into account the working methods and physical stresses to which workers are subjected"³⁴.

More precise temperature values can be found in the "Technical rules for workplaces - Room temperature - **ASR A3.5**"³⁵ (amended in March 2022). ASR A3.5 is not a binding text, but it does specify the OSH requirements of the ArbStättV. If the employer complies with ASR A3.5, it is assumed that the requirements of the ArbStättV are also met. If the employer chooses other means of complying with the ArbStättV, he must guarantee the same level of occupational health and safety that he would have achieved by applying the ASR A3.5.

The scope of application of ASR A3.5 (Article 2) is restricted to **work rooms**, break rooms, on-call rooms, sanitary rooms, canteen rooms and first-aid rooms which do not have specific climatic requirements. As a result, outdoor work in the open air³⁶ is not covered by ASR A3.5.

32 Arbeitsstättenverordnung (AStV).

<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10009098>

33 Arbeitsstättenverordnung (ArbStättV). https://www.gesetze-im-internet.de/arbst_ttv_2004/BJNR217910004.html

34 Point 3.5 of Annex of ArbStättV.

35 Technische Regeln für Arbeitsstätten. Raumtemperatur. ASR A3.5 <https://www.baua.de/DE/Angebote/Rechtstexte-und-Technische-Regeln/Regelwerk/ASR/ASR-A3-5.html>

36 More specifically, Article 5 of ASR A3.5 refers to construction sites, but only sets out provisions for enclosed premises (canteens, toilets, etc.). It is specified that "[on construction sites] in break rooms, on-call rooms, toilets and canteens [...], it is sufficient that the air temperature is +18°C and that it is guaranteed that an air temperature of +21°C can be reached during the period of use. In break rooms, on-call rooms, sanitary facilities and canteens, it is permitted to deviate briefly from the air temperatures mentioned in this ASR by means of ventilation processes triggered by the users". This is because it is difficult to introduce temperature limits in the open air, which is beyond the control of the employer: "The previous version of the ASR did not contain explicit rules for construction sites. [...] While it is natural that no temperature specifications can be made for open-air construction sites, the new version of the ASR now provides ambient temperature regulations for break rooms, on-call rooms, canteens and sanitary facilities on construction sites". <https://blog.seton.de/raumtemperatur-auf-baustellen.html>

ASR A3.5 points out that for most workstations, the air temperature is sufficient to determine whether the ambient temperature is acceptable for health. However, for workstations where air humidity, heat radiation or air velocity are high, these elements must be considered and assessed separately.

As a general rule, **the air temperature in work rooms should not exceed 26°C**. It is **possible to continue working at a higher temperature if appropriate measures are taken**.

To determine this, the **text first refers to the outside air temperature**. If the outside air temperature is very high (as in a summer heatwave), it can be assumed that the temperature in the indoor workplace could rise, potentially endangering workers.

So, **if the outside air temperature is above 26°C**, the air temperature in the workroom should be analysed.

ASR A3.5 provides for three thresholds, with specific solutions for each of them:

- **If the temperature in the workroom exceeds 26°C but is below 30°C**: the employer must implement the preventive measures listed in Table 4 (*Tabelle 4: Beispielhafte Maßnahmen*) of ASR A3.5. These measures include: keeping curtains closed even after working hours, using fans (table, pedestal, tower or ceiling fans), operating electrical appliances only when necessary, allowing ventilation at night, offering refreshments and possibly modifying working hours. However, in certain cases, a temperature above 26°C (although below 30°C) can represent a health risk, particularly when: i) heavy physical work is being carried out, ii) special work or protective clothing must be worn that greatly hinders heat dissipation, iii) workers are vulnerable (young people, the elderly, pregnant women, etc.). In such situations, other measures should be decided on the basis of an appropriate risk assessment.
- **If the temperature of the workroom exceeds 30°C but is below 35°C**: effective measures must be taken in accordance with the risk assessment, in order to reduce the strain on workers (and always in accordance with table 4 of ASR A3.5).
- **If the temperature in the workroom exceeds 35°C**: the room will not be considered suitable for work unless special measures are applied. The employer must intervene with technical measures (e.g. air showers, water curtains), organisational measures (e.g. air cooling phases) or by providing personal protective equipment (e.g. heat protective clothing). If no measures are taken, the room must remain unoccupied for as long as the temperature is exceeded. As the German trade union IG Metall pointed out in a press article³⁷, "the lack of auxiliary means does not automatically mean that workers can simply go home, but only that they cannot work in certain premises".

Finally, **mention should be made of German legislation concerning extreme heat in the workplace** (such as workplaces involving the use of industrial ovens, etc.).

The Ordinance on Preventive Occupational Health Care³⁸ (abbreviated to ArbMedVV) stipulates that in the event of "activities involving extreme heat stress which may lead to a particular danger",

37 https://www.liberation.fr/checknews/est-il-vrai-que-les-allemands-travaillent-moins-des-qu'il-fait-trop-chaud-comme-le-dit-gerard-filoche-20220618_UXQ2GGEJLJF2DHTFYHKV6BG7IA/

38 *Verordnung zur arbeitsmedizinischen Vorsorge (ArbMedVV)*. <https://www.gesetze-im-internet.de/arbmedvv/BJNR276810008.html> According to Article 1, the aim of this ordinance is "to identify and prevent occupational diseases at an early stage through occupational health measures. Occupational health care should also contribute to maintaining employability and to the further development of occupational health protection. [...] This Ordinance does not affect other occupational health prevention measures, in particular under the Occupational Health and Safety Act".

the employer is obliged to carry out **mandatory specific prevention**³⁹. However, the ArbMedVV does not explain what is meant by extreme heat stress leading to a particular danger, or the work activities concerned.

Reference should be made to Occupational Health Rule AMR n.13.1⁴⁰, "**Activities involving exposure to extreme heat which may result in a particular hazard**", which states that, if its provisions are put in place by the employer, the employer may assume that the relevant requirements contained in the ArbMedVV are complied with. However, the employer may choose a different way of complying with his obligations other than by applying AMR 13.1, but in this case he must be able **to achieve the same level of protection** of the safety and health of employees.

AMR 13.1 begins with a **definition of extreme heat** (Article 2): "a climatic condition in which the evacuation of the heat produced by the body is difficult due to an external thermal load. It is understood as a climatic influence composed of air temperature, humidity, air speed and thermal radiation".

AMR 13.1 goes on to state that "activities exposing workers to extreme heat and likely to involve particular risks result from a combination of the influence of climate, work clothing, the arduousness of the work and working hours".

The text (point 4.2) gives **concrete examples of activities carried out under potential extreme heat stress**, such as working on furnace roofs, for example in power stations; certain activities in the ceramics industry; moving around or climbing into tanks, boilers, industrial furnaces, drying installations, reactors which have not yet cooled down completely, as well as working inside them, etc.

In principle, **activities involving a high heat load solely because of the season**, and activities involving exposure to high heat for a short period (of the order of one minute) **do not fall within the scope of this AMR 13.1** (point 4.3). However, there are **exceptions**, as other activities in addition to those listed in point 4.2 may entail particular risks in terms of excessive exposure to heat. In order to determine this, the employer must check whether at least one of the following parameters is present (point 4.4):

- **air temperature above 45°C and occupancy time > 15 min;**
- **air temperature above 30°C for at least four hours during the working day and, at the same time, high humidity** (characterised, for example, by damp or wet skin);
- liquid absorption of more than four litres per shift;
- unbearable heat radiation on uncovered skin.

Thus, in these situations, AMR 13.1 triggers the need for the employer to **implement specific preventive measures**, in accordance with the ArbMedVV, without specifying what such measures would be⁴¹.

Belgium

In Book V ("Environmental factors and physical agents"), Title 1 ("Thermal atmospheres") of the

39 Article 4, paragraph 1 and Annex, part 3, paragraph 1, subparagraph 1 of the ArbMedVV

40 AMR 13.1 „Tätigkeiten mit extremer Hitzebelastung, die zu einer besonderen Gefährdung führen können“. <https://www.baua.de/DE/Angebote/Rechtstexte-und-Technische-Regeln/Regelwerk/AMR/AMR-13-1.html>

41 <https://aug.dguv.de/gesundheitschutz/sommer-hitze-im-buero/>

Code of Wellbeing at Work⁴², temperature limits are set according to the workload. The temperature indicated is not simply the air temperature but is expressed using the WBGT Index.

Firstly, it is specified that the employer must carry out "a risk analysis of the technological or **climatic thermal environments** present in the workplace [...], taking into account the following factors:

1. the air temperature, expressed in degrees Celsius;
2. the relative humidity of the air, expressed as a percentage;
3. air speed, expressed in metres per second;
4. thermal radiation due to the sun or technological conditions;
5. the physical workload evaluated by the energy to be developed per second, necessary to carry out the work, and calculated in watts. For a continuous 8-hour shift, the physical workload can be classified as very light (less than 117 watts), light (117 to 234 watts), medium (235 to 360 watts), heavy (361 to 468 watts) and very heavy (more than 468 watts);
6. work methods and work equipment used;
7. the characteristics of the work clothing and PPE;
8. the combination of all these factors.

Risk analysis takes account of **changes in these factors over the course of working time**, frequently changing working circumstances and **seasonal variations**".

Next, Art. V.1-3.- § 2 indicates the **maximum WBGT values at work**, depending on the physical workload. These values also differ in the event of exposure to cold or heat.

In the case of exposure to heat, the WBGT Index value may not exceed:

- 29 for light or very light work,
- 26 for medium work,
- 22 for heavy work,
- 18 for very heavy work.

The WBGT index can be calculated using methods such as those published on the website of the Federal Public Service - Employment, Labour and Social Dialogue⁴³.

Then, Chapter III of Title 1 of Book V specifies that "where the prevailing temperatures may, for technological or climatic reasons, exceed the action values⁴⁴ referred to in Article V.1-3, the employer shall first draw up, on the basis of the risk analysis [...], **a programme of technical and organisational measures to prevent or minimise exposure**, as the case may be, to cold or heat and the risks arising therefrom. The measures [...] relate in particular to:

1. technical measures which affect ambient air temperature, humidity, heat radiation or air velocity, in particular the installation of artificial ventilation systems, in accordance with the provisions relating to the ventilation of workplaces, the capture and evacuation of hot and humid vapours or gases, the installation of reflective partitions and the use of air humidifiers or dehumidifiers;
2. reducing the physical workload by adapting work equipment or work methods;

42 <https://emploi.belgique.be/sites/default/files/content/documents/Bien-%C3%AAtre%20au%20travail/R%C3%A9glementation/Code%20livre%20V%20titre%201%20Ambiances%20thermiques.pdf>

43 <https://emploi.belgique.be/fr/themes/bien-etre-au-travail/facteurs-denvironnement-et-agents-physiques/ambiances-thermiques-0>

44 The "action values" refer to the thresholds (expressed using the WBGT Index) that trigger specific measures.

3. alternative working methods which reduce the need for exposure to excessive cold or heat;
4. limiting the duration and intensity of exposure;
5. the adaptation of working hours or the organisation of work in such a way that the duration of the worker's exposure to excessive heat is reduced and, if necessary, periods of presence at the workplace are alternated with rest periods to be spent on the premises or in rest facilities which meet the requirements referred to in Article III.1-61 and Annex III.1-1;
6. the provision of clothing which protects workers against exposure to excessive cold or heat and against dampness or heat radiation;
7. the provision, free of charge to workers, of appropriate hot or cold drinks.

Chapter IV details the measures to be taken in the **event of exposure to excessive heat**, making a distinction between technological and **climatological** heat. In the latter case, "when the action values referred to in Article V.1-3, § 2, [...] are **exceeded, the employer shall take the following measures**:

1. if the levels continue to be exceeded, the employer shall, within a period of 48 hours from the time when the exceedance is observed, install **artificial ventilation devices** in the work premises in accordance with the provisions concerning ventilation of work premises;
2. if the time limit referred to in point 1° is exceeded, the employer shall **establish a system of limited presence at the workstation and rest periods** as provided for in Article V.1-10, paragraphs 2 and 3⁴⁵;
3. the employer shall **ensure that refreshing drinks are distributed** at no cost to workers, in accordance with the advice of the prevention consultant/occupational physician, in order to compensate for dehydration resulting from working conditions".

In the event of excessive heat that is both technological and climatological in origin, and where the above-mentioned WBGT values are exceeded, the employer must apply the provisions laid down for exposure to excessive heat of technological origin.

Lastly, Title 1 of Book V stresses the **importance of health surveillance**, which is essential when **workers are "habitually employed outdoors"**.

As regards the **alternation between work and rest periods**, there are several possibilities for determining these time limits. In accordance with Article V.1-4.- § 1, the employer may:

4. apply the standard NBN EN ISO 7243⁴⁶, or NBN EN ISO 7933⁴⁷ or NBN EN ISO 9886 ⁴⁸ ;
5. if the employer does not wish to apply these standards, the alternation of periods of presence at the workstation and rest periods shall be **fixed after obtaining the opinion of the prevention consultant/occupational physician** and the prior agreement of the workers' representatives on the Committee, or failing that, of the trade union delegation;
6. if the employer does not wish to apply the standards set out in point 1 and is unable to consult a prevention consultant/occupational physician, the alternation is set **in accordance with the provisions of a collective labour agreement** concluded in the joint committee to which the employer belongs and made compulsory by Royal Decree, provided that these provisions

45 This article deals with exposure to excessive heat caused by technology.

46 ISO 7243:2017. Ergonomics of the thermal environment - Assessment of heat stress using the WBGT (wet bulb globe temperature).

47 ISO 7933:2004. Ergonomics of the thermal environment - Analytical determination and interpretation of heat stress using calculation of the predicted heat strain.

48 ISO 9886:2004. Ergonomics - Evaluation of thermal strain by physiological measurements.

guarantee protection comparable to that set out in Annex V.1-1;

7. finally, if it is not possible to use one of the aforementioned tools, the employer may apply the **table proposed** by this Title 1, available in Annex V.1-1.

This Annex sets the rest periods at work in the event of exposure to heat, depending on the workload, as follows:

Alternating between work and rest	Value of the WBGT index in the event of work...			
	...light	...medium	...heavy	...very heavy
45 min/15 min	29,5	27	23	19
30 min/30 min	30	28	24,5	21

As the Federal Public Service Employment website⁴⁹ explains, the table should be interpreted as follows: for example, in the case of light work, **if the WBGT value is equal to or greater than 29.5**, there should be 15 minutes of rest per hour. **If it is equal to or greater than 30**, there must be 30 minutes of rest per hour.

Belgium is thus one of the few European countries to have introduced specific limits that also apply to outdoor work. The values take into account factors other than air temperature alone: WBGT index and workload.

Cyprus

Cyprus also has a **specific framework for working outdoors in extreme heat**.

The first legislative measures to regulate work involving heat stress date back to the early 2000s⁵⁰. The provisions relating to temperature at work were recently reformulated and updated in 2014 and then again in 2020⁵¹, with the introduction of a "Code of Practice for Thermal Stress of Employees"⁵².

To better understand the measures and obligations detailed in this Code, a guide⁵³ is also available: this is a sort of short, simplified version of the Code to help employers easily identify what they need to do to ensure workers' OSH in the event of high temperatures.

While the guide itself is not a binding document, it does state that "the Code of Practice is published in accordance with [...] the Health and Safety at Work Act 1996 as amended from time to time [...]. **In criminal proceedings, a person's failure to comply with a provision of the Code of Practice [...] is evidence of a failure to comply with the provisions of the laws or regulations**

49 <https://emploi.belgique.be/fr/themes/bien-etre-au-travail/facteurs-denvironnement-et-agents-physiques/ambiances-thermiques-0>

50 Workplace Regulations of 2002 and 2004 (Κ.Δ.Π. 174/2002 et Κ.Δ.Π. 494/2004).

51 Κ.Δ.Π. 291/2014 and Κ.Δ.Π. 206/2020.

52 **ΚΩΔΙΚΑΣ ΠΡΑΚΤΙΚΗΣ ΘΕΡΜΙΚΗ ΚΑΤΑΠΟΝΗΣΗ ΤΩΝ ΕΡΓΑΖΟΜΕΝΩΝ.**

[https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/\\$file/Heat_Stress_Code_of_Practice_NEW.pdf](https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/$file/Heat_Stress_Code_of_Practice_NEW.pdf)

53 **Οδηγός για την Εφαρμογή του Κώδικα Πρακτικής για τη ΘΕΡΜΙΚΗ ΚΑΤΑΠΟΝΗΣΗ ΤΩΝ ΕΡΓΑΖΟΜΕΝΩΝ.**

[https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/\\$file/ODIGOS_THERMIKH_KATA_PONSHH_NEW.pdf](https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/$file/ODIGOS_THERMIKH_KATA_PONSHH_NEW.pdf)

[...] to which the Code of Practice relates, unless it is proved otherwise to the satisfaction of the Court that there has been satisfactory compliance otherwise than by the relevant provision of that Code".

The guide stresses that heat is a particularly significant threat to workers in Cyprus, given the climatic conditions and the amount of sunshine during the summer period, and that the measures in the Code **apply to both indoor and outdoor work**⁵⁴. Interestingly, the provisions of the Code must be implemented by both employers (who must ensure the OSH of their employees) and self-employed workers.

After an introduction outlining the risks associated with exposure to high temperatures and the impact of heat on workers' health, safety and productivity, the guide focuses on the complexity of determining temperature limits in the workplace, due to the fact that air temperature is only one of **a number of factors to be considered**. These certainly include "humidity, air velocity, sources of thermal radiation, but also parameters related to the worker, such as the type and form of work, the intensity of the work activity expressed in terms of oxygen consumption, the duration of exposure to the unfavourable thermal environment, clothing, as well as the worker's state of health (illness, obesity, pregnancy, acclimatisation, etc.), etc."

As far as the working environment is concerned, four parameters need to be analysed: air temperature, humidity, air speed and also heat radiation from bodies or surfaces in the vicinity of the work. We are reminded that air temperature alone is an incomplete indicator: "a working environment in which the air temperature is 35°C, relative humidity is low, there is air movement and there are no radiating bodies, is more favourable for the worker than an environment in which the air temperature is 32°C but relative humidity is high, the air is practically immobile and there are radiating bodies in the workplace".

The Code uses a system called the **Corrected Effective Temperature Index**⁵⁵. Quoting a 1969 World Health Organisation document⁵⁶, it points out that the corrected effective temperature limit values corresponding to **8 hours' occupational exposure in an unfavourable thermal working environment** are as follows:

Type of work	People not acclimatised to working conditions	People acclimatised to working conditions
Light	30 °C	32,2 °C
Medium	28 °C	30 °C
Heavy	26,5 °C	28,5 °C

If such values are exceeded at work, the employer is required to take appropriate action. The Code distinguishes between action to be taken in the case of indoor work and outdoor work.

54 <https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/1D53129AD65E97B8C2257DDD002620AF?OpenDocument>

55 There are two indices called effective temperature and corrected effective temperature: effective temperature is an index which "takes into account temperature, humidity, and airspeed, but not radiation. Introduced by Houghton and Yaglou, this measure of heat sensation is defined as the temperature of saturated motionless air that would produce the same sensation of heat or cold as the combination of temperature, humidity, and air motion under consideration. An improvement on this measurement by Vernon and Warner uses the temperature given by the globe thermometer instead of the dry-bulb air temperature and thus includes an approximation of the radiation component. This standard is known as the corrected effective temperature." <https://archive.unu.edu/unupress/unupbooks/80a01e/80A01E05.htm>

56 <https://apps.who.int/iris/handle/10665/40716>

When working indoors, the employer must not only avoid exceeding these maximum temperatures, but also try, as far as possible, to keep the corrected actual temperature within the comfort limits. These are the 'optimum' temperatures for working, not the maximum, and range from 15,5°C to 26,5°C.

Employers can lower temperatures in a number of ways. The first step is to apply "**technical measures**", such as:

- **Interventions on the structural elements of buildings:** thermal insulation of the slab or roof; wet slab or roof or white or reflective paint; opaque or reflective glazing to be installed on the south or west sides; in large openings that are left open due to the needs of the production process and remain so for long periods, a cold air curtain must be installed; openings at the highest points of sloping ceilings to facilitate natural ventilation.
- **Interventions in parts of the production process:** insulation of hot surfaces located in work areas (boilers, hot water pipes, etc.); blocking heat sources with thermal insulation partitions and dissipating heat to the outside environment.
- **Interventions on the workplace microclimate:** elimination of hot air and pollutants as close as possible to their source; adequate general ventilation by installing fans at high points in rooms and ventilation of work areas with centrifugal fans; adequate renewal of workplace air, when production conditions so require, by introducing fresh air and simultaneously evacuating workplace air; air conditioning desirable where possible.

If the technical measures do not make it possible to achieve or maintain the corrected effective temperature within the above-mentioned limits, then "**organisational measures**" should be taken, such as:

- provide training for employees;
- organise working hours so that heavy work is carried out during the coolest hours of the day;
- organise frequent, short rest breaks in a cool, shaded area or in a suitably air-conditioned room or in a room where fans are used, if possible;
- adjust work or allow rest or stop work depending on the type of work being carried out, and air temperature (in the shade) and relative humidity conditions;
- introduce a rotation of workers at work according to the type of activity carried out
- provide workers with fresh drinking water (at a temperature of 10 to 15°C);
- provide workers with appropriate headgear and light, loose-fitting, breathable clothing (e.g. cotton);
- avoid exposing vulnerable groups (e.g. people over 65, people with chronic respiratory and cardiovascular diseases, chronic renal failure, diabetes mellitus, people with reduced immune systems or other serious illnesses, pregnant or breast-feeding women, etc.) to the heat load.

When working outdoors, in the open air, the employer has a number of obligations. Firstly, to avoid excessive exposure to ultraviolet radiation, they must take appropriate measures.

Then, concerning heat stress: "in all cases where there is a possibility of workers being exposed to high levels of heat stress at work, employers and self-employed workers are required to take **all the necessary technical and organisational measures**, by means of a risk assessment, to protect themselves against heat stress".

In addition, in the event of particularly high air temperatures (**above 32°C**, for example during heatwaves), Cyprus has introduced a specific intervention system.

On the basis of the table below⁵⁷, combining air temperature, relative humidity and the type of activity carried out (light, medium and heavy), the employer will have to intervene to **guarantee a specific rest period in the shade or modify the work to be carried out**.

Air temperature and humidity can be known by the employer by measuring them using precise instruments (particularly for humidity) or by following weather reports and forecasts.

Here a translation (EUROGIP) of table 12 of the "Code of practice for Thermal Stress of Employees".

Type of work**	Air temperature °C	Work can continue	Work / change of task or rest* per hour			
			75%/25%	50%/50%	25%/75%	0%/100%
			Relative humidity (%)			
Light	32	≤ 87	88-93	94-98	≥ 99	-
	33	≤ 77	77-82	83-88	89-93	≥ 94
	34	≤ 67	68-73	74-79	80-84	≥ 85
	35	≤ 62	63-68	69-74	75-79	≥ 80
	36	≤ 53	54-59	60-65	66-70	≥ 71
	37	≤ 47	48-53	54-58	59-64	≥ 65
	38	≤ 42	43-47	48-52	53-58	≥ 59
	39	≤ 38	39-43	44-47	48-52	≥ 53
	40	≤ 33	34-37	38-41	42-47	≥ 48
	41	≤ 29	30-33	34-37	38-42	≥ 43
	42	≤ 25	26-29	30-33	34-38	≥ 39
	43	≤ 22	23-26	27-29	30-33	≥ 34
	44	≤ 18	19-22	23-25	26-28	≥ 29
	45	≤ 14	15-18	19-21	22-24	≥ 25
	46	≤ 12	13-16	17-19	20-22	≥ 23

* Change of task or rest: this means that the employer must ensure either a change in the tasks of its employees (in particular by favouring light work in a shaded area) or alternatively guarantee rest if he cannot offer such a change of work.

** Type of work: the Code gives examples of what is meant by light, medium and heavy workloads.

57 Table 12 of the Code of Practice, available on page 56 of the Code : ΚΩΔΙΚΑΣ ΠΡΑΚΤΙΚΗΣ ΘΕΡΜΙΚΗ ΚΑΤΑΠΟΝΗΣΗ ΤΩΝ ΕΡΓΑΖΟΜΕΝΩΝ.
[https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/\\$file/Heat_Stress_Code_of_Practice_NEW.pdf](https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/$file/Heat_Stress_Code_of_Practice_NEW.pdf)

Type of work**	Air temperature °C	Work can continue	Work / change of task or rest* per hour			
			75%/25%	50%/50%	25%/75%	0%/100%
			Relative humidity (%)			
Medium	32	≤ 60	61-72	73-81	82-90	≥ 91
	33	≤ 52	53-61	62-70	71-78	≥ 79
	34	≤ 45	46-54	55-64	65-73	≥ 74
	35	≤ 40	41-49	50-59	60-68	≥ 69
	36	≤ 35	36-44	45-54	55-63	≥ 64
	37	≤ 30	31-39	40-48	49-57	≥ 58
	38	≤ 26	27-34	35-43	44-52	≥ 53
	39	≤ 22	23-30	31-38	39-47	≥ 48
	40	≤ 19	20-26	27-34	35-42	≥ 43
	41	≤ 16	17-22	23-30	31-37	≥ 38
	42	≤ 13	14-19	20-26	27-33	≥ 34
	43	≤ 10	11-16	17-22	23-28	≥ 29
	44	≤ 8	9-14	15-20	21-25	≥ 26
	45	≤ 5	6-11	12-17	18-21	≥ 22
	46	-	≤ 9	10-14	15-18	≥ 19

Heavy	32	≤ 44	45-56	57-70	71-79	≥ 80
	33	≤ 38	39-49	50-62	63-71	≥ 72
	34	≤ 33	34-43	44-56	57-65	≥ 66
	35	≤ 28	29-37	38-50	51-60	≥ 61
	36	≤ 24	25-33	34-46	47-56	≥ 57
	37	≤ 20	21-29	30-40	41-51	≥ 52
	38	≤ 17	18-24	25-35	36-46	≥ 47
	39	≤ 14	15-21	22-32	33-41	≥ 42
	40	≤ 11	12-18	19-27	28-36	≥ 37
	41	≤ 9	10-15	16-24	25-32	≥ 33
	42	≤ 7	8-13	14-20	21-27	≥ 28
	43	≤ 5	6-12	13-18	19-24	≥ 25
	44	-	≤ 8	9-14	15-20	≥ 21
	45	-	-	≤ 11	12-17	≥ 18
	46	-	-	≤ 7	8-14	≥ 15

For example, with an external air temperature of 35°C and a humidity level of 49%:

- light workload: work can continue.
- medium workload: 75% work + 25% (change of work/rest) per hour. This means that in the space of an hour, you can work for a maximum of 45 minutes, after which you have to rest or change tasks in the shade for the remaining 15 minutes.
- in the event of a heavy workload: 50% work + 50% (change of work/rest) per hour. This means that in the space of an hour, you can work for a maximum of 30 minutes, then rest or change tasks in the shade for the remaining 30 minutes.

The guide provides a few details on the design of this table. Firstly, **it is assumed that the worker is wearing light summer clothing**. In fact, "if the performance of a specialised task requires special, heavier clothing or clothing with greater thermal insulation capacity or which prevents the evaporation of sweat, the authorised heat exposure limit for the worker must be reduced, depending on the type of clothing and the work performed". It is also assumed that the worker has **sufficient quantities of water available** to avoid dehydration and that he can work in conditions that enable him to keep his body temperature below 38°C, that is, without adverse effects on his health. In addition, **the table does not apply to vulnerable workers** (the elderly, pregnant women, etc.).

Finally, the **employer is required to document**⁵⁸ – by means of a daily record – the measures taken to reduce the heat stress of workers, when applying the table⁵⁹ mentioned above (combining air temperature, humidity and workload). The guide provides a copy of the form⁶⁰ to be completed by the employer "on days when heat stress conditions prevail, for the purpose of documenting compliance with the relevant provisions of the legislation and in particular the provisions of the Code of Practice for Thermal Stress of Employees"⁶¹.

Luxembourg

As in other countries, "employers are required to ensure the health and safety of their employees in all work-related matters. Thus, taking into account the specific characteristics of their company, it is up to each employer to **take the necessary measures to deal with the climatic phenomenon**". However, despite increasingly frequent heatwaves in Luxembourg too, **there is no statutory maximum temperature** for limiting working hours in this country⁶².

There are, however, **prevention recommendations** drawn up by the Accident Insurance Association (*Association d'assurance accident* - AAA), the insurer of accidents at work and occupational diseases. More specifically, these are "best practice in occupational health and safety, [...] drawn up by the **Prevention Department with the assistance of experts** chosen by

58 <https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/465238CBD7DFB5E7C2258846003A6AFB?OpenDocument>

59 This table applies mainly to outdoor work. Nevertheless, employers should refer to it if they are unable to put in place effective technical and organisational measures (fans, for example) for indoor work.

60 Available on page 21 of the guide: **Οδηγός για την Εφαρμογή του Κώδικα Πρακτικής για τη ΘΕΡΜΙΚΗ ΚΑΤΑΠΟΝΗΣΗ ΤΩΝ ΕΡΓΑΖΟΜΕΝΩΝ**.
[https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/\\$file/ODIGOS_THERMIKH_KATA_PONSHH_NEW.pdf](https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/AA15464D2FE5770FC2257E0A003C76A3/$file/ODIGOS_THERMIKH_KATA_PONSHH_NEW.pdf)

61 <https://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/All/1D53129AD65E97B8C2257DDD002620AF?OpenDocument>

62 https://www.securex.lu/sites/default/files/2019-08/obligations_employeur_chaleur.pdf

the AAA Board of Directors"⁶³.

The main purpose of these recommendations is to supplement current legislation⁶⁴, drawing attention to a specific risk, proposing measures likely to avoid it and helping employers and employees to fulfil their OSH obligations. There are two types of recommendation: general (covering basic measures for preventing occupational accidents and diseases) and specific to certain activities.

The "R01 General recommendations - Prevention recommendations"⁶⁵ includes some guidance on temperatures at work. However, R01 simply refers to the "minimum temperature in the work premises", which must be:

- 20 °C for offices,
- 19 °C for an activity carried out mainly in a seated position,
- 17 °C for an activity carried out mainly in a non-sitting position,
- 12 °C for work requiring great physical effort.

R01 cites the risks associated with exposure to heat and cold, recognising that **in construction work**, carried out essentially under natural climatic conditions, heat or cold are two **climatic factors that can give rise to health risks**. However, there is no maximum temperature for exposure to heat. Even so, R01 sets out a number of preventive measures to be taken in the event of high temperatures, including: "avoid direct exposure to the sun if possible, and install sunscreens if necessary; wear light-colored, covering and reflective clothing and head coverings with adequate UV protection; apply a protective sun cream with a protection factor (20-30) to uncovered parts of the body every two hours; wear appropriate UV protection for the eyes; drink plenty of fluids; do not eat food that is difficult to digest; instruct employees appropriately".

Switzerland

In this country too, as the main occupational accident insurer (Suva) points out, "insofar as individuals' resistance to heat and working conditions varies greatly, **there is no temperature limit value** that would be applicable to everyone"⁶⁶.

However, a number of special measures must be taken in the event of high temperatures at work. These are detailed in the **CFST Directive n.6508**⁶⁷, on the use of occupational physicians and other specialists in occupational safety (also known as the MSST Directive).

In accordance with the provisions of the Ordinance on the Prevention of Accidents and Occupational Illnesses⁶⁸ (OPA), the Federal Coordination Commission for Occupational Safety

63 More information on AAA's prevention recommendations <https://aaa.public.lu/fr/securite-sante-travail/recommandations-de-prevention.html>

64 In particular Book III entitled "Protection, safety and health of workers" of the Labour Code and the Grand-Ducal regulations adopted in implementation of this book. <https://aaa.public.lu/fr/securite-sante-travail/recommandations-de-prevention.html>

65 <https://aaa.public.lu/fr/documentation/publications/brochures/recommandations-chapitre-1.html>

66 The only exception is that "in underground work in a hot, humid climate, the dry temperature is limited to 28°C". <https://www.suva.ch/fr-ch/accident/pour-les-fournisseurs-de-prestations/suva-medical/publications/2020/septembre/prevention-concernant-le-travail-a-la-chaleur>

67 <https://www.ekas.admin.ch/download.php?id=6944>

68 https://www.fedlex.admin.ch/eli/cc/1983/1968_1968_1968/fr

(Commission fédérale de coordination pour la sécurité au travail - CFST) is responsible for drawing up "directives for safety at work", the main objectives of which are to explain the regulations and good practices to be implemented and to ensure uniform and appropriate application of the occupational safety regulations.

Application of the CFST directives confers a presumption of compliance with OSH regulations. It is nevertheless possible to apply the law on OSH in other ways, but in this case the employer must be able to prove that the safety of workers is guaranteed in an equivalent manner.

Annex 1 of the CFST Directive No. 6508 lists high temperatures (and low temperatures, both of which are "climatic constraints") among the "**special hazards**". The directive stipulates that when a company has at least one of the "special hazards" listed in Annex 1 and does not have the knowledge required to guarantee the health and safety of its workers, the **employer is obliged to consult an occupational health and safety specialists** (a recognised MSST specialist⁶⁹).

In case of high temperatures, the employer must consult a MSST specialist for permanent workstations which, for technical reasons, are **at ambient temperatures in excess of 30°C**.

These climatic conditions can represent a significant health risk for workers, requiring the implementation of special safety measures.

With regard more specifically to the construction sector, it should be noted that in January 2022, the **new version of the Ordinance on Construction Work**⁷⁰ (OTConst) came into force after revision. Among the elements added, Article 37, entitled "Sun, high heat and cold", simply states that "**when work is carried out in the sun, high heat or cold, the necessary measures should be taken** to protect workers", without specifying which measures should be applied.

It should be noted that Suva can also intervene in the event of high temperatures. According to Article 70 of the OPA, Suva may, by decision, subject a company, part of a company or a worker to the prevention regulations in the field of occupational medicine in order to prevent occupational diseases specific to certain categories of company or types of work, as well as to prevent certain accident risks inherent in the worker. This means that "**it is possible to report to Suva not only parts of companies exposed to heat, but also individual workers who are suffering from illnesses and in whom there is a suspicion of reduced fitness for work in heat**". After examining the individual situation on site, Suva can order measures to prevent heat-related illnesses. [...] If it is not possible to prevent heat-related illnesses using these measures, Suva may require preventive occupational health examinations"⁷¹.

Weather-related layoff scheme and extreme heat

Although there is often a lack of regulations concerning maximum temperatures at work, there are nevertheless provisions allowing work to be stopped for a time in certain trades (mainly construction and other outdoor work), particularly on days affected by exceptional heatwaves.

This is particularly the case with the weather-related layoff scheme and equivalent versions in other countries. This is not an obligation, but a possibility for the employer to temporarily (from a few

69 For a definition of MSST specialists, see page: <https://www.ekas.admin.ch/index-fr.php?frameset=26>

70 <https://www.fedlex.admin.ch/eli/cc/2021/384/fr>

71 <https://www.suva.ch/fr-ch/accident/pour-les-fournisseurs-de-prestations/suva-medical/publications/2020/septembre/prevention-concernant-le-travail-a-la-chaieur>

hours to a few weeks) stop work and allow employees to receive **technical unemployment benefit** during this suspension of work.

Adverse weather often refers to meteorological episodes that prevent the normal performance of work outdoors, such as snow, heavy storms, etc. It is worth noting that in recent years some countries have expressly included **heatwaves under the concept of "adverse weather"**, with temperature and/or humidity thresholds that trigger the possibility of accessing this short-time unemployment mechanism.

In France⁷², the Labour Code (Article L5424-8⁷³) stipulates that "weather conditions and floods shall be deemed to be bad weather when they make it dangerous or impossible to carry out the work, having regard either to the health or safety of employees, or to the nature or technique of the work to be done". However, ministerial letters have specified that the weather conditions concerned are **frost, snow, ice, rain, wind or floods, but heatwaves are not included** de facto⁷⁴.

As stated by the *Union des Caisses de France*⁷⁵, it is possible to make a claim for compensation in the event of heatwaves, but the case will be analysed on a case-by-case basis. However, claims are likely to be accepted for stoppages in an area declared by the prefect to be **at alert level⁷⁶ 3 (orange) or 4 (red)**.

Here are a few examples of countries that have explicitly included heat in their unemployment schemes for adverse weather.

Italy

Since 2016⁷⁷, high temperatures have been included among the "meteorological events" (*eventi meteo*) for which short-time working can be used (*cassa integrazione guadagni ordinaria*⁷⁸).

During the summer of 2022, the National Institute for Social Security (INPS) clarified⁷⁹ in detail the conditions for access to short-time working in the event of extreme heat. The document reminds all employers of the possibility of using this tool, "given the **exceptional heatwave** affecting the whole of Italy and **the impact that these weather conditions can have on professional activities**".

72 <https://www.ffbatiment.fr/actualites-batiment/actualite/vague-de-chaleur-vigilance>

73 https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000006903887#

74 <https://www.editions-tissot.fr/actualite/droit-du-travail/alerte-canicule-le-chomage-intemperies-peut-il-etre-utilise>

75 The *Union des caisses de France Congés Intempéries BTP* (UCF CIBTP) is a non-profit association administered by the construction and public works entrepreneurs and craftsmen;; it manages the weather-related layoff scheme for the building and public works sector. https://www.cibtp.fr/media/carte-btp/documents/cip_faq_toutes-cibles_fr_v20200618.pdf

76 More information on heatwave alert levels in the National Heatwave Plan - see also the Ministry of Labour page <https://travail-emploi.gouv.fr/sante-au-travail/prevention-des-risques-pour-la-sante-au-travail/article/chaleur-et-canicule-au-travail-les-precautions-a-prendre> (numerous resources available, including a "Heatwave risk prevention guide 2023" and Interministerial instruction on heatwave management dated 12 June 2023).

77 INPS circular no.139/2016 <https://servizi2.inps.it/servizi/Bussola/VisualizzaDoc.aspx?sVirtualURL=%2FCircolari%2FCircolare%20numero%20139%20del%2001-08-2016.htm>

78 The State's economic contribution, which replaces or supplements the remuneration of employees whose professional activity has been suspended or partially reduced due to the company's production difficulties.

79 Press release dated 28 July 2022: https://www.inps.it/content/inps-site/it/it/inps-comunica/atti/circolari-messaggi-e-normativa/dettaglio.circolari-e-messaggi.2022.07.messaggio-numero-2999-del-28-07-2022_13904.html

The *cassa integrazione* can now be invoked by employers in the event of suspension or reduction of work activity **due to high temperatures, that is to say, those in excess of 35°C**.

The INPS specifies that "**even temperatures below 35°C** can lead to an application being accepted [...] if we take into account not only the air temperature recorded in the weather reports, but also the so-called felt temperature, which is higher than the actual temperature. This situation arises, for example, **on days when humidity levels are high** [...]. The **type of work in progress and the way in which it is carried out is also an important factor in assessing the eligibility of the request [in the event of temperatures] below 35°C**".

This unemployment-weather mechanism does not apply indiscriminately to all trades, but **mainly to activities carried out outdoors**. In particular, the INPS cites occupations likely to be affected by felt temperatures that are higher than the air temperature, such as "road surfacing work, work on the façades and roofs of buildings, outdoor work requiring the wearing of protective clothing and, in general, all phases of work that take place in places that cannot be protected from the sun or that involve the use of materials or machines that are particularly sensitive to high heat".

In addition, exceptionally, "**indoor work may also be taken into account** [in the *cassa integrazione* application] when it cannot benefit from ventilation or cooling systems due to unforeseeable circumstances beyond the employer's control".

The employer is not obliged to attach weather reports to his claim. In fact, it will be up to the INPS to check the temperatures on days when work activities within a company have been suspended.

Finally, the INPS points out that the "*cassa integrazione* is valid in all cases where the employer, on the instructions of the company's safety officer, orders the suspension/reduction of work due to risks or dangers to the safety and health of workers, provided that the causes leading to the suspension/reduction are not attributable to the employer himself or to the workers".

In the event of unemployment due to adverse weather, the employee generally receives a **contribution equal to 80% of the total salary** (subject to certain annual limits set by the INPS).

Austria

In the construction sector, there is a 1957 law on "compensation for construction workers in the event of bad weather"⁸⁰, abbreviated to BSchEG.

Article 3 of the Act, which defines the types of adverse weather eligible for technical unemployment funding, was amended in 2013 to **include heat as well**. The article now states that: "bad weather within the meaning of this Federal Act [...] exists if the atmospheric influences interfering with work (rain, snow, frost, heat, etc.) are so severe or persistent that it is impossible to start or continue work or that employees cannot be expected to start or continue work".

As the Union of Construction and Wood Workers (*Gewerkschaft Bau-Holz*, GBH) points out, this recognition of heat as an adverse weather event is the result of a **long trade union struggle**⁸¹.

From 2013, weather-related unemployment could be requested when the **air temperature**

80 *Bauarbeiter-Schlechtwetterentschädigungsgesetz 1957 (BSchEG)*.
<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10008167>

81 https://www.gesundearbeit.at/cms/V02/V02_1.12.a/1342610039659/arbeitnehmerinnenschutz/hitze/wann-bekommen-wir-hitzefrei

reached 35°C. In 2019, this threshold was **reduced to 32.5°C**, at GBH's request. It should be noted that these temperature values do not appear in the law, but in **the Austrian collective agreement for the construction industry**⁸².

Article 5 of the BSchEG law sets out the compensation procedure in detail: "after hearing the works council, **the employer shall decide** whether work should be stopped, continued or resumed on certain days depending on the weather conditions". In addition, "in the event of adverse weather, the worker is required, by order of the employer, to remain at the workplace to resume work when the adverse weather ends, failing which he loses his entitlement to adverse weather compensation; this presence may not, however, be ordered for more than three hours a day and only if suitable shelters are available".

The compensation amounts to **60% of the gross salary** that would have been paid without the work suspension.

GBH states⁸³ that in 2019, "one company in two [in the sectors concerned] used this mechanism. As a result, **39,122 construction workers from 5,245 companies were able to escape the heat**".

However, recourse to short-time working remains a possibility that depends on the employer's decision. In a document dating back to 2020⁸⁴, the GBH, the President of the Salzburg Chamber of Labour (AK) and the President of the Austrian Trade Union Federation (*Österreichischer Gewerkschaftsbund*, ÖGB) say that too few employers are using this mechanism, even when temperatures are high. They are therefore **calling for new regulations** to make it compulsory for all companies in the construction sector to stop work when the temperature exceeds 32.5°C. In this context, the legislator should also stipulate that any extensions to construction deadlines due to heatwaves should not entail penalties for companies.

Finally, in 2021, the GBH trade union, in cooperation with AK and Global 2000⁸⁵, an independent Austrian environmental organisation, launched an application called Heat.App for workers in the construction sector. Under the BSchEG law, temperature values are taken from the nearest measuring point at the Central Institute for Meteorology and Geodynamics (ZAMG). However, only employers have access to this information, which has led to discontent among employees.

This new application⁸⁶ now gives workers a real-time interface to the nearest ZAMG measurement point, via a simple mobile phone. **A warning signal is sent to the application as soon as 32.5°C is reached.**

Luxembourg

Also, in this country, the labour law allows companies to make use of the weather-related unemployment scheme under certain conditions⁸⁷.

82 <https://www.oegb.at/themen/klimapolitik/klima-und-arbeitsmarkt/hitze-am-arbeitsplatz-steigt>

83 https://www.bau-holz.at/cms/D01/D01_4.1.1.a/1342633939912/news-themen/news/aktuelle-informationen/hitze-bauarbeiter-schuetzen

84 https://www.bau-holz.at/cms/D01/D01_4.1.1.a/1342633939912/news-themen/news/aktuelle-informationen/hitze-bauarbeiter-schuetzen

85 <https://www.global2000.at/en>

86 https://www.bau-holz.at/cms/D01/D01_0.a/1342664431471/home/die-gbh-hitze-app-fuer-bauarbeiter

87 <https://itm.public.lu/fr/actualites/communiqués/2020/08/chaleur-canicule.html>

This possibility only concerns the building and public works sector: "any business **in the building and civil engineering sectors as well as in the related skilled crafts segments** carrying out its normal activity on **building sites** may apply for a weather-related layoff subsidy if its workplace has become unfit for work or if carrying out works is impossible or dangerous due to bad weather conditions, such as rain, cold, snow, frost, thaw and **exceptional heat**"⁸⁸.

Unemployment due to adverse weather is covered by Title III of Book V of the Labour Code⁸⁹. Article L. 531-2 does not list heat as a form of adverse weather: "For the purposes of this chapter, rain, cold, snow, frost and thaw shall be deemed to be bad weather, provided that the direct and immediate effect of the bad weather renders the workplace impassable or makes it impossible or dangerous to carry out the work, having regard either to the health or safety of employees, or to the nature or technique of the work to be carried out".

However, paragraph 2 of this article specifies that "**at the request of the persons or services responsible for protection and prevention in the establishment concerned [...], the Minister responsible for Employment** or the official delegated for this purpose, on the advice of the employer and the competent occupational health service [...], **may, in the event of exceptional heat, allow employees** whose work is made dangerous to their health or safety as a result of the direct and immediate effect of the heat and its consequences **to benefit from the provisions of this chapter**".

To benefit from this mechanism, the employer must submit a request to the Agency for the Development of Employment (ADEM). During the period of adverse weather unemployment, **as of the 17th inactive hour, the Employment Fund (Fonds pour l'emploi) reimburses up to 80 % of the average gross hourly remuneration actually earned by the worker** during the 3 months preceding the month in which the inactivity occurred". During the weather-related unemployment period, "the employer advances a compensatory allowance of at least 80 % of the salaries corresponding to the inactive hours, subject to a limit of 250 % of the minimum salary for unskilled workers".

It is up to the employer to decide whether or not to use this mechanism. However, before taking any decision concerning the suspension of work, the employer is required to **consult "the duly authorised staff representative in the workplace** (member of the staff delegation or worker designated by the delegation)".

Unlike in Austria, this mechanism has very rarely been used during heatwaves in the country. According to ADEM⁹⁰ data, no applications were made in 2020 and 2021. However, some construction companies reportedly made use of this mechanism during the summer of 2022, the second hottest summer on record in the country.

Collective agreements to set heat exposure limits

Without waiting for national and/or European legislation (which could be slow in coming) on temperatures at work, **collective agreements can be highly relevant tools** for providing concrete

88 For more information on the weather-related unemployment scheme in Luxembourg go to: <https://guichet.public.lu/fr/entreprises/sauvegarde-cessation-activite/sauvegarde-emploi/chomage-partiel-technique/chomage-intemperies.html>

89 <https://data.legilux.public.lu/filestore/eli/etat/leg/code/travail/20230101/fr/pdf/eli-etat-leg-code-travail-20230101-fr-pdf.pdf#page=293>

90 <https://5minutes.rtl.lu/actu/luxembourg/a/1943377.html>

solutions at sectoral and/or local level.

They make it possible to target working conditions as closely as possible to the sectors concerned. The ILO, too, in its above-mentioned study "Working on a warmer planet", points to the importance of this instrument, through which it would be possible to renegotiate, from the point of view of high temperatures, indoor and outdoor working methods, working hours, dress codes, work equipment and possible rest periods, or even maximum permissible temperatures at work in the event of extreme heat.

The following are **examples** of collective agreements in outdoor sectors (mainly construction) in two European countries, Spain and Greece, which have introduced specific measures concerning exposure to high temperatures during the summer season.

Spain

The general collective agreement for the construction sector⁹¹ provides (Article 166 "Atmospheric factors") that "**when temperatures are extreme**, particularly during **heatwaves** which have serious consequences for health, **union representatives may propose different working hours** in order to avoid the hours of greatest sunshine. Protective creams against bad weather, such as solar radiation, must also be available on construction sites".

This general agreement may be supplemented, where necessary, by **local agreements depending on the autonomous community or province**.

It is in these local agreements that we find more details on these restrictions on working hours during the summer. Indeed, some autonomous communities particularly affected by the heat (such as Andalusia and Extremadura) have felt the need to provide more information on the subject.

The southern autonomous communities provide for the use of *jornada continua* (also known as *jornada continuada* or *jornada intensiva*) in the construction industry during the summer. The *jornada continua* is a day during which work is carried out continuously (i.e. **without breaks**) and ends earlier (usually before 3 p.m.). The aim is to **avoid exposure to the heat** during the sunniest periods of the day, particularly in the afternoon.

Between autonomous communities (and sometimes between towns within the same community), there may be differences in terms of how the *jornada continua* is applied, especially as regards the daily working hours and the duration of the measure (from June to September or June to August, etc.).

By way of example, here is the application of the *jornada continua* in the building and public works sector for a number of Andalusian towns in 2018⁹²:

- Malaga⁹³ : **from 7.30am to 2.30pm from Monday to Friday** for 40 working days (from **9 July to 31 August**);
- Seville: **from 7.30am to 2.30pm from 25 June to 31 August**;

91 Available on: <https://www.boe.es/buscar/doc.php?id=BOE-A-2017-10951>

92 <https://www.diariocordoba.com/cordoba-ciudad/2018/06/18/construccion-comienza-aplicar-horario-verano-36410770.html>

93 For this city, the Collective Labour Agreement for Construction, Public Works and Auxiliary Trades in Malaga 2017-2021 is available here: <https://habitat.ccoo.es/7bf7ec220533ee76e97c14c22b7e4332000072.pdf>

- Cadiz: **from 7.30am to 2.30pm from Monday to Thursday and from 7.30am to 12.30pm on Friday, from 1 July to 31 August.**

The summer timetable varies from town to town, where the unions have signed and agreed on specific calendars.

Similarly, in Extremadura, for the construction sector, the measure was introduced under the Badajoz⁹⁴ and Cáceres⁹⁵ provincial agreements. **Between 12 July and 12 August 2022**, the working day was reduced to 7 hours a day⁹⁶.

The *jornada continua* is also provided for in the collective agreements for the building and public works sector in the autonomous communities of Castilla-La Mancha and Madrid. While the *jornada continua* in the building and public works sector has existed in some southern regions for a long time, in Madrid it was only in 2021 that this specific reduction was introduced, thanks to the agreement reached in the Community of Madrid's sectoral agreement. Under the latter, the *jornada intensiva* will now apply from mid-July to mid-August⁹⁷.

In all these regions, the Spanish unions have **asked workers to cooperate in denouncing employers who are opposed to compliance** with the *jornada continua*. For their part, the unions undertake to ensure that this reduction in working hours is respected, and to **report any failure to do so to the labour authorities**.

Greece

In Greece too, the collective agreements for certain professions - particularly exposed to high temperatures during the summer - provide for special measures to be applied in the event of extreme heat. In some cases⁹⁸, there are **specific values for maximum permissible temperatures** at work.

For example, the national collective agreement for the construction sector and related industries⁹⁹ provides that **when temperatures exceed 38°C in the shade**, work must be interrupted **without any reduction in daily pay**.

For its part, the collective agreement for workers in the shipbuilding and repair sector (in the local agreement of the Prefectures of Piraeus, Attica and the Islands) states that when the Hellenic National Meteorological Service (EMY) reports a temperature of:

- 36 °C and 37 °C: work is suspended from 2pm to 6pm;
- from 38 °C: work is suspended from 1pm to 7pm. Working hours must be between 7am and

94 <https://www.fundacionlaboral.org/uploads/convenio/applications/ARCH62876ae69f2a2.pdf>

95 <https://www.fundacionlaboral.org/uploads/convenio/applications/ARCH628b5645d172d.pdf>

96 <https://www.hoy.es/extremadura/martes-comienzo-jornada-20220711120804-nt.html>

97 Article 49 of the Collective Agreement for the Construction and Public Works Sector of the Autonomous Community of Madrid <https://www.fundacionlaboral.org/uploads/convenio/applications/ARCH628b56ee34217.pdf>. It is also stipulated that "the distribution of the remaining hours, up to the actual annual working time, [...] shall be freely agreed in each company".

98 A summary of collective agreements that have introduced anti-heat measures was published in June 2021 by the "Information Centre for Employees and the Unemployed" (Kepea/Gsee) of the General Confederation of Greek Workers <https://www.kepea.gr/antimetopisi-thermikis-kataponisis-ergazomenon>

99 **Σ.Σ.Ε. των εργατοτεχνιτών Οικοδόμων και των Συναφών Κλάδων όλης της Χώρας.**

1pm, with no reduction in daily pay¹⁰⁰.

"In order to ensure better coordination during summer days, the Piraeus Shipbuilders' Union will place, at its own expense, an EMY-certified thermometer in Perama [...] via which a **temperature measurement will be taken at 10am**." On the basis of the temperature value and the resulting forecasts, the above-mentioned measures will be applied. These measures do not apply to workers in air-conditioned premises (particularly indoors).

Finally, another collective agreement applies to couriers who use bicycles in publishing and stationery companies. Under its provisions, when the outside temperature is high (38°C or more), these people are temporarily prohibited from working outside company premises.

Negotiation at company level

Regardless of how precise the legislation is, employers remain responsible for their employees' OSH. Given the recurrence of heatwaves, some employers have negotiated and implemented measures relating to working conditions, in the light of the difficulties encountered by their employees.

Sometimes this awareness is triggered by particularly traumatic events, such as serious or fatal accidents. This was the case in July 2022, when a 60-year-old dustman from Madrid died of heatstroke after his body temperature reached 41 degrees while cleaning the streets of Madrid. His son subsequently complained¹⁰¹ about the difficult working conditions: his father wore polyester work clothes, a material unsuited to the heat. He worked in the street under the sun without adequate protection, alone, with an external air temperature of 42°C.

In the wake of this death, in addition to the considerable media coverage, **the trade unions and the six companies** contracted to provide the city of Madrid's municipal cleaning service (including the company that employed the victim) **agreed to limit work in the event of high temperatures**. It has been decided that, for work requiring significant physical effort (such as manual street sweeping), work must be suspended in the afternoon **when temperatures exceed 39°C**.

More specifically, the agreement sets out a **three-level intervention plan**¹⁰² based on heatwave alerts issued by the State Meteorological Agency (AEMET):

- **Green level (air temperature below 36°C):** simply implement the usual recommendations for coping with the heat, such as using head protection, sun cream, staying hydrated, eating fresh food and adapting routes to prioritise cooler, shadier areas during the hottest hours.
- **Yellow level (air temperature above 36°C and below 39°C):** services such as brush-cutting or the use of diesel blowers will be suspended in the afternoon and priority will be given to the use of air-conditioned vehicles; if a non-air-conditioned vehicle is used, operators will be able to stop for 10 minutes every hour and a half to cool down.
- **Orange level (air temperature above 39°C):** all work requiring significant physical effort (such as manual sweeping) will be suspended during the afternoon and only services carried out from a vehicle will remain operational; in addition, workers will have to work in pairs at least, and never alone.

100 Chapter B of the Collective Agreement **ΣΣΕ ναυπηγοεπισκευαστικών εργασιών Νομών Πειραιά - Αττικής και Νήσων** <https://www.taxheaven.gr/labordoc/133/content/545>

101 <https://elpais.com/espana/madrid/2022-07-18/el-barrendero-fallecido-por-un-golpe-de-calor-en-madrid-tenia-un-contrato-de-un-mes-y-le-habia-cambiado-el-turno-a-un-companero.html>

102 <https://www.lavanguardia.com/vida/20220719/8419569/barrenderos-madrid-trabajaran-tarde-mas-39oc.html>

Prevention efforts: a few examples

At national level, **efforts are being made to prevent** the risks associated with **excessive exposure to heat**, particularly **when working outdoors in summer**. The following are examples of initiatives in terms of national heatwave management plans, communication campaigns and the provision of tools by the Ministries of Health and Labour, social protection institutions and occupational accident and disease insurers.

France

The law does not specify a temperature above which work must be stopped. However, the French National Institute for Research and Safety (INRS) indicates that **heat above 30°C for a sedentary worker and above 28°C for a job requiring physical activity can pose a health risk**. It has therefore developed prevention brochures and advice to help employers limit workers' exposure to excessive heat as far as possible.

INRS reminds us of the importance of risk assessment¹⁰³ (which is mandatory for all employers) which, in the case of work carried out in high temperatures, should take account of the following factors:

- Factors inherent to the workstation or the task to be performed,
- Factors linked to the organisation or layout of the premises,
- Individual factors that increase the risk of heat stroke (illnesses, taking medication, age, obesity...). Some information is accessible to the employer, while other information is confidential. The occupational physician can therefore play an essential role in assessing the risks for each individual.

Once the risks have been assessed, the employer must implement effective preventive measures. On this INRS web page¹⁰⁴, detailed advice is available on:

- work organisation,
- the design and layout of workstations,
- the importance of employee training and information,
- the provision of suitable protective clothing and equipment.

The INRS has grouped together all its prevention tools (documents, brochures, computer graphics) on this page¹⁰⁵, including the brochure entitled "Working in the heat of summer. What can you do?"¹⁰⁶, summarising all the relevant preventive measures.

For the **building and public works sector**, advice on how to prevent high temperatures is also available on the OPPBTP¹⁰⁷ (*Organisme Professionnel de Prévention du Bâtiment et des Travaux Publics*), the prevention body for the building and public works industry, such as a list of precautions to take on building sites in the event of heatwaves¹⁰⁸.

103 <https://www.inrs.fr/risques/chaleur/evaluer-risques.html>

104 <https://www.inrs.fr/risques/chaleur/mesures-prevention.html>

105 <https://www.inrs.fr/risques/chaleur/publications-outils-liens-utiles.html>

106 <https://www.inrs.fr/media.html?refINRS=ED%206371>

107 <https://www.preventionbtp.fr/ressources/boites-a-outils/fortes-chaleurs-canicule>

108 https://www.preventionbtp.fr/actualites/sante/canicule-les-precautions-a-prendre-sur-les-chantiers_fs5VAu39HeVXu62BYpdxhc

As far as the building and public works sector is concerned, the law lays down a number of preventive measures, but these are not specific to work in the heat. In particular, the Labour Code sets out the following obligations:

- Workers must **have access either to premises** where they can be accommodated in conditions that protect their health and safety in the event of weather conditions likely to affect them, **or to worksite facilities that guarantee them equivalent conditions** (article R. 4534-142-1¹⁰⁹).
- Employers in the building and public works sector are required to provide workers with **at least 3 litres of water per day per worker**. (article R. 4534-143¹¹⁰).

In addition, it is necessary to ensure that personal protective equipment and machinery are compatible with the high temperatures and to take appropriate organisational measures to ensure that work is carried out without exposing employees to risks¹¹¹.

Finally, in a more general way, and not just for the building and public works sector, the Ministry of Labour¹¹² reminds that, when Météo France¹¹³, the national official weather and climate service, publishes a **red alert for risk of heatwave, employers are subject to a number of specific obligations**. Given the exceptional scale of certain heatwaves in previous years (particularly in 2022), the Ministry of Labour has developed guidelines for employers in the event of a heatwave alert. In such situations, employers are required, as part of their safety obligation, to **carry out a daily reassessment of the risks** to which each employee is exposed, based on: the temperature and how it changes during the day; the nature of the work to be carried out (particularly outdoors or in thermal environments where temperatures are already high, or where there is a physical workload); and the age and state of health of the workers.

Then, on the basis of this risk reassessment, the employer must:

- **Adjust workloads, working hours and work organisation in general** to ensure the health and safety of workers throughout the red alert period. Particular attention should be paid to pregnant women, people suffering from chronic illnesses or disabilities, etc.
- **Decide to stop work** if the assessment shows that the measures taken are insufficient, particularly for work carried out at very high temperatures and involving a heavy physical load (roof insulation or roofing work, repeated handling of heavy loads, etc.).

A detailed summary of the obligations and behaviour to be observed in the face of high summer temperatures, including at work, can be found in the ORSEC Guide "Specific provision: Health management of heatwaves"¹¹⁴, published in 2021 and regularly updated. Drawn up by the Directorate General of Health (*Direction générale de la Santé – DGS*), within the French Ministry of Health and as a result of interministerial work, this guide provides the information you need to prepare for heatwaves. In particular, sheet O2/K specifically concerns employers, reminding them of their obligation to guarantee the health and safety of their workers, including in the event of excessive summer heat.

109 https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000019993410

110 https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000018528987

111 <https://www.economie.gouv.fr/entreprises/canicule-obligations-employeur#>

112 <https://travail-emploi.gouv.fr/sante-au-travail/prevention-des-risques-pour-la-sante-au-travail/article/chaleur-et-canicule-au-travail-les-precautions-a-prendre>

113 Météo France publishes daily weather warning maps on its website, which are updated at least twice a day at 6am and 4pm. <https://vigilance.meteofrance.fr/fr/canicule>

114 https://sante.gouv.fr/IMG/pdf/guide_orsec_vagues_de_chaleur_-_accessible.pdf

Among the main points, employers must:

- ensure that the risk assessment document is drawn up and updated, and that an internal heatwave management plan is drawn up where appropriate;
- appoint a person to be responsible for heatwave preparation and management;
- identify the workstations most exposed to a significant heat source;
- inform employees of the risks, the means of prevention and the signs and symptoms of heatstroke;
- regularly check the weather forecasts in order to anticipate as best as possible, or even reorganise the activity, particularly if it has to take place outdoors and involves a physical workload;
- put in place appropriate organisation and resources (measures to limit exposure, staggered working hours, more frequent breaks, etc.).

Finally, we should mention the **new Heatwave Management Plan**¹¹⁵, published in June 2023 and presented by the Minister for Ecological Transition and Territorial Cohesion. The Plan targets the general public as well as workers and businesses.

With regard to the professional world, three specific actions are planned for the summer of 2023:

- **Companies will be warned before each heatwave** and a **guide will be created on the work that can be carried out quickly by companies** to improve the temperature in the workplace (also mentioning elements such as the cost of this work, its duration and any existing financial aid). In addition, communication campaigns will be aimed at **disseminating good practices and behaviour to adopt at work** to improve the temperature in offices (aeration/ventilation, closing curtains, etc.). These good practices are not always known to the general public, particularly in regions not used to high temperatures.
- **The Labour Inspectorate will be stepping up its inspections** to check that employers are complying with their obligation to protect and ensure the OSH of their workers. Inspectorate staff will also be mobilised to help companies take account of the risk of heat-related accidents. Priority will be given to those sectors most exposed to the risk of heat. Particular attention will also be paid to the employment of young workers: according to the Labour Code (article R. 4153-36¹¹⁶) it is forbidden to assign young people to work exposing them to extreme temperatures likely to damage their health.
- During heatwaves, **road transport of live vertebrate land animals** for economic purposes **will be prohibited** from 1pm to 6pm.

At the same time, the **new instruction**¹¹⁷ on heatwave management of 13 June 2023 issued by the Directorate General for Labour (*Direction générale du Travail* – DGT, attached to the Ministry of Labour) supplements the interministerial instruction¹¹⁸ of 12 June 2023 on the health management of heatwaves in mainland France. Its main aim is **to inform and remind companies of the actions to be taken by labour inspectors**, and **to list the useful resources available to companies** to prevent the risks associated with heatwaves.

115 https://www.ecologie.gouv.fr/sites/default/files/08.06.2023_Plan_vagues_de_chaleur.pdf
https://www.ecologie.gouv.fr/sites/default/files/08.06.2023_DP-PlanChaleur.pdf

116 https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000028058771

117 Instruction n° DGT/CT4/2023/80 of 13 June 2023. https://travail-emploi.gouv.fr/IMG/pdf/instruction_ministerielle_vagues_de_chaleur_du_130623.pdf

118 Interministerial instruction n° DGS/VSS2/DGOS/DGCS/DGT/DGSCGC/DGEC/DJEPVA/DS/DGESCO/DIHAL/2023/64 of 12 June 2023. https://sante.gouv.fr/IMG/pdf/instruction_interministerielle_gestion_sanitaires_vagues_de_chaleurs_en_france_maj_120623.pdf

Generally speaking, from the start of the summer, inspectors are being asked to disseminate prevention messages as widely as possible among workers and companies, and to ensure that employers comply with their OSH obligations, in particular by putting in place appropriate measures to deal with the risk of heat at work.

The Instruction of 13 June also emphasises that the number of **heat-related accidents (particularly serious and fatal ones) is specifically monitored** as part of the interministerial health management system for heatwaves. In fact, this monitoring is **one of the objectives of the latest Plan for the Prevention of Serious and Fatal Accidents at Work¹¹⁹** (PATGM).

Switzerland

Suva, one of the country's main occupational accident insurers, has published **advice** on its website **on how to prevent accidents when working in high temperatures¹²⁰**. It distinguishes 4 situations, depending on the air temperature: up to 24°C; 25 to 31°C; 32 to 35°C; and 36°C and above. For each of these situations, Suva gives advice on prevention, ranging from basic protection (sun cream, helmets, etc.) to the implementation of more specific and more important measures, particularly concerning the organisation of work (shading the workplace, arranging for employees to change tasks so that they can carry out strenuous work early in the morning, providing 5-10-minute breaks every hour, etc.). **When the air temperature reaches 36°C, it is advisable to consult a recognised occupational safety specialist (MSST),** who can assess the work situation.

Suva also reminds us of¹²¹ the existence of CFST Directive no. 6508, which requires the services of an MSST specialist for permanent workstations which, for technical reasons, are **at ambient temperatures above 30°C** (and if the company does not have the knowledge required to guarantee the health and safety of workers).

It also quotes the DIN EN ISO 27243¹²² standard, which is "a reliable and internationally recognised instrument". On the basis of the latter, Suva specifies that in the case of physical work of long duration at temperatures exceeding 25°C WBGT during a period of work, the thermal stress should be assessed and, depending on the duration and arduousness of the work, preventive measures envisaged. Secondly, "generally speaking, **physical work lasting more than one hour and climatic values of 30°C WBGT and above require measures to be taken**", notably technical (concerning the production process), organisational (concerning work organisation) and personal (concerning workers exposed to heat) measures. Suva gives examples for each of these three types of measure.

Finally, it is worth mentioning another interesting tool developed by Suva for an appropriate risk assessment (including risks due to exposure to heat). On its website, Suva provides a **checklist**

119 *Plan pour la prévention des accidents du travail graves et mortels (PATG) 2022-2025.* <https://travail-emploi.gouv.fr/IMG/pdf/planaccidentstravailgravesmortels2022-2025.pdf>

120 <https://www.suva.ch/fr-ch/autoportrait/news-et-medias/news/securite-au-travail/travailler-en-periode-de-forte-chaaleur-que-faire>

121 <https://www.suva.ch/fr-ch/accident/pour-les-fournisseurs-de-prestations/suva-medical/publications/2020/septembre/prevention-concernant-le-travail-a-la-chaaleur#state=%5Banchor-009A50EF-0A2A-4457-B63E-6D5C49D6E0BE%5D>

122 DIN EN ISO 27243 has since been replaced by ISO 7243 "Ergonomics of the thermal environment — Assessment of heat stress using the WBGT (wet bulb globe temperature) index".

entitled "Working outdoors in direct sunlight and hot weather"¹²³. With regard to temperature, the document distinguishes between additional measures to be taken in the event of temperatures **in excess of 25, 30 and 35°C in the shade, and in the event of high humidity**. This checklist is not exhaustive, nor does it replace a proper risk assessment: the purpose of this document - which takes the form of a questionnaire for the employer - is to help the latter identify any shortcomings and take appropriate action.

Spain

Recently in Spain, the Labour Inspectorate, with the support of the Ministry of Labour, ran a **major communication campaign** on the risks associated with excessive exposure to heat at work in summer.

In July 2021¹²⁴, the Minister of Labour and the Social Economy, and the Director of the State Labour and Social Security Inspectorate (OEITSS - *Organismo Estatal de Inspección de Trabajo y Seguridad Social*) presented the **first Labour Inspectorate Prevention Plan against Heat Stroke** (*Plan de Inspección de Trabajo para combatir riesgos por golpes de calor*).

In presenting the plan, the Minister of Labour paid tribute to a farm worker who died at work in August 2020 at the age of 42, as a result of the high summer temperatures.

In practical terms, this plan **involves sending information and brochures on prevention to companies** likely to be affected by the risk of heat in summer. For its part, the Labour Inspectorate has undertaken to give priority to dealing with complaints received in this area, in order to take the most effective action possible. In the construction sector, the Inspectorate will in particular ensure compliance with the *jornada continua* in those areas of Spain where this is explicitly provided for in collective agreements¹²⁵.

In 2021, the government sent out 137,000 letters to all businesses, temporary employment agencies and public administrations active in two sectors: **construction and agriculture**. In 2022, the range of recipients was extended to include other sectors exposed to the sun and summer heat, such as the hotel and catering industry, gardening, waste collection and street cleaning (among others).

Besides raising companies' awareness of preventive measures, the letters also remind them of the penalties for non-compliance. Although Spanish law does not stipulate a maximum temperature for outdoor work¹²⁶, prevention to ensure workers' health and safety remains an employer's obligation under existing legislation, as it is in other EU countries. Failure to comply may constitute a serious or very serious offence, punishable by fines ranging from €2,451 to €49,181 and from €49,181 to €983,736 respectively.

Here are some examples of preventive measures¹²⁷ set out in these letters:

123 <https://www.suva.ch/download/listes-de-controle/travailler-a-l-exterieur-en-plein-soleil-et-par-fortes-chaleurs/travailler-a-l-exterieur-en-plein-soleil-et-par-fortes-chaleurs--67135.F>

124 <https://elpais.com/economia/2021-07-26/la-inspeccion-de-trabajo-lanza-una-campana-para-prevenir-los-golpes-de-calor-en-la-agricultura-y-la-construccion.html>

125 <https://prensa.mites.gob.es/WebPrensa/noticias/ministro/detalle/4120>

126 The anti-heatstroke communication campaigns mentioned refer to the legislative framework in force before the publication of the Royal Decree 4/2023 of May 2023.

127 <https://www.uso.es/golpe-de-calor-plan-de-inspeccion-para-combatir-riesgos-en-el-trabajo/#>

- provide drinking water close to the workplace;
- schedule the heaviest and most arduous tasks during the coolest hours of the day, adapting working hours if necessary. Take more breaks than usual in cool places;
- try to use loose-fitting clothing, light fabrics and light colours. Protect your head with a cap or hat;
- provide shaded areas or cool places for workers to rest;
- avoid isolated work and favour teamwork to facilitate recognition of the first symptoms of heat stroke;
- inform workers about the risks associated with heat, its effects and the preventive and first-aid measures to adopt.

Italy

In July 2022, INAIL (the National Institute for Insurance against Accidents at Work) published a **guide for workers, employers and company OSH managers**, containing guidelines for preventing illnesses caused by heat stress¹²⁸. This document¹²⁹ was developed in collaboration with the National Research Council-Institute of BioEconomy (CNR-Ibe).

Firstly, the document contains a veritable catalogue of all the pathologies linked to excessive heat in the workplace (cramps, sweat dermatitis, hydromineral imbalances, even heat stroke). It then sets out the preventive measures that can be taken to provide adequate protection for workers.

While reiterating the employer's obligation to identify risks (including those related to heat) and implement effective preventive measures to protect employees' OSH, the document lists a whole series of useful tips, divided into the following chapters:

- workers' training;
- prevention strategies and individual protection of workers;
- reorganisation of working hours/days;
- providing accessible shaded areas for breaks;
- facilitating workers' acclimatisation to working conditions and exposure to heat (which should be gradual, particularly for new recruits);
- implementation of the "buddy system" (never work alone in the heat);
- emergency planning and response;
- specific measures for indoor workplaces.

This document has been produced as part of a wider collaboration between INAIL and the National Research Council (CNR). The two institutes are collaborating on the project "**Workclimate: intervention strategies to counteract environmental heat stress in the professional sphere**", funded by INAIL since 2019.

Using INAIL accident data and statistics, the *Workclimate* project aims to increase knowledge of the impact of environmental heat stress conditions on workers, with a particular focus on

128 INAIL press release launching the publication of the document: <https://www.inail.it/cs/internet/comunicazione/news-ed-eventi/news/news-pubbl-guida-gestione-caldo-2022.html>

129 <https://www.inail.it/cs/internet/docs/alg-pubbl-guida-infor-gest-rischio-caldo-work.pdf>

estimating the social costs of accidents at work, with a view to defining intervention and risk prevention plans.

The *Worklimate* project¹³⁰, in addition to the above-mentioned guide, has led to the publication of information sheets¹³¹, studies¹³² (such as the one on the "Effects of high temperatures and heatwaves on accidents in the agricultural sector"), the organisation of events and conferences, and a number of IT tools. In particular, a platform setting up a heat stress forecasting system has been developed¹³³.

Using the WBGT Index, this platform attempts to predict the risk of heat stress in spring and summer in Italy. These predictions are estimated on the basis of a profile of a standard worker (height 175 cm, weight 75 kg), not acclimatised to heat, who carries out a moderate to intense activity directly exposed to sunlight or shade. This worker is not wearing any personal protective equipment or is wearing clothing that does not increase the risk. The software develops geographical maps of Italy that show heat risk forecasts for up to three days, at four times of the day corresponding to 8am, 12pm, 4pm and 8pm. The risk level forecast is defined by **the ratio (in percentage) between the forecast ambient temperature and the standard worker's personalised ambient temperature threshold**. This results in the following risk levels:

- If the predicted WBGT value is less than 80% of the personal WBGT threshold (of the standard worker), the resulting risk will be zero (green);
- If the predicted WBGT value is between 80 and 100%, the risk will be low (yellow);
- If the predicted WBGT value is above the personal threshold, the risk may be moderate (between 100 and 120%, orange) or high (above 120%, red).

It is possible to obtain a fairly accurate risk forecast from a geographical point of view: in addition to Italian regional maps, the platform can give a prediction - over five days - of the level of heat-related risk expected at midday in any specific location desired (but always with reference to the standard worker profile)¹³⁴.

Finally, *Worklimate* works on a **mobile application**¹³⁵ **to obtain personalised heat stress risk forecasts**, based on the characteristics of each worker (height, weight, physical activity, type of clothing worn) and the work environment (exposed to the sun or in shaded areas).

Greece

In June 2022, the Ministry of Health published a document¹³⁶ entitled "Prevention of the effects of high temperatures and heatwaves", aimed at reminding people of prevention measures and advice in the event of high temperatures, particularly during the summer period. Some of the recommendations are aimed at workers, but the document itself is aimed at prevention for the whole population. This is in fact an annual publication, as other similar documents have been

130 <https://www.worklimate.it/>

131 <https://www.worklimate.it/materiale-informativo/>

132 Sometimes also available in English: <https://www.worklimate.it/pubblicazioni/>

133 <https://www.worklimate.it/scelta-mappa/>

134 <https://worklimate.it/profilo/ordinanza-caldo-lavoro>

135 <https://www.worklimate.it/previsioni/>

<https://www.cnr.it/it/evento/18431/cambiamenti-climatici-e-sicurezza-dei-lavoratori-il-progetto-worklimate>

136 https://www.elinyae.gr/sites/default/files/2022-06/34174_2022.pdf

published in previous years¹³⁷.

In June 2022, the Labour Inspectorate published a document on "Preventing heat stress among workers", with specific reference to outdoor occupations¹³⁸.

Stressing that workers are under particular stress during the summer period, it states that "**the activity of local occupational health and safety inspection services during this period must focus on preventive checks** on the implementation of measures aimed at reducing heat stress for workers. **An immediate response must be provided in the event of complaints from workers** or their collective bodies".

In particular, inspection checks must be intensive and "**priority must be given to outdoor work** (e.g. in construction, roadworks and other engineering work) and to work in enclosed areas where, due to the nature of the production processes, there may be **additional heat stress due to high temperature-humidity values** and radiant heat (e.g. in foundries, metallurgy, plastics industries, kitchens, etc.) and especially **manual work** (e.g. transporting heavy objects, building materials)".

Although there is no maximum temperature at work in Greece, the Labour Inspectorate stresses that **companies subject to the collective labour agreements in force must comply with measures to protect workers against heat stress**, in accordance with the specific conditions included in these agreements. In fact, some Greek collective agreements (mentioned above) contain provisions in this area.

As a general rule, the Inspectorate reiterates the employer's obligations, which include:

- identify and assess workplace risks (including those due to heat) in writing;
- **take appropriate technical and organisational measures**, where necessary, to reduce heat stress for workers.

With regard to this last point, the Inspectorate provides in the appendix to its document **an indicative and non-exhaustive list of all the technical and organisational measures** that the employer could put in place to reduce heat stress at work.

Among the **technical measures**, the Inspectorate quotes:

1. **Intervention on the structural elements of the buildings:** insulation of the roof or slab; painting the outside of the buildings with white paint or another reflective insulating paint; construction of shading devices on the west and south sides of the buildings; installation of opaque or reflective glazing on the west and south sides; installation of cold air curtains in large openings which, due to the needs of the production process, remain open; openings at the highest points of sloping ceilings for natural ventilation.
2. **Intervention in certain parts of the production process:** insulation of hot surfaces located in work areas (hot water - steam pipes, boilers, tanks, etc.); insulation of heat sources by thermal insulation partitions and dissipation of heat to the outside environment.
3. **Intervention on the workplace microclimate:** adequate natural ventilation or installation of artificial ventilation following a study (ensuring air circulation speed by methods such as the

137 For example, in 2018: <https://www.moh.gov.gr/articles/health/dieythynsh-dhmosias-ygieinhs/ygieinh-periballontos/prostasia-se-ektakes-katastaseis/5536-prolhphsh-twn-epiptwsewn-apo-thn-emfanish-ypshlwn-thermokrasiwn-kai-kayswna-egkyklios-2018> and in 2020: <https://www.moh.gov.gr/articles/health/dieythynsh-dhmosias-ygieinhs/metadotika-kai-mh-metadotika-noshmata/c388-egkyklioi/7184-prolhphsh-twn-epiptwsewn-apo-thn-emfanish-ypshlwn-thermokrasiwn-kai-kayswna>

138 https://ypergasias.gov.gr/wp-content/uploads/2022/06/15.06.2022_%CE%95%CE%93%CE%9A%CE%A5%CE%9A%CE%9B%CE%99%CE%9F%CE%A3-%CE%98%CE%95%CE%A1%CE%9C%CE%99%CE%9A%CE%97-%CE%9A%CE%91%CE%A4%CE%91%CE%A0%CE%9F%CE%9D%CE%97%CE%A3%CE%97.pdf

creation of natural currents, the use of fans and the mechanical supply of fresh air with simultaneous evacuation of stale air); local extraction of hot air and pollutants at the point closest to the source of their generation; installation of air-conditioning machines, following a relevant study, where possible.

Organisational measures include:

- modify the organisation of the working day by providing breaks of an appropriate length to reduce heat stress for workers;
- schedule work involving high heat stress for workers, if possible, outside peak temperature periods;
- reduce or cease work in areas particularly exposed to heat, such as machine rooms, foundries, glassworks, ceramic factories, shipbuilding, asphalt laying, etc. between noon and 4pm;
- provide canteens or other suitable areas for breaks, equipped with air-conditioning systems;
- provide fresh drinking water at a temperature of 10-15°C.

With regard to forward-looking work, the document states that **the Ministry of Labour has recently set up a technical working group** (comprising, among others, the Ministry, representatives of the social partners and scientific experts) **to develop a uniform framework for protecting workers against heat stress**. The working group's first proposal is **to use the WBGT Index**, which is capable of taking into account other components of the environment in addition to air temperature.

For the time being, there is no table or framework defined in this area from a legislative point of view. While the working group continues its research, the Inspectorate provides in its document many references to international standards (notably ISO 7933:2004¹³⁹), WHO documents and other useful instruments to help identify heat exposure limits.

Finally, the Inspectorate also recommends the use of various tools:

- A. The website of the Hellenic National Meteorological Service (EMY). The EMY shows a **geographical map of Greece¹⁴⁰ with different colours (white, green, yellow, red or black) depending on the WBGT values for the day¹⁴¹**.

For each colour, the site makes the following recommendations:

- White: work can continue as normal.
- Green: moderation in the performance of heavy work by non-acclimatised workers, frequent water consumption (every hour).
- Yellow: reduce heavy work for all non-acclimatised personnel, avoid working in unshaded areas, pay attention to rest periods and drink water regularly (every 30 minutes).
- Red: avoid working in direct sunlight, take long rest periods and drink water every 15 minutes.

139 ISO 7933:2004. Ergonomics of the thermal environment — Analytical determination and interpretation of heat stress using calculation of the predicted heat strain.

140 http://www.emy.gr/emy/el/forecast/deikths_wbgt

141 The WBGT limits used for each colour follow the table set up by the NOAA (National Oceanic and Atmospheric Administration) in the United States. A reference table is available on the right at the top of the website. http://www.emy.gr/emy/el/forecast/deikths_wbgt

- Black: stop all outdoor work in areas without shade.

B. **Simplified calculation tools to determine thermal stresses.** The Inspection refers to the Famelab website¹⁴², offering a fairly simple tool which, by combining air temperature and humidity, estimates heat stress (a sort of simplified WBGT value, **ΘΥΒΜΑΣ** in Greek). The same site also offers information sheets, advice and a guide to prevention in the event of work in the heat, taking into account the intensity of the work¹⁴³.

Malta

There is no maximum temperature allowed at work. In addition to the traditional obligations of the employer (OSH responsibility), the Regulation on the minimum health and safety requirements for workplaces¹⁴⁴ is limited to stating that "it shall be the duty of the employer to **maintain in every workplace inside buildings or other structures** in which people are employed, **a thermal environment which is reasonably practicable and comfortable**, having regard to the working methods being used and the physical demands placed on the workers, other than for short periods, in conformity with accepted standards". This is a generic formulation, inspired by the European Directive on minimum requirements for the workplace.

However, in terms of prevention, the Occupational Health & Safety Authority (OHSa) publishes an updated version of the *Guidelines for Work in the Sun and Heat* on its website every year¹⁴⁵. This is a non-binding guide for both employers and self-employed workers, containing useful information on the risks associated with working in the sun and heat, and possible preventive measures.

This text advises the use of the WBGT Index to assess heat stress at work. With regard to risk assessment in particular, the **guide calls for workers to be involved and consulted on any problems in this respect** and on the prevention and protection measures that can be taken.

Finally, in addition to the traditional preventive measures (making water available, changing working hours, reducing exposure to the sun, etc.), it is worth highlighting two points:

- The guide stresses the importance of knowing the **level of humidity in the workplace**, in order to understand what measures need to be put in place to prevent accidents;
- It stresses the unacceptability of the practice of "**Danger money**", which consists of salary compensation given to staff working in a dangerous environment. For the guide, "you cannot pay workers a sum of money to work in the sun instead of taking the necessary measures".

United Kingdom

In this country too, the law does not lay down precise maximum limits for temperatures at work,

142 <https://www.famelab.gr/el/ergasia/> - **ΘΥΒΜΑΣ** is WBGT in Greek.

143 <https://www.famelab.gr/wp-content/uploads/2022/05/OHS-Practical-Guide-05-1.pdf>

144 Work Place (Minimum Health and Safety Requirements) Regulations. <https://legislation.mt/eli/sl/424.15/eng/pdf>

145 Latest version of 2022: https://www.ohsa.mt/sites/default/files/2022-08/Work_in_the_Sun_and_Heat.pdf

either inside or outside work premises¹⁴⁶. The UK is accustomed to a milder climate in summer than southern Europe, but the heatwaves of summer 2022 came as a surprise, reaching a record temperature of 40.3°C in July.

Faced with this extraordinary situation, the unions¹⁴⁷ called for the introduction of legally binding maximum temperatures in the following terms:

- As soon as the indoor temperature reaches 24°C, the employer would be obliged to implement specific preventive measures.
- The legal maximum temperature for indoor work should be set at 30°C (27°C for people doing arduous work). This would be **an absolute maximum**, meaning that employees could be sent home and their employers prosecuted if temperatures at work reach or exceed this value.
- With regard to outdoor work, the unions are calling for the explicit introduction of an obligation for employers to protect workers by providing sun protection and water, and to organise work so that employees are not outside during the hottest hours of the day.

This initiative was taken up by 55 MPs in a parliamentary motion¹⁴⁸, but this has not yet led to the drafting of a proper bill.

For the moment, when it comes to high temperatures at work, it is possible to consult the various tools and information published by the *Health and Safety Executive* (HSE).

The HSE¹⁴⁹ recalls the general obligations of employers (such as risk assessment). Interestingly, it also provides:

- a **checklist¹⁵⁰ to assess heat stress**, to be used when workers have to operate in an environment with high temperatures;
- a simplified guide¹⁵¹ on *Heat stress in the workplace*;
- prevention advice¹⁵² and measures to reduce heat stress at work.

146 This country does, however, have minimum working temperature values. See *The Approved Code of Practice on the Workplace (Health, Safety and Welfare) Regulations 1992*: <https://www.legislation.gov.uk/uksi/1992/3004/made>

147 Notably *Trades Union Congress (TUC)*. Here is their press release on "Heat – The case for a maximum temperature at work": <https://www.tuc.org.uk/sites/default/files/Temperature.pdf>
In 2009 TUC had already published a document entitled "*The case for a legally enforceable maximum temperature*": <https://www.tuc.org.uk/sites/default/files/extras/maxtemp2009.pdf>

148 Motion of 11 July 2022: <https://edm.parliament.uk/early-day-motion/59986/maximum-temperature-in-the-workplace>

149 <https://www.hse.gov.uk/temperature/employer/the-law.htm>

150 <https://www.hse.gov.uk/temperature/assets/docs/heat-stress-checklist.pdf>

151 <https://www.hse.gov.uk/pubns/indg451.pdf>

152 <https://www.hse.gov.uk/temperature/employer/heat-stress.htm>

3. Regulation and prevention of heat-related work in other countries around the world

This part of the report analyses the provisions relating to these countries: **Australia, New Zealand, the United States** (four States in particular), **Canada** (including its federal Provinces and Territories), **South Africa, the Gulf States, China, Japan, and South Korea**.

Australia

Australia is a country where there are **no maximum temperatures at work**, due to the complexity of the different work environments, the type and duration of the work activity and the physical conditions of the worker. All these factors cannot be summed up by a single stop work temperature¹⁵³.

However, the employer¹⁵⁴ remains responsible for the OSH of its employees. According to the legislation, the employer must provide and maintain a workplace free from risks to health and safety. Where there are risks to OSH (including from high temperatures), these must be eliminated or reduced as far as "reasonably practicable"¹⁵⁵.

In the event of a heatwave, the government agency *Safe Work Australia*¹⁵⁶ states that the employer must carry out **additional risk assessments** and put in place heat risk control measures, including:

- planning work so as to use the coolest times of the day;
- reducing activities involving physical effort;
- carrying out work in safer locations;
- ensuring that workers have access to cool fresh water, air conditioning or fans (if possible), and shaded areas if they are working outdoors.

In addition, wherever possible, *Safe Work Australia* stresses that **workers should not work alone**. If it is not possible to do otherwise, then procedures should be put in place to **monitor lone workers** and ensure that they can easily call for help.

In general, the Australian authorities have published a large number of documents and resources, aimed at workers and employers, concerning outdoor work in Australia in periods of extreme heat such as:

- *Guide on exposure to solar ultraviolet radiation (UVR)*¹⁵⁷;

153 As explained by the Australian Government Agency *Safe Work Australia* <https://www.safeworkaustralia.gov.au/safety-topic/hazards/working-heat/frequently-asked-questions>

154 In Australia and New Zealand, the term "employer" is often replaced in publications and legislation by the acronym PCBU, *Person conducting a business or establishment*. PCBU is an umbrella concept used to capture all types of working arrangements or structures and can be a: company; unincorporated body or association; sole trader or self-employed person.

155 Article 17 *Management of risks of the Work Health and Safety Act 2011* <https://www.legislation.gov.au/Details/C2022C00082>
The definition of "reasonably practicable" can be found in Article 18 of the same law.

156 <https://www.safeworkaustralia.gov.au/safety-topic/hazards/working-heat/frequently-asked-questions>

157 https://www.safeworkaustralia.gov.au/system/files/documents/2001/guide-exposure-solar-ultraviolet-radiation_1.pdf

- *Guide for managing the risks of working in heat*¹⁵⁸, updated in 2021. The aim of this document is to provide information on managing the risks associated with working in the heat, as well as practical measures to be taken in the event of excessively high temperatures. The guide is intended primarily for employers in the sectors most affected by excessive heat, such as transport, postal services and **construction**, among others. It provides advice on how to deal with exposure to heat both **inside and outside buildings** and premises.
- *Managing risks of working in heat fact sheet*¹⁵⁹, a kind of summary of the previous guide.

Other instruments include:

- A **specific checklist**¹⁶⁰ to help employers determine whether there is a risk of heat-related illness in the workplace.
- A webpage¹⁶¹ summarising and making available all the resources on the subject published by *Safe Work Australia*.
- An IT tool¹⁶² developed by *Workplace Health and Safety Queensland*: this is a heat stress calculator to help assess the risks associated with working in heat.

New Zealand

WorkSafe New Zealand, the OSH regulator, points out that **existing legislation** (in particular HSWA *Health and Safety at Work Act 2015*¹⁶³) **does not specify minimum or maximum temperatures at work**, as it is impossible to establish such limits on the basis of air temperature alone, as several factors would have to be taken into account:

- humidity,
- exposure to the sun or other sources of radiant heat,
- air circulation and movement,
- the pace of work and the degree of physical workload,
- the clothing or personal protective equipment (PPE) worn by workers,
- other factors and characteristics relating to the worker's health.

It is the employer's responsibility to carry out a risk assessment in the workplace, in consultation with the workers. The assessment will need to take account of extreme heat in any work environment subject to high temperatures and, in this case, all the above elements will need to be considered.

WorkSafe has a number of online tools for both hot and cold work, including:

- A very detailed guide to best practices, *Working safely in extreme temperatures*¹⁶⁴, which, in

158 <https://www.safeworkaustralia.gov.au/sites/default/files/2021-10/Guide%20for%20managing%20the%20risks%20of%20working%20in%20heat.pdf>

159 <https://www.safeworkaustralia.gov.au/sites/default/files/2020-12/Working%20in%20Heat%20Fact%20Sheet.pdf>

160 <https://www.safeworkaustralia.gov.au/safety-topic/hazards/working-heat/checklist-managing-risks-heat-workplace>

161 <https://www.safeworkaustralia.gov.au/safety-topic/hazards/working-heat/resources>

162 <https://fswqap.worksafe.qld.gov.au/etools/etool/heat-stress-basic-calculator-test/>

163 <https://www.legislation.govt.nz/act/public/2015/0070/latest/whole.html#DLM6544135>

164 <https://www.worksafe.govt.nz/dmsdocument/23438-working-safely-in-extreme-temperatures/latest>

addition to a reminder of existing obligations¹⁶⁵, in this area, provides advice on risk assessment in the event of extreme temperatures, as well as possible preventive measures.

This guide concerns "any outdoor work during summer" carried out in the country. Interestingly, it proposes screening questionnaires for employees. It draws attention to the importance of health checks prior to carrying out a specific task, including in certain extreme thermal conditions: "this is particularly important for **picking up any temporary conditions that may have not been present during pre-employment discussions**". Appendices E and F of the document contain two examples of health questionnaires, one for work in the heat (*Heat exposure screening questionnaire*) and the other for work in the cold (*Cold exposure screening questionnaire*). These questionnaires should only be completed with the assistance of a physician or occupational health nurse.

- Practical information for employers (*Working in extreme heat - a guide for businesses*¹⁶⁶) and for employees (*Working in extreme heat – a guide for workers*¹⁶⁷).
- A document entitled *Managing thermal comfort at work*¹⁶⁸, for employers. Chapter 8 (*Managing heat*), p. 17, concerns the **management of excessive heat in outdoor workplaces**. It presents a **detailed table of possible measures** to be implemented in these workplaces, which are particularly affected by heatwaves.

In addition, with regard to temperature, the text gives indications of 'thermal comfort' values, but only **indoors**. Assuming that workers are wearing clothing appropriate to the season, that the air speed is around 0.1-0.2 metres per second (without creating draughts in the case of sedentary work), that humidity levels are normal (40-70%) and that workers are not directly exposed to a source of radiant heat, the comfort values would be as follows:

Type of work	Summer	Winter
Sedentary work	19-24 °C	18-22 °C
Physical work	16-21 °C	16-19 °C

United States

Federal and State legislation

OSHA (*Occupational Safety and Health Administration*), the US federal government agency responsible for OSH, states that US legislation does not specify a maximum working temperature.

The OSH Act¹⁶⁹ of 1970 generally provides that "each employer shall furnish to each of his employees **employment and a place of employment which are free from recognized hazards** that are causing or are likely to cause death or serious physical harm to his employees". The dangers arising from excessive exposure to heat are obviously among these risks.

165 A very clear summary of the obligations set out in the law can be found in Appendix B of this document, on page 54.

166 <https://www.worksafe.govt.nz/dmsdocument/23450-working-in-extreme-heat-a-guide-for-businesses/latest>

167 <https://www.worksafe.govt.nz/dmsdocument/23456-working-in-extreme-heat-a-guide-for-workers/latest>

168 <https://www.worksafe.govt.nz/dmsdocument/5420-managing-thermal-comfort-at-work>

169 Occupational Safety and Health Act. https://www.osha.gov/laws-regs/oshact/section_5

At State level, OSHA¹⁷⁰ indicates that only three of them have taken more specific legislative measures concerning exposure to heat: Minnesota, California, and the State of Washington.

In **Minnesota**, the measures adopted concern only enclosed workplaces. With the adoption of Administrative Rule § 5205.0110 "Indoor ventilation and temperature in places of employment"¹⁷¹, all indoor workplaces must now comply with the following WBGT Index values (expressed in degrees Fahrenheit), depending on the workload:

Professional activity	WBGT °F (Fahrenheit)
Light work	86
Moderate work	80
Heavy work	77

As for **California**, the California Code of Regulation, Title 8, Section 3395¹⁷² sets out new obligations for employers in 5 sectors: agriculture, **construction**, landscaping, oil and gas extraction, transportation or delivery of agricultural products, construction materials or other heavy materials (except for employment that consists of operating an air-conditioned vehicle and does not include loading or unloading). These new provisions specifically concern **outdoor places of employment**.

To prevent the onset of heat-related illnesses, employers must now:

- **Provide employees with free drinking water** (fresh and pure). The water should be located as close as possible to the areas where employees work. Where drinking water is not supplied continuously, it must be provided in sufficient quantity at the start of the working day.
- **Ensure access to shade**. In particular, when the outside temperature in the work area exceeds 80 °F (26.6 °C), the employer must set up and maintain one or more shaded areas at all times while employees are present; these areas must either be open to the air or be provided with ventilation or a cooling system. The shade should be located as close as possible to the areas where employees are working.
- **Follow specific high-heat procedures**. In particular, if the temperature is 95°F (35°C) or higher, the employer must:
 1. Ensure that **effective communication** by voice, observation or electronic means is maintained so that employees in the workplace can contact a supervisor if necessary. An electronic device, such as a mobile phone, may only be used for this purpose only if reception in the area is reliable;
 2. Observe employees for **alertness and signs or symptoms of heat illness**. The employer must ensure effective observation/supervision of employees by implementing one or more of the following measures:
 - a) appoint a supervisor to observe a maximum of 20 employees, or

170 Overview of existing heat standards in the United States: <https://www.osha.gov/heat-exposure/standards>
Updated version August 2022 on <https://crsreports.congress.gov/product/pdf/IN/IN11701#>

171 Minnesota Administrative Rules. §5205.0110 Indoor ventilation and temperature in places of employment. <https://www.revisor.mn.gov/rules/5205.0110/>

172 California Code of Regulations, title 8, section 3395. <https://www.dir.ca.gov/title8/3395.html>

- b) implement the *buddy system* (at least two employees working together, never alone), or
 - c) if the employee is alone, communicate with him or her on a regular basis, for example by radio or mobile phone, or
 - d) use other effective means of observation.
3. **Designate one or more employees on each site as being authorised to call the emergency medical services** and allow other employees to call the emergency services when no designated employee is available.
 4. Remind employees throughout the working day to **drink plenty of water**.
 5. **Organise meetings before work starts** to review the high-heat procedures, encourage employees to drink plenty of water and remind employees of their right to rest if necessary.
 6. For employees working in agriculture, the following provisions also apply: when the temperature reaches or exceeds 95 °F (35 °C), the employer must ensure that the employee takes a preventive rest period of at least ten minutes every two hours. If the workday extends beyond eight hours, then an additional preventative rest period will be required at the conclusion of the eighth hour of work; and if the workday extends beyond ten hours, then another preventative rest period will be required at the conclusion of the tenth hour and so on.
- **Follow specific procedures in the event of an emergency response:** for example, if an employee shows signs or symptoms of heat illness, they should be monitored and not left alone or sent home without being offered on-site first aid and/or being provided with emergency medical services in accordance with the employer's procedures.
 - **Follow special measures in case of "heatwaves",** in particular:
 1. All employees must be closely supervised by a supervisor or designated person during a "heatwave", which refers to any day in which the predicted high temperature for the day will be at least 80°F (26.6°C) and at least 10°F higher than the average high daily temperature in the preceding five days.
 2. An employee who has been newly assigned to a high heat area shall be closely observed by a supervisor or designee for the first 14 days of employment.
 - **Provide training for employees and supervisors on a number of subjects related to exposure to heat,** in particular:
 - a) environmental and personal risk factors for heat-related illnesses, as well as the added burden of heat load on the body caused by exertion, clothing and personal protective equipment;
 - b) the employer's procedures for complying with regulatory requirements;
 - c) the importance of frequent water consumption;
 - d) the concept, importance and methods of acclimatisation;
 - e) the different types of heat illness, the signs and symptoms, the appropriate first aid and/or emergency procedures;
 - f) how to report immediately to the employer, directly or through the supervisor, symptoms or signs of heat illness on oneself or a colleague.

Supervisor training should also cover the emergency response procedures to follow if an employee exhibits signs or symptoms consistent with possible heat illness, as well as how to monitor weather reports and how to respond to hot weather advisories.

Finally, the employer will have to establish, implement, and maintain a proper **Heat Illness Prevention Plan (HIPP)**. This plan integrates and does not replace the *Illness and Injury Prevention (IIP)* plan, which is compulsory for all employers.

The HIPP must be **written in English and in the language understood by the majority of employees**. It must be made available to employees at the worksite upon request. In order to meet their obligations, employers may complete an existing HIPP form¹⁷³ describing how they will ensure compliance with Title 8, Section 3395 of the California Code of Regulations.

Finally, the State of California has developed a web page¹⁷⁴, "*Heat Illness Prevention*", which sets out all the existing obligations and provides employees and employers with all the resources and materials available on preventing heat stress at work (including brochures, communication campaigns and webinars).

The **State of Washington** has approved specific measures to be taken in the event of excessive heat exposure when working in an outdoor environment (*outdoor heat exposure*). These measures are set out in the Washington Administrative Code (WAC), sections 296-62-095 to 296-62-09560¹⁷⁵. The provisions - valid **from 1 May to 30 September each year** - must be taken **only when employees are exposed to outdoor heat equal to or greater than the values in the following table**, which takes into account the type of clothing or personal protective equipment worn by the employees:

All other clothing	89°F (31,6°C)
Double-layer woven clothes including coveralls, jackets and sweatshirts	77°F (25°C)
Nonbreathing clothes including vapor barrier clothing or PPE such as chemical resistant suits	52°F (11,1°C)

These provisions do not apply to incidental heat exposure, i.e. when employees are not required to carry out a professional activity outdoors for more than 15 minutes per hour.

They therefore concern prolonged exposure to heat and set out the following requirements:

- **Specific responsibilities for both employers and employees.** As in California, employers must:
 - a) include an *Outdoor heat exposure safety programme* in the *Accident Prevention Programme (APP)*;
 - b) encourage employees to frequently consume water or other acceptable beverages to ensure hydration. Employees, for their part, are responsible for monitoring their personal risk factors for heat-related illness (including monitoring their water consumption to ensure

173 https://www.dir.ca.gov/dosh/dosh_publications/HIP-sample-procedures.pdf

174 Heat Illness Prevention. Department of Industrial Relations of the State of California. <https://www.dir.ca.gov/dosh/heatillnessinfo.html>

175 Washington Administrative Code (WAC). <https://app.leg.wa.gov/WAC/default.aspx?cite=296-62&full=true#296-62-095>

they are sufficiently hydrated).

- **Obligation to provide drinking water**, in particular, the employer must ensure that a sufficient quantity of drinking water is readily available to employees at all times and that all employees have the opportunity to drink at least one quart of drinking water per hour.
- **Monitoring and rapid response to signs and symptoms of heat-related illness.** Employees showing symptoms must be relieved of their duties and provided with sufficient means to reduce their body temperature. They should also be monitored to determine whether medical attention is required.
- **Appropriate training for employees and supervisors**, before starting any outdoor work exceeding the temperatures in the table above. The subjects on which employees should be instructed must include:
 - a) environmental factors that contribute to the risk of heat-related illness;
 - b) general knowledge of personal factors which may increase vulnerability to heat-related illness (age, medical conditions, alcohol use, etc.);
 - c) the importance of removing heat-retaining PPE during all breaks;
 - d) the importance of frequently drinking small quantities of water;
 - e) the importance of acclimatisation;
 - f) the different types of heat-related illnesses, signs and symptoms;
 - g) the importance of immediately reporting signs or symptoms of heat-related illness in either themselves or in co-workers to the person in charge, as well as the procedures that the employee should follow, including appropriate emergency response procedures.

Supervisors must be trained (in addition to the subjects provided for employee training) on the procedures to be followed if an employee presents signs or symptoms compatible with a possible heat-related illness and the procedures for moving or transporting an employee to a place where he or she can be assisted by an emergency medical service provider, if necessary.

For certain sectors, there are other related requirements in chapters WAC 296-305 (safety standards for firefighters) and WAC 296-307 (safety standards for agriculture).

In conclusion, with regard to the frameworks applicable in the **States of California and Washington**, while there are no maximum temperatures at work above which work should be stopped or prohibited, these States **impose a series of preventive measures when a certain air temperature is exceeded**.

In addition to the three states mentioned by OSHA, Oregon has also recently introduced specific measures against heat-related hazards, publishing the **Oregon OSHA Heat Illness Prevention Standard** in June 2022 (OAR 437-004-1131 and OAR 437-002-0156)¹⁷⁶.

A first in the United States, **these provisions apply to both indoor and outdoor workplaces**, where the **Heat Index (HI)** in the workplace is equal to or greater than **80°F**.

176 <https://osha.oregon.gov/OSHArules/adopted/2022/ao3-2022-letter-alh-heat.pdf>

OAR 437-004-1131 applies to the agricultural sector, while OAR 437-002-0156 applies to general industry, including construction.

This index combines air temperature and humidity in the shade¹⁷⁷. Although it is less detailed than the WBGT Index, it at least takes humidity into account, which is not the case in the Californian and Washington standards (these States refer to air temperature; California uses the term "dry bulb temperature").

The measures introduced in Oregon are **similar to those in California and Washington**, including: access to drinking water; access to shaded areas; heat acclimatisation for workers; the introduction of an emergency response plan and specific measures in the event of a heatwave; training for employees and supervisors; the requirement for employers to draw up a *Heat Illness Prevention Plan* (HIPP) detailing how they will ensure compliance with all heat prevention provisions.

It is the environmental reference values that change, given the Heat Index:

- Oregon has determined that a workplace hazard exists whenever the Heat index (HI) reaches **80°F (the caution level)** and that a more serious hazard exists whenever it exceeds **90°F (the extreme caution level)**.
- Shaded areas must be created and water supplied to employees if the HI is **equal to or exceeds 80°F**.
- When the heat index **exceeds 90°F**, effective and regular communication must be maintained in the workplace so that employees can easily contact a supervisor or the emergency services if necessary.
- Employers must implement specific measures in the event of extreme heat, particularly when the HI index **exceeds 90°F**. Among the new measures, **Oregon has established a precise alternation between work and rest**, notably a cooling break in the shade of:
 - 10 minutes every 2 hours of work when the HI is between 90-94 °F;
 - 20 minutes every working hour when the HI is between 95-99 °F;
 - 30 minutes every working hour when the HI is between 100-104 °F;
 - 40 minutes every working hour when the HI reaches or exceeds 105°F.

It is important to recall the context that led to the approval of these provisions. In June 2021, Oregon was hit by a deadly heatwave¹⁷⁸, which caused numerous hospitalisations and deaths in the workplace. It was so exceptional (with air temperatures exceeding 116 °F, i.e. 46.6 °C) that the State of Oregon urgently adopted (July 2021) "**Temporary Rules to Address Employee Exposure to High Ambient Temperatures**"¹⁷⁹. They were then made permanent in the 2022 legislation.

In terms of perspective at federal level, although there are no maximum temperatures at work or maximum heat exposure periods, the situation could change in the near future. In the US Congress, two bills were introduced in 2021: H.R. 2193 (in the House of Representatives) and S. 1068 (in the

177 OSHA defines this Index as follows: "Heat Index is another common way to measure heat stress. It is measured in the shade and combines air temperature and relative humidity to represent how hot the conditions feel at rest. The heat index does not account for the effects of wind, sunlight, radiant heat sources, or workload".
<https://www.osha.gov/heat-exposure/hazards#>

178 Reference is made to the unprecedented heatwave of 2021 in Western North America, hitting in particular Western Nevada, Northern California, Oregon, Idaho and the State of Washington in the United States and many Provinces in Canada. https://en.wikipedia.org/wiki/2021_Western_North_America_heat_wave

179 Adoption of Temporary Rules to Address Employee Exposure to High Ambient Temperatures.
<https://osha.oregon.gov/OSHArules/adopted/2021/ao6-2021-letter-heatillnessprevention.pdf>

Senate), both entitled the **Asuncion Valdivia Heat Illness and Fatality Prevention Act of 2021**¹⁸⁰.

Asunción Valdivia was a Californian farm worker who died of heatstroke in 2004, after working for 10 hours without a break in temperatures of 105°F (40.5°C). He had fainted at work and his employer had asked his son to take him home. Asunción Valdivia died because of the lack of adequate preventive measures and rapid intervention in the workplace.

These bills, if adopted¹⁸¹, **would require OSHA to propose**, within two years, **and then promulgate**, within 42 months, **a binding standard for heat exposure in both indoor and outdoor workplaces**. In more detail, the aim is to establish measures such as paid break periods in cool areas, the provision of water, **limits on heat exposure time** and emergency intervention for workers suffering from heat-related illness. Employers are also required to train their employees on heat-related risks and illnesses and on the procedures to follow in the event of symptoms.

On July 27, 2022, the Committee on Education and the Workforce of the U.S. House of Representatives ordered that H.R. 2193 be reported in November 2022¹⁸². The text is currently being amended¹⁸³.

OSHA and NIOSH prevention tools

Although these are not binding documents, **OSHA** proposes several tools and materials¹⁸⁴ on the prevention of heat-related illnesses, as well as a detailed bibliography¹⁸⁵ on the subject of heat in the workplace.

The federal agency **NIOSH** (*National Institute for Occupational Safety and Health*) also provides a detailed bibliography¹⁸⁶ on heat at work.

Among the various tools, three in particular should be mentioned:

- An **application**, developed jointly by OSHA and NIOSH (**OSHA-NIOSH Heat Safety Tool App**¹⁸⁷), which is designed **to help plan outdoor work activities based on the heat felt throughout the day**. The application uses the Heat Index (HI) to give real-time heat values as well as specific forecasts (hour by hour), depending on the geographical area required. It also provides risk levels for outdoor work and recommendations for OSH measures to put in place¹⁸⁸.
- **An online WBGT calculator**. As the Heat Index (HI) is not as detailed as the WBGT, OSHA

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<https://www.brown.senate.gov/imo/media/doc/Asuncion%20Valdivia%20Heat%20Illness%20and%20Fatality%20Prevention%20Act%20117th%20One-Pager.pdf>

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Follow the progress of this bill project in the Senate <https://www.congress.gov/bill/117th-congress/senate-bill/1068> and in the House of Representatives: <https://www.congress.gov/bill/117th-congress/house-bill/2193>

182

The report is available here: <https://www.congress.gov/117/crpt/hrpt547/CRPT-117hrpt547.pdf>

183

New version (November 2022) of the bill H.R. 2193 on <https://www.congress.gov/bill/117th-congress/house-bill/2193/text>

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<https://www.osha.gov/heat>

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<https://www.osha.gov/heat-exposure/resources>

186

<https://www.cdc.gov/niosh/topics/heatstress/>

187

<https://www.cdc.gov/niosh/topics/heatstress/heatapp.html>

188

The Oregon OSHA Heat Illness Prevention Standard (OAR 437-004-1131 and OAR 437-002-0156) requires the employer to use this application to determine the heat index (HI) in outdoor workplaces (the employer can assume that the value given by the app is also valid inside the premises, if they have no ventilation and cooling systems. Furthermore, if the enclosed premises are designed or otherwise known to be affected by outdoor humidity - for example, hoop houses and greenhouses in nursery operations - the employer must measure and use the actual humidity inside the premises to calculate the Heat Index).

does not advise employers to base their risk assessment solely on the HI. A WBGT calculator developed by OSHA can now be consulted online¹⁸⁹, concerning outdoors (**OSHA Outdoor WBGT Calculator**). However, OSHA also invites the employers to consider the workload in addition to the WBGT Index in order to properly assess the risks at work.

- A NIOSH study entitled "*Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments*"¹⁹⁰. It provides a detailed overview of the risks associated with working in heat, the factors that influence heat stress and gives recommendations on maximum heat values at work as well as general prevention recommendations in this area, in order to guarantee workers' OSH.

In particular, Chapter 1 and Figures 8-1 for workers not acclimatised to heat and 8-2 for acclimatised workers (in Chapter 8) provide an overview of the recommendations detailed in the other chapters. The figures show the **Recommended heat stress alert limits (RALs)**. They refer to the profile of a standard worker, namely a man with a body weight of 70 kg and a body surface area of 1.8 m². NIOSH points out that "men and women adapt well to heat exposure and, given their similar physiological ability to tolerate heat, there are no significant differences between the sexes".

The figures are presented in the form of a Cartesian plan: on one axis we find the WBGT value of the work environment, on the other the metabolic heat (different according to the physical workload).

Canada

Legislation at federal and provincial level

Canada has a number of provisions relating to temperatures in the workplace. As in the United States, a **distinction must be made between the provisions applicable at the level of the State of Canada** as a whole and **those existing at the level of the Canadian Provinces**, which may supplement the governmental provisions.

A detailed summary of all existing provisions (Federal and Provincial) relating to temperature at work can be consulted on the *Canadian Centre for Occupational Health and Safety*, CCOHS website¹⁹¹.

In Canada, **there is no maximum temperature at work**, except in a few specific cases, and for **enclosed workplaces**:

- Section 9.9 of the Canada Occupational Health and Safety Regulations¹⁹² states that "in each personal service room and food preparation area, the temperature, measured one metre above the floor in the centre of the room or area, shall, if feasible, be maintained at a level of not less than 18°C and not more than 29°C". The CCOHS specifies that "personal service room means a change room, toilet room, shower room, lunch room, living space, sleeping quarters or a combination thereof".

189 <https://www.osha.gov/heat-exposure/wbgt-calculator>

190 <https://www.cdc.gov/niosh/docs/2016-106/> - PDF on <https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf?id=10.26616/NIOSH PUB2016106>

191 https://www.ccohs.ca/oshanswers/phys_agents/temp_legislation.html

192 <https://laws-lois.justice.gc.ca/eng/regulations/SOR-86-304/page-13.html>

- **Concerning the public service:** the National Joint Council Occupational Health and Safety Directive¹⁹³ (Public Service Canada) specifies (section 2.2) that "in **office accommodations**, air (dry bulb) temperatures during working hours should be maintained **within the ideal temperature range of 20°C to 26°C**. Temperatures between 17°C and 20°C and above 26°C can be uncomfortable, and **occupancy should not exceed one hour daily or 40 hours annually** in each of these extremes. Temperatures above 26°C are deemed uncomfortable when the Humidex reading (Appendix A) at a given temperature equals 40°C or less. It is recognised that temperatures between 30°C to 39°C represent significant discomfort; temperatures between 40°C to 45°C represent great discomfort and exertion should be avoided; temperatures above 45°C are dangerous; and temperatures above 54°C provide a situation where a heat stroke is imminent"¹⁹⁴. It is the employer's responsibility to implement the necessary corrective measures (which may include, among other things, increasing the frequency of rest periods and temporarily relocating employees to workstations outside the affected area) if the above uncomfortable levels are reached.

With regard to the Provinces, some of them have set temperature values to be applied inside work premises. For example, the **Province of Prince Edward Island** (in its *Occupational Health and Safety Act General Regulations*¹⁹⁵ - sections 11.10 and 11.11) sets minimum temperature values for enclosed workplaces, which vary according to the nature of the work performed. Several situations are described, ranging from light work performed in a seated position (20°C) to heavy physical work performed in a standing position (12°C). Similar measures exist in **Quebec** and **New Brunswick**.

It is interesting to note that **many Provinces** have adopted more specific measures concerning heat stress. In particular, some of them have **made it mandatory to comply with maximum heat stress values as described by the American Conference of Governmental Industrial Hygienists (ACGIH)**, notably in the document *TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*¹⁹⁶.

On the CCOHS page¹⁹⁷ you will find a summary of the thermal constraints indicated by the ACGIH, which refer to the WBGT Index (expressed in °C) and take account of the workload.

193 <https://www.njc-cnm.gc.ca/directive/d7/v282/s793/en>

194 The temperatures quoted here, between 30°C and 54°C, do not refer to air temperature, but to Humidex values, a heat stress index expressed in degrees Celsius and combining air temperature and humidity. Find out more about Humidex on the following pages of this report.

195 https://www.princeedwardisland.ca/sites/default/files/legislation/o1-01g-occupational_health_and_safety_act_general_regulations.pdf

196 <https://portal.acgih.org/s/store#/store/browse/detail/a154W00000BOag7QAD>

197 https://www.ccohs.ca/oshanswers/phys_agents/heat/heat_control.html

ACGIH Screening Criteria for Heat Stress Exposure (WBGT values in °C) for a five-day working week of eight hours a day with conventional breaks								
Allocation of Work in a Work/Rest Cycle (over eight hours)	Workers acclimatised to the heat				Workers not acclimatised to the heat			
	Light work	Moderate work	Heavy work	Very heavy work	Light work	Moderate work	Heavy work	Very heavy work
75 to 100%	31	28	–	–	28	25	–	–
50 to 75%	31	29	27.5	–	28.5	26	24	–
25 to 50%	32	30	29	28	29.5	27	25.5	24.5
0 to 25%	32.5	31.5	30.5	30	30	29	28	27

Example: a work environment has a WBGT Index of 27°C; the worker is not used to working in hot conditions (not acclimatised) and performs a moderate physical workload. According to the ACGIH, the employee must then work for **only about 25 to 50% of an eight-hour period**. In the remaining time, he must take a break, which may also include the assignment and performance of other (lighter) tasks but it is important to pay particular attention to activities associated with high levels of fatigue that would prevent the body from cooling down properly.

These values assume that workers exposed to heat are properly hydrated, are not taking any medication, are wearing light clothing and are generally in good health.

If particular clothing is worn (heavy, non-transpiring, etc.), the ACGIH proposes adjustments to the table:

Type of clothing	WBGT index correction (°C)
Work clothes (long-sleeved shirt and long trousers)	0
Cloth (woven material) coveralls	0
SMS (Spunbonded - Meltdown - Spunbonded) polypropylene coveralls	+0.5
Polyolefin coveralls	+1
Double-layer woven clothing	+3
Limited-use vapour-barrier coveralls	+11

The following Provinces and two Federal Territories have made compliance with these thermal constraints mandatory:

- **British Columbia**, in its OHS Regulation (sections 7.27 to 7.32)¹⁹⁸
- **Manitoba**, in its Workplace Safety and Health Act and Regulation (section 4.12)¹⁹⁹
- **Newfoundland and Labrador**, in its OHS Regulations (section 44)²⁰⁰
- **New Brunswick**, in its General Regulation - Occupational Health and Safety Act (section 22)²⁰¹
- **Nova Scotia**, in its Workplace Health and Safety Regulations (sections 2.1 and 2.3)²⁰²
- **Prince Edward Island**, in its Occupational Health and Safety Act General Regulations (section 42.1)²⁰³
- the **Northwest Territories** and **Nunavut**, but only in the case of work in mines (in their respective versions of the Mine Health and Safety Regulations).

In **Ontario**, the law²⁰⁴ stipulates that employers must "take every precaution reasonable in the circumstances for the protection of a worker". According to a document published²⁰⁵ by the Ontario Ministry of Labour, this duty to protect also includes "developing policies and procedures to protect workers in environments that are hot because of hot processes and/or weather". Heat stress is a constant concern during the summer months, so the **Ministry recommends** that employers follow the Threshold Limit Values (TLVs) for Heat Stress and Heat Strain published by the ACGIH to comply with their duty to protect.

Finally, **Quebec** has thermal constraints by law, but does not follow those indicated by the ACGIH. The Quebec Regulation respecting occupational health and safety²⁰⁶, in Annex V ("Evaluation of Heat Stress"), details the limit values to be applied to work (use of the WBGT Index expressed in °C combined with the workload):

Alternate Regimen work/rest	Light work	Moderate work	Heavy work
Continuous work	30	26.7	25
Work 75%, rest 25% (every hour)	30.6	28	25.9
Work 50%, rest 50% (every hour)	31.4	29.4	27.9
Work 25%, rest 75% (every hour)	32.2	31.1	30

Above a certain WBGT value for the environment and depending on the type of work, the table indicates how work and rest should be alternated. Annex V specifies that the WBGT method **does**

198 <https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-07-noise-vibration-radiation-and-temperature#SectionNumber:7.27>

199 https://www.gov.mb.ca/labour/safety/pdf/whs_workplace_safety_act_and_regs.pdf

200 https://www.assembly.nl.ca/legislation/sr/regulations/rc120005.htm#44_

201 <https://www.canlii.org/en/nb/laws/regu/nb-reg-91-191/latest/nb-reg-91-191.html>

202 <https://www.novascotia.ca/Just/Regulations/regs/ohsworkplace.htm>

203 https://www.princeedwardisland.ca/sites/default/files/legislation/o1-01g-occupational_health_and_safety_act_general_regulations.pdf

204 Paragraph 25(2)(h) of the Occupational Health and Safety Act. <https://www.ontario.ca/laws/statute/90o01#BK47>

205 https://www.ohcow.on.ca/edit/files/heat_stress__ministry_of_labour.pdf

206 <https://www.legisquebec.gouv.qc.ca/en/document/cr/s-2.1,%20r.%2013>

not apply to workers who are not acclimatised to heat, who are physically incapable of performing a specific job or who wear clothing especially adapted to certain dangerous tasks as protection against the heat.

Although the Canadian government has not officially introduced the ACGIH maximum heat exposure values into its legislation (unlike some of its Provinces), two points should be noted.

Firstly, in the absence of clearly prescribed standards, the Government, through the Ministry of Labour's office, generally applies the Threshold Limit Values (TLVs) for heat stress, as defined by the ACGIH. **Labour inspectors use these TLVs as a guideline to ensure that employers comply with their general obligation to take all reasonable precautions** to protect the health and safety of workers²⁰⁷.

Secondly, as in the United States, **legislative work is underway** to amend Canadian law with a view to introducing heat stress obligations into the Canada Occupational Health and Safety Regulations (COHSR)²⁰⁸.

This government site²⁰⁹ summarises the requirements for **indoor and outdoor work** that will be integrated into the COHSR:

1. To reduce injuries and work time loss related to **thermal stress encountered both indoors and outdoors**:
 - employers, in consultation with the workplace committee, the health and safety representative, or the policy committee as appropriate, must develop and **implement procedures for the monitoring and control of thermal stress**, which would include the following:
 - monitoring requirements of thermal conditions such as cooling power of wind and Humidex;
 - protective clothing and equipment;
 - administrative controls such as fluid replacement and work practices, work rest cycles, acclimatisation, scheduling and organisation of work;
 - engineering controls, such as temporary equipment, shields, insulation and fans to reduce exposure;
 - employee training to ensure that each employee is familiar with signs and symptoms associated with overexposure to thermal stresses;
 - internal reporting on any incident associated with exposure to thermal stresses and the treatment provided. The reporting should include the date and time, conditions of work, health symptoms, protective measures, and treatment.
2. **Where work is performed indoors** an employee shall be kept free from exposure in accordance with the standards below:
 - Levels exceeding the Threshold Limit Values (TLVs) for **heat stress** exposure listed in the *Screening Criteria for TLV and Action Limit for heat stress exposure*, section of the

207 As reported by UFCW, Canada's private sector union
https://www.ufcw.ca/index.php?option=com_content&view=article&id=41&Itemid=80&lang=en

208 <https://laws-lois.justice.gc.ca/eng/regulations/SOR-86-304/FullText.html>

209 <https://www.canada.ca/en/employment-social-development/services/health-safety/reports/thermal-stress-work-place.html>

heat stress and strain adopted by the *American Conference of Governmental Industrial Hygienists* (ACGIH) in its most recent publication entitled "Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents & Biological Exposure Indices (BEIs)"; and

- Levels exceeding the TLVs listed in the **Cold Stress** section of the most recent ACGIH publication entitled "Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents & Biological Exposure Indices (BEIs)".

According to this formulation, **the ACGIH TLVs apply only to enclosed workplaces**. However, in the Provinces as well, it is not always clear whether the application of these TLVs concerns only enclosed workplaces or also outdoors. The above-mentioned provisions of the Provinces often refer to "*workplaces*" without sometimes defining this term. For example, in the Province of **Manitoba**'s OHS Regulation, the workplace is well defined as any "building, site, workshop, structure, mine, mobile vehicle, or any other premises or location **whether indoors or outdoors** in which one or more workers, or self-employed persons, are engaged in work or have worked"²¹⁰.

Until these amendments to COHSR are adopted, the Government of Canada invites employers to use the "Thermal stress in the work place" guideline²¹¹ developed in 2018 by the Labour Program of Employment and Social Development Canada (ESDC). Its purpose is "**to assist federally regulated work places in managing and controlling thermal stress exposures**" (including both heat stress and cold stress), by differentiating between risks, warning signs, symptoms, and prevention and control techniques. It is intended as a tool for industrial hygiene specialists and health and safety professionals to develop prevention programmes and recommend control measures relating to thermal stress.

The Humidex Index

Canada has developed the **Humidex Index** for the general public, which aims to determine the heat felt by combining air temperature and humidity²¹². Although similar, it differs from the American *Heat Index* in the way it is calculated.

Depending on the Humidex values (always expressed in °C), there are different alert levels:

210 Article 1 https://www.gov.mb.ca/labour/safety/pdf/whs_workplace_safety_act_and_regs.pdf
Article 4.12 on thermal stress, which applies to all workplaces, would therefore also apply to outdoor workplaces such as construction sites. Indeed, the public agency dedicated to the prevention of workplace injury and illness Safe Work Manitoba cites Article 4.12 to indicate employers' responsibilities, particularly in the event of heat stress in summer in outdoor workplaces such as building sites : <https://www.safemanitoba.com/topics/Pages/Working-in-Hot-Weather.aspx>

211 <https://www.canada.ca/content/dam/esdc-edsc/documents/services/health-safety/reports/thermal-stress-work-place/thermal-stress-guideline-en.pdf>
On page 14, we find the sub-chapter "6.5 Heat stress example". Here, a detailed heat stress calculation for a 20-year-old trainee weighing 90 kg, working as a postman outdoors in summer, is presented. The WBGT of the work environment is calculated, as is the trainee's maximum exposure to heat stress according to the ACGIH TLVs, and the measures and solutions that the employer should put in place to reduce this worker's exposure to heat are detailed. The following sub-chapter, "6.6 Controls for hot environment", details the measures to be implemented in the event of heat stress at work.

212 More information on Humidex: https://www.ccohs.ca/oshanswers/phys_agents/humidex.html

Humidex range	Degree of Comfort
20 to 29	Little discomfort
30 to 39	Some discomfort
40 to 45	Great discomfort; avoid exertion
46 and over	Dangerous; heat stroke possible

As these alert levels are not specific to the work, in order to determine the level of danger of heat-related work activity, other factors need to be considered, such as wind speed, air movement, workload, sources of radiant heat and the physical condition of the workers. That said, the CCOHS²¹³ indicates that "**under certain workplace conditions, the Humidex may serve as an indicator of discomfort resulting from occupational exposure to heat**". For example, it could be used "when humidity is high, but when workload, wind speed, and radiant heat sources do not significantly contribute to the heat burden [...]. **Offices are typical of workplaces** where Humidex could be used".

In some cases, Humidex has been incorporated into a number of the **country's collective agreements**. This was the case in the metallurgy sector²¹⁴ (2011-2014). This text provided that²¹⁵ when **the Humidex index is equal to or greater than 39 degrees Celsius in a plant**, as measured by the company using its automated thermometer and hygrometer system, **employees receive an additional 25% of their regular hourly rate** for the shift in question. In addition, **employees who have worked at least two hours** during the shift in question **may choose not to accept the 25% increase and leave the plant**.

However, it should be noted that this *Humidex Policy* no longer appears in the most recent version of this collective agreement (2020-2025)²¹⁶. It has now been established that, **during the months of June, July and August, employees will receive \$0.15 per hour worked as compensation** for the fact that the *Humidex Policy* has been removed. However, new preventive measures have been introduced: the employer will monitor Humidex values at work and, in order to minimise heat stress, will implement solutions in the event of "uncomfortable" Humidex values. In particular, the employer will provide employees with fresh drinking water, fans, air-conditioned rest areas and heat stress training.

Finally, the Humidex Index has been used by the **Occupational Health Clinics for Ontario Workers Inc. (OHCOW)** to develop an **intervention plan in the event of heat at work**. This plan, called *Humidex Based Heat Response Plan*²¹⁷, attempts to translate the ACGIH TLVs (expressed in WBGT) into Humidex values. The CCOHS points out that technically there is no way to directly

213 https://www.ccohs.ca/oshanswers/phys_agents/humidex.html

214 Collective Agreement between Riverside Brass and Aluminum Foundry Limited and United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union.
<https://sp.ltc.gov.on.ca/sites/mol/drs/ca/Manufacturing%20%20Fabrication%20and%20Machinery/295-0015-14.pdf>

215 Pages 24-25 of the Collective agreement.

216 [https://sp.ltc.gov.on.ca/sites/mol/drs/ca/Manufacturing%20%20Fabrication%20and%20Machinery/331-22116-25%20\(295-0015\).pdf](https://sp.ltc.gov.on.ca/sites/mol/drs/ca/Manufacturing%20%20Fabrication%20and%20Machinery/331-22116-25%20(295-0015).pdf). The new provisions concerning Humidex can be found on pages 37-38.

217 <https://www.ohcow.on.ca/wp-content/uploads/2022/06/humidex-based-heat-response-plan-01-14-21.pdf>
The Plan applies to both indoor and outdoor workplaces. For outdoor work in direct sunlight between the hours of 10 am and 5 pm, it is important to add 2-3° to the Humidex measurement, in order to identify, in the table, the correct measures to adopt.

compare the WBGT index and the Humidex values; the OHCOW plan therefore involves some simplifications in the conversion of values, based on certain theoretical assumptions. However, it does represent an interesting tool, attempting to help employers put in place adequate, differentiated and specific preventive measures for each range of Humidex values (there are several), by type of physical activity and by heat acclimatisation (or not) of workers²¹⁸. The plan is aimed in particular at **employers and employees "for whom calculations based on the WBGT index seem complicated and costly"**. It should be noted that, according to the Canadian private sector union UFCW, this plan, which was first introduced in 2003, "**has since been adopted by many workplaces across Canada**"²¹⁹.

Finally, to help employers, the OHCOW has also developed a **heat stress calculator** based on Humidex (*Humidex-Based Heat Stress Calculator*), which can be easily consulted on its official website²²⁰; all you need to know is the air temperature and humidity, and the site will calculate the corresponding Humidex value for that working environment.

South Africa

The 1987 Environmental Regulations for Workplaces²²¹, amended in 2003, include "Thermal Requirements" (article 2), covering both cold and hot work.

While this article is very detailed with regard to cold, concerning the heat it merely states that "**where the time-weighted average WBGT index, determined over a period of one hour, exceeds 30°C** in the environment in which an employee works, the employer of such employee shall, if practicable, take steps to reduce the said index to below 30°C".

If it is not possible to reduce the said index and "hard manual labour" is performed, the employer must, for his employees:

- (i) **ensure that they are certified beforehand and thereafter**, at intervals not exceeding one year, **as fit to work in such an environment by a registered medical practitioner** or a registered nurse in accordance with a protocol prescribed by such medical practitioner;
- (ii) ensure that they are **acclimatised to the working environment** before they are required or permitted to work there;
- (iii) inform them of the **need to drink at least 600 ml of water per hour**;
- (iv) **train them** in the precautions to be taken **to avoid heatstroke**;
- (v) provide the means by which **they can receive prompt first aid in the event of heatstroke**.

In this country, there is not an absolute maximum temperature that would require to stop work: if a specific value is exceeded (in this case 30°C WBGT), the employer is obliged to try to reduce

218 The Plan has two columns, detailed as follows by the CCOHS:

Humidex 1 for moderate physical work with an unacclimatised worker OR heavy physical work with an acclimatised worker

Humidex 2 for moderate physical work with an acclimatised worker OR light physical work with an unacclimatised worker

https://www.ccohs.ca/oshanswers/phys_agents/humidex.html

219 https://www.ufcw.ca/index.php?option=com_content&view=article&id=41:heat-stress&Itemid=6&lang=en

220 <https://www.ohcow.on.ca/resources/apps-tools-calculators/humidex-based-heat-stress-calculator-plan/> The calculator is specific to indoor locations; as pointed out in the OHCOW Plan, 2-3°C must be added to the Humidex measurement for outdoor work in the sun between 10am and 5pm.

221 Environmental Regulations for Workplaces <http://www.safetycon.co.za/documents/Environmental%20Regulations.pdf>

this value and to put in place **specific preventive measures if hard manual work is carried out**.

The need for more detailed regulations concerning work in the heat remains a topical issue in this country, which has seen a significant increase in heat stress from 1971 to the present day²²². In 2020, the National Department of Health published the *National Heat Health Action Guidelines*²²³.

This document states that "**government, business and unions need to work together to develop regulatory frameworks and labour standards [that] pertain specifically to heat hazards in the workplace**". The National Department of Health cites some potential intervention measures against heat stress, such as:

- adjusting working hours to start earlier in the day,
- allowing workers to choose flexible working hours,
- changing the dress code,
- introducing worker rotation where workers alternate between working in warm and cool areas,
- allowing frequent breaks,
- monitoring temperatures in the workplace, together with frequent risk assessments.

With specific regard to **outdoor workers**, the National Department of Health indicates that they should be guaranteed increased protection from direct sunlight, for example by providing shaded outdoor areas, having a source of fresh water nearby, encouraging workers to drink before they are thirsty and ensuring that sufficient breaks are taken in cool or shaded areas. Finally, workers should wear lightweight, light-coloured, loose-fitting clothing that provides protection from the sun while allowing air to circulate, and protect their heads with a hat.

The Gulf States

The Gulf Cooperation Countries (**Saudi Arabia, Bahrain, the United Arab Emirates, Kuwait, Qatar and Oman**) have particularly difficult climatic conditions, with intense heat throughout the period from April to October. Air temperatures can reach 55°C in the shade, humidity levels are often over 80% and rainfall is very rare.

These conditions make outdoor work particularly difficult and even dangerous. As a result, all these countries **have adopted work bans over the years, banning people from working outdoors at specific times of the day and during specific periods of the summer**. The bans generally concern few hours of the day (the hottest part of the day) and their application (in terms of timetable and calendar) varies slightly from one country to another.

The table below, produced by the NGO Migrant-Rights.org²²⁴, presents a summary of these provisions (the legislative sources indicated are the most recent):

222 Consult the study "Spatiotemporal characteristics of human thermal comfort across southern Africa: An analysis of the Universal Thermal Climate Index for 1971-2021". <https://rmets.onlinelibrary.wiley.com/doi/10.1002/joc.8009>

223 <https://www.health.gov.za/wp-content/uploads/2022/06/National-Heat-Health-Action-Guidelines.pdf>

224 <https://www.migrant-rights.org/2019/10/summer-outdoor-work-ban-end-across-the-gcc-but-heat-stress-continues/>

Country	Legislation	Period and times of restriction	Sanctions
Bahrain	Ministerial decision No. (3) of 2013	1 July to 31 August Noon to 4pm	BHD 500 (USD 1,326) to BHD 1,000 (USD 2,652) for each worker caught working outside.
Saudi Arabia	Ministerial decision No. (3337) of 2014	15 June to 15 September Noon to 3pm	SAR 3,000 (USD 800) and SAR 10,000 (USD 2,666) as well as closure of the company for 30 days (except oil and gas workers)
Oman	Ministerial decision No. (286) of 2008, amended by the Ministerial decision No. (322) of 2011	1 June to 31 August 12.30pm to 3.30pm	OMR 100 (USD 259) to OMR 500 (USD 1,298) and up to one month's imprisonment
Qatar	Ministerial decision No. (16) of 2007 (Valid until 2021)	15 June to 31 August 11.30am to 3pm	Company closure of up to one month (excludes oil and gas workers)
Kuwait	Ministerial decision No. (189/L) of 2012, amended by the Ministerial decision No. (212/L) of 2012	1 June to 31 August 11am to 4pm	KD 100 (USD 328) to KD 200 (USD 656) for each worker caught working outdoors
United Arab Emirates	Announcement decision by the Ministry of Human Resources and Emiratisation	15 June to 15 September 12.30pm to 3pm	Dh 5,000 (USD1,361) for each worker caught working outdoors

This approach is similar to that used in Spanish collective agreements in the building and public works sector: it involves a limit on exposure to the sun and heat, **set independently of the day's air temperature and humidity, or the workers' workload.**

However, while in Spain the working day in the construction industry ends at around 2.30 pm, in the Gulf States work can resume in the afternoon after the ban has ended (3 pm, 4 pm, etc., depending on the country's *work ban*). In Greece, too, some collective agreements provide for the suspension of work in the afternoon, but work may not resume until around 6 or 7 pm.

One of the criticisms of restrictions of this type is that they take no account of the working environment: if in a Gulf country the air temperature is 40°C and humidity 60% at 3pm, it is likely that these conditions will be exactly the same at 3.15pm. What is more, the provisions apply for 2 or 3 months on average, whereas these areas have difficult conditions beyond the summer

months. By way of example, the NGO Migrant-Rights.org points out that in Bahrain, where the ban on work only applies from July to August, June 2019 was the hottest June recorded in over a century, with temperatures exceeding 40°C for 20 days, with the hottest day reaching 45.3°C.

As the ILO notes²²⁵, this approach would not sufficiently protect workers from heat-related illnesses: "**the current ban** on outdoor midday work in the Gulf Cooperation Countries **could be adjusted to reflect real-time temperature, humidity and workload** for all outdoor worksites".

The ILO also highlights the **limited capacity of labour inspectorates**, while the NGO Migrant-Rights.org condemns limited controls due to a lack of resources: in Bahrain, for example, in 2019 there were only twelve inspectors (six for the services sector and six for the industrial sector), for around 80,000 companies operating in the country.

With global warming, it will probably be necessary to review these measures in order to better protect staff working outdoors, especially as the **construction sector** is particularly widespread in these countries, accounting for around **23% of employment in 2017** (ILO data).

Qatar has therefore made a number of important changes to its work ban, through the Ministerial Decision²²⁶ of 26 May 2021:

- the period during which outdoor work is prohibited has been slightly extended: work must be suspended between **10 am and 3.30 pm from 1 June to 15 September** (article 2);
- in addition, **regardless of the time of day, all work must stop if the WBGT Index exceeds 32.1°C in the workplace** (article 4).

Given that Article 4 deals more generally with the employer's obligations, it would appear that the suspension of work activities in the event of a WBGT Index value of over 32.1°C applies all year round and not just from June to September.

Article 4 details other employer obligations relating specifically to heat stress:

1. **Carry out a heat stress risk assessment with workers** and update it regularly. A copy of the assessment must be kept at the workplace and made available for review by labour inspectors.
2. **Train all workers on heat stress by the beginning of the month of May of each year.**
3. Provide free and sufficiently cool drinking water to all workers throughout the working day.
4. Provide shaded rest areas that are easily accessible to workers and offer effective shelter from the sun and high temperatures during breaks.
5. Provide workers with personal protective equipment suitable for high temperatures, in particular thin, loose-fitting, light-coloured clothing.
6. **Carry out annual health checks to diagnose and manage chronic diseases** that may contribute to the risk of heat stress. The medical examination is carried out at no cost to the worker. **Employers should keep a record of these medical examinations.**
7. Train paramedics and OSH supervisors to provide advice and first aid to workers.
8. **Adopt the WBGT (Wet-Bulb Globe Temperature) index to assess the level of heat stress**

225 In its above-mentioned report "Working on a warmer planet - The impact of heat stress on labour productivity and decent work". https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_711919.pdf

226 Unofficial translation of the text proposed by the ILO at https://www.ilo.org/wcmsp5/groups/public/---arabstates/---ro-beirut/documents/legaldocument/wcms_794551.pdf

at work. The assessment should **take into account all meteorological parameters**: solar radiation, relative humidity, air temperature and wind speed. Employers must take the necessary measures if the indicators rise.

9. Monitor and record weather conditions in the workplace and **stop work in workplaces where the WBGT index exceeds 32.1°C**.

This highlights the importance of taking into account not only air temperature when assessing the working environment (but also other fundamental parameters such as humidity), as well as paying particular attention to training employees on the subject of heat stress.

China

In this country, the introduction of "Administrative measures on Heatstroke Prevention" (AMHP2012)²²⁷ dates back to June 2012. This regulation follows an increase in **heatstroke and deaths** of workers carrying out outdoor work in summer, "**becoming an important problem of common interest** for all sectors of society".

These measures reiterate the employer's obligations already set out in the law (Article 6): "the employer must, in accordance with the relevant national regulations, reasonably arrange the production site, improve the production process and workflow, adopt good thermal insulation, ventilation and cooling measures to ensure that the workplace meets the requirements of national occupational health standards".

Secondly, they introduce special measures for work carried out in the presence of high temperatures (Article 7): for example, the employer is obliged to **carry out health checks on employees** working in high temperatures and to adapt the work of workers suffering from heart, lung and cerebrovascular diseases, tuberculosis, diseases of the central nervous system and other physical conditions unsuited to the hot working environment; the cost of the occupational health check is to be borne by the employer.

Article 8 lays down more specific provisions for the **summer season**: "**during the period of high temperatures, the employer shall**, in accordance with the following provisions, **adopt reasonable arrangements** for working hours, rotation of operations, appropriate increases in rest periods for workers in high-temperature working environments and reductions in work intensity". In addition, for **outdoor work**, the employer must comply with the following provisions, depending on the temperatures observed:

- **If the temperature reaches 40°C**, outdoor activities must be stopped for the whole day;
- **If the temperature is between 37°C and 40°C**, the employer must ensure that the employees do not work outdoors in the open air for more than 6 hours in total throughout the day, and continuous working time must not exceed national regulations; in addition, the employer must not organise work outdoors in the open air during the 3 hours of the highest temperature period of the day.
- **If the temperature is between 35°C and 37°C**, the employer must adopt measures such as rotating shifts to shorten workers' continuous working time and must not organise overtime

227 Administrative Measures on Heatstroke Prevention (AMHP).
<http://www.nhc.gov.cn/zyjks/zcwj2/201207/3cda5ca273484f0b994733bccc819aac.shtml>

for workers working outdoors.

It should be noted that in the event of suspension or reduction of working hours, **the employer must not reduce workers' wages.**

Among other obligations, the employer must (articles 9 and following):

- Provide workers with **personal protective equipment** that complies with requirements and encourage and guide workers to use it correctly.
- Provide workers with prior OSH training and regular occupational health training during their employment, and to **disseminate occupational health knowledge such as protection against high temperatures and first aid in the event of heatstroke.**
- Provide **adequate heatstroke prevention, refreshing drinks** and the necessary medication that meets hygiene standards for workers who work in high temperatures or hot weather.
- **Provide rest areas** in high-temperature work environments. Rest areas should have seating, be well ventilated or be equipped with heatstroke prevention and cooling facilities such as air conditioners.
- **Have emergency plans in place** in the event of heatstroke due to high temperatures, organise regular emergency rescue exercises, equip rescue personnel and have a sufficient supply of first-aid medicines.

However, AMHP2012 also allows employers to **grant wage compensation** (Article 17) "when workers perform **outdoor work with temperatures above 35°C** and **effective measures cannot be taken by the employer to lower the temperature of the work premises below 33°C**". These *High Temperature Subsidies (HTSs)* are paid to workers when the temperature exceeds 33°C indoors and 35°C outdoors. This allowance, paid by the employer, is "**set by the provincial human resources and social security administrative departments**, in collaboration with the relevant departments, and is adjusted in due course in line with socio-economic developments". The exact value of the allowance is not defined, and the amount varies from city to city.

A 2013²²⁸ article cites a few examples:

- In **Shanghai**, from June to September, the allowance was RMB 200 (around EUR 26) per month for each worker.
- In **Beijing**, from June to August, the allowance was not less than 120 RMB per month (around EUR 16) for employees working outdoors and 90 RMB (around EUR 12) per month for employees working indoors.
- In **Hubei Province**, from July to September, the daily allowance was 8 RMB (EUR 1) per employee.

Finally, the AMHP2012, in addition to providing for penalties in the event of infringements, opens the way (Article 16) for collective bargaining to establish better working conditions in the event of hot-weather work, specifying that: "**trade unions shall negotiate on an equal footing** with the employer on behalf of the workers on matters relating to hot-weather work and the protection of hot-weather work and shall **sign collective agreements** or special collective agreements **on high-temperature operations and high-temperature labour protection**".

228 <https://www.china-briefing.com/news/high-temperature-allowance-standards-in-chinas-major-cities-and-provinces/>

Generally speaking, the effectiveness of the aforementioned regulations is nuanced. In a study²²⁹ published in 2015, researchers, while acknowledging that AMHP2012 is **the first regulation in the world concerning the protection of workers against heatstroke**, consider that it could be improved:

1. Firstly, the AMHP2012 provisions only take into account air temperature, ignoring other important components such as **humidity, a factor that aggravates heat stress** when combined with high temperature;
2. Secondly, "the **regulation is left to local implementation** in practice";
3. Lastly, "**there is an ambiguity inherent**" in AMHP2012: the stated aim is to prevent employers from exposing workers to heat that is harmful to their health; but these measures provide for the possibility of compensating employees exposed to such a risk. Moreover, **given the low amount of the HTSs, employers may prefer to pay the subsidy** rather than reduce working time.

Japan

The Ordinance on Industrial Safety and Health²³⁰, which sets out the basic OSH conditions in Japan, makes **no specific provision for maximum temperatures at work**.

However, as far as **offices alone** are concerned, the Ordinance on Health Standards in the Office of 1972²³¹ (Chapter II, article 5) states that "**the employer shall**, when air-conditioning equipment of the centrally controlled system is installed, make an effort to **keep the temperature of office rooms 17°C or higher but 28°C or lower**, and the **relative humidity of office rooms 40% percent or more but 70% or less**".

That said, the increase in summer temperatures and the resulting heat illnesses and heatstroke have been a source of concern in this country for years. In the summer of 2018, for example, an exceptional heatwave resulted in around 35,000 people being hospitalised in the country in the space of three weeks²³².

To tackle this problem, over the years the country has invested more in prevention, both in the general population and in the workplace.

In the workplace, **reducing deaths from heatstroke was one of the objectives of the 13th Occupational Safety & Health Programme**, the Government's Industrial Accident Prevention Plan²³³.

This Plan (in place from 2018 to 2022) contained developments on high temperatures at work, including the **objective of reducing deaths from heatstroke in the workplace by at least 5%**

229 Yan Zhaoa et al. "Potential escalation of heat-related working costs with climate and socioeconomic changes in China". <https://www.pnas.org/doi/epdf/10.1073/pnas.1521828113>

230 Source ILO : https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=29235
Source in Japanese/English: <https://www.japaneselawtranslation.go.jp/en/laws/view/3878>

231 Source ILO : <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/29301/69494/F1059813446/JPN29301.pdf>

232 <https://www.lefigaro.fr/international/2018/07/24/01003-20180724ARTFIG00086-canicule-au-japon-la-chaueur-fait-aumoins-80-morts.php>

233 The 13th Occupational Safety & Health Programme.
https://www.jisha.or.jp/english/pdf/13th_OSH_program_outline.pdf

over the period compared to the level achieved between 2013 and 2017.

In terms of accompanying measures, the plan also provided for:

- **Disseminate the WBGT value measuring instruments** in compliance with *Japan Industrial Standards (JIS)* and **promote the necessary measures** to ensure breaks are taken, water and salt consumed and cool vests worn **according to the measured WBGT value for outdoor work** and high-temperature and humidity for indoor work during the summer.
- **Introduce advanced approaches to the construction industry** and **offer educational tools** for workers to promote improved awareness of anti-heatstroke measures.

The 14th Occupational Safety & Health Programme for the period 2023-2027 is currently being finalised. According to exchanges between EUROGIP and JISHA (*Japan Industrial Safety and Health Association*), it seems that certain heatstroke prevention provisions will be included:

- An explicit reference to a 2021 document *Outline of Basic Measures to Prevent Heat Stroke in the Workplace*.
- Employers will have to **understand how the WBGT Index works and implement appropriate measures based on the WBGT value in the workplace.** The latter measures will be improved compared to those already in place, in particular those concerning assessment of the working environment, worker health checks and occupational health education.

The above-mentioned document *Outline of Basic Measures to Prevent Heat Stroke in the Workplace* summarise the **recent changes made to the Japanese standard JIS Z 8504** (non-binding²³⁴) on thermal stress in the workplace²³⁵.

They present the maximum WBGT values that should be respected in the workplace, differentiated according to workload²³⁶ :

Workload	WBGT reference values °C	
	People acclimatised to heat	People not acclimatised to heat
Rest situation	33	32
Low metabolic rate	30	29
Medium metabolic rate	28	26
High metabolic rate	26	23
Very high metabolic rate	25	20

This document, similarly to the ACGIH thermal constraints, also makes adjustments depending on the type of clothing worn by the worker²³⁷.

234 <https://www.eu-japan.eu/government-procurement/tendering-process/standards-and-licenses>

235 JIS Z 8504. Estimation of the Heat Stress on Working Man, Based on the WBGT-Index (Wet Bulb Globe Temperature)-Hot Environments.

236 In the original document, the table can be found on page 10 and is called Table 1-1.

237 In the original document, the table can be found on page 12 and is called Table 1-2.

If these values are exceeded (or are likely to be exceeded), the document *Outline of Basic Measures to Prevent Heat Stroke in the Workplace* distinguishes 3 categories of preventive measures to be implemented:

1. **Management of the working environment:** try to reduce the WBGT value (via air conditioning or ventilation for example; in the case of hot and humid outdoor workplaces, it is suggested that "a simple roof or similar structure should be provided to block direct sunlight and the return of light from surrounding walls and the ground"); make drinking water available, create shaded areas, air-conditioned rest areas, etc.
2. **Work management:** organise breaks, reduce the time spent working continuously in hot and humid work areas, avoid physically intensive work if possible, change the work place/room, etc.
3. **Health care:** this involves special measures/attention for workers suffering from chronic diseases or any other medical condition²³⁸ that may make them particularly vulnerable to the risk of heatstroke. If possible, these workers should be prevented from doing strenuous work in the heat, their workplace/workspace should be changed if possible, and so on. It is also advisable to check workers' state of health before they start work in the heat, and to make tools such as thermometers, scales, etc. available in rest areas, etc., so that body temperature, weight and other physical conditions can be checked if necessary.

How effective has the 13th OHS Programme been? Although there has been a reduction in heatstroke at work, the situation in 2022 is worse than in 2021, probably due to a major heatwave that affected the country from the end of June to the end of August²³⁹.

Statistics from the Japanese Ministry of Labour²⁴⁰ are as follows:

Victims of heatstroke at work (2018-2022)					
	2018	2019	2020	2021	2022
Number of people suffering from heatstroke in the workplace	1 178	829	959	561	805
Of which deceased	28	25	22	20	28

In 2022, out of 805 heatstrokes, **172** occurred in the **construction** sector and 144 in the manufacturing industry, accounting for around **40% of all cases**.

238 As a reminder, in Japan, when hiring employees, employers must have the said employees undergo a medical examination for the following : blood, eye test, hearing test, blood pressure, liver function test, urine test, chest X-ray, medical history, etc., in accordance with Articles 43, 44 and 45 of the Occupational Health and Safety Regulations https://www.mhlw.go.jp/web/t_doc?dataId=74003000&dataType=0 (Article 43 contains the list of medical examinations to be carried out). Certain tests (including blood and urine tests, etc.) must also be carried out annually (Article 44); these are in effect annual health check-ups for workers, paid for by the employer. Further information on this OECD page <https://www.oecd-ilibrary.org/sites/9789264311602-7-en/index.html?itemId=/content/component/9789264311602-7-en>

239 https://en.wikipedia.org/wiki/2022_Japan_heatwave

240 <https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000116133.html>

In terms of fatalities, the construction and public works sector accounted for a very high number. According to the government's data, most of these accidents occurred in workplaces where the employer had not determined the WBGT value during the working day or provided OHS training to prevent heatstroke. The authorities also found that employers had not taken appropriate measures to manage heatstroke-related emergencies²⁴¹ (such as immediate transport to hospital).

Alongside the five-yearly OHS programmes, Japan has for some years been running an **annual campaign (from 1 May to 30 September) to prevent heatstroke at work**, called *STOP! Heat Stroke Cool Work Campaign*²⁴². In its most recent version (2023), it promotes the document *Outline of Basic Measures to Prevent Heat Stroke in the Workplace*. Between May and September 2023, companies are being asked to:

- (i) **implement heatstroke prevention measures** based on the WBGT index,
- (ii) **provide training** on occupational health in advance,
- (iii) **establish an emergency management system**, in particular to anticipate and **disseminate the emergency measures to be taken** in the presence of signs and symptoms of heatstroke.

Finally, we should mention the existence of several heatstroke prevention tools, available on official websites (often these pages are also available in English):

- "Information on heatstroke"²⁴³ from the Ministry of Labour: brochures, documents, videos and links on this subject (this page is not specific to work but is also aimed at the general public).
- A special website **on preventing heatstroke in the workplace**²⁴⁴ created by the Ministry of Labour: lots of material, including tools for **prevention campaigns** in the workplace, information on the WBGT Index, a summary of prevention measures to be put in place in the workplace, etc. This site collects **testimonials from companies**²⁴⁵ that have introduced effective prevention measures. These are mainly companies in the building and public works sector, which explain in detail the measures they have taken (on site, in work organisation, etc.).
- A specific page²⁴⁶ from the Ministry of the Environment, on heatwave alerts, which shows two maps of Japan, with different colours depending on **the WBGT value for the day**. The first

241 <https://www.mhlw.go.jp/content/11200000/000900487.pdf>

In this document, it is possible to consult an in-depth analysis of heatstroke at work in 2022 (divided by industrial sector), the 28 deaths recorded, as well as graphs and tables on the evolution of cases of heatstroke at work from 2013 to 2022. There is also a web page showing these same results <https://neccyusho.mhlw.go.jp/heatstroke/>

242 Press release launching the 2023 campaign: https://neccyusho.mhlw.go.jp/pdf/2023/r5_neccyusho_campaign.pdf

243 https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryou/kenkou/nettyuu/index.html

244 <https://neccyusho.mhlw.go.jp/>

Examples of preventive measures to be taken in the workplace: <https://neccyusho.mhlw.go.jp/case/r3-index/>

The page in fact summarises the content of the document "Outline of Basic Measures to Prevent Heat Stroke in the Workplace", showing the distinction between measures affecting the working environment ("Management of the working environment"), work organisation ("Work management") and "Health care".

Here is a leaflet on the WBGT Index at work <https://www.mhlw.go.jp/content/11200000/000628869.pdf>

245 The page is entitled "Case study on countermeasures against heatstroke - Efforts by companies". The analysis was carried out on two occasions, in 2020 and 2021. You can select the year, the sector and the company and read about the heatstroke prevention efforts put in place by the employer. <https://neccyusho.mhlw.go.jp/case/r3/> It is possible to download a sheet for each company (summarising the efforts made), as well as a PDF document containing all these testimonials (rich in photos too). Here is the document for 2021:

<https://neccyusho.mhlw.go.jp/img/case/%E5%85%A8%E4%BC%81%E6%A5%AD%E5%8F%96%E7%B5%84%E4%BA%8B%E4%BE%8B.pdf>

246 <https://www.wbgt.env.go.jp/> - In English: <https://www.wbgt.env.go.jp/en/>

map identifies WBGT values across the country, while the second shows **areas at risk of heatstroke** if WBGT levels are particularly high during the day. These maps are updated daily **from the end of April to the end of October**.

Finally, with regard to **outdoor work in adverse weather**: the Ordinance on Industrial Safety and Health²⁴⁷ (Article 522 - "Prohibition of work in adverse weather") stipulates that "when work is carried out at a place having a height of 2 m or higher, and **when dangers** in carrying out the work **are expected due to bad weather conditions** such as strong wind, heavy rain, heavy snow, **the employer must not have workers engage in the work**". According to exchanges between EUROGIP and JISHA, it is **not currently possible to suspend work**²⁴⁸ **in the event of high temperatures**, as is the case in Italy and Austria, for example. Adverse weather²⁴⁹ in Japan includes:

- strong wind (average speed of 10 m/s or more for 10 minutes),
- windstorm (with an instantaneous speed of more than 30 m/s),
- heavy rain (50 mm or more at a time),
- heavy snow (25 centimeters or more of snow at a time),
- earthquakes of moderate magnitude or greater (seismic intensity scale 4 or higher).

South Korea

This country **does not set a maximum temperature in the workplace, nor a maximum duration of exposure** to a specific temperature.

There is, however, a "**Guide to implementing the 3 basic rules for preventing heatstroke**"²⁵⁰, concerning work in high temperatures (drink water, seek shade and take regular breaks).

In detail, this guide includes the following recommendations, which apply **solely to outdoor work**:

Temperature	Level of danger	Preventive measures
31°C (87,8°F) or more	Attention	<ul style="list-style-type: none"> • Provide cool drinking water and shaded areas • Identify and look after heat-sensitive/vulnerable employees
33°C (91,4°F) or more	Alert	<ul style="list-style-type: none"> • Provide cool drinking water every hour and areas of shade

247 Source ILO: https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=29235
Source in Japanese/English: <https://www.japaneselawtranslation.go.jp/en/laws/view/3878>

248 More information on the suspension of work in the event of bad weather in this document: <https://jsite.mhlw.go.jp/toyama-roudoukyoku/library/toyama-roudoukyoku/topics/topics377/akutenkoutopics377-5.pdf> and at <https://jsite.mhlw.go.jp/kanagawa-roudoukyoku/content/contents/000694518.pdf>

249 http://www.n-anzeninkai.com/wp-content/uploads/2014/07/akutenko_sagyoH25.-9.pdf

250 PDF downloadable from this website
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Temperature	Level of danger	Preventive measures
		<ul style="list-style-type: none"> • Organise a 10-minute break in the shade every hour • Modify work schedules and organisation, particularly during the hottest hours (from 2pm to 5pm), to limit work outdoors • Provide a cooling kit for outdoor workers, such as a cooling waistcoat or ice pack
35°C (95°F) or more	Warning	<ul style="list-style-type: none"> • Provide cool drinking water every hour and areas of shade • Organise a 15-minute break in the shade every hour • Stop outdoor work during the hottest hours (from 2pm to 5pm), except in inevitable cases (in which case allow sufficient break time) • Provide outdoor workers with a cooling kit
38°C (100,4°F) or more	Danger	<ul style="list-style-type: none"> • Provide cool drinking water every hour and areas of shade • Organise a 15-minute break in the shade every hour • Avoid outdoor work • Stop outdoor work during the hottest hours of the day (from 2pm to 5pm), with the exception of emergency work required for disaster management and safety (in which case allow sufficient break time) • Provide outdoor workers with a cooling kit

According to exchanges with the *Korea Occupational Safety and Health Agency (KOSHA)*, the government has taken up the issue of working in extreme heat.

The Ministry of Labour states²⁵¹ that "according to the Korea Meteorological Administration, **heatwaves over the past decade lasted longer than the previous years**, [...] posing a serious health threat to workers. In particular, the **construction industry** has seen **the greatest number of heat-related injuries** as workers work directly under the hot sun. Considering that such injuries begin to be reported in June [...] and most frequently occur in July and August, **special attention from employers and workers is required during this period**".

For example, in 2021 and 2022, in order to strongly recommend the suspension of work on construction sites during heatwaves, **various ministries** (including the Ministry of Employment and Labour, the Ministry of Land, Infrastructure and Transportation, and the Ministry of the Economy and Finance) **have jointly conducted a campaign on "Emergency protection measures** for workers in preparation for heatwaves"²⁵², including:

- The Ministry of Labour's commitment to **communicate heatwave alerts quickly** in cooperation with local governments from June onwards.

251 <https://www.moel.go.kr/english/news/moelNewsDetail.do?idx=3095>

252 A complete overview of state-level prevention initiatives for summer 2022 on https://www.moel.go.kr/local/andong/news/notice/noticeView.do?bbs_seq=20220501548
The documents (Guides and self-assessment forms) are available in the "Attachments" box.

- Wide distribution of the "Guide to implementing the 3 basic rules for preventing heatstroke", to raise awareness of the importance of prevention in the workplace.
- In the version of the guide published in 2022, measures to be implemented in **enclosed workplaces** when indoor temperatures rise due to heatwaves have also been included.
- In 2022, the distribution and availability to employers of **heatstroke self-assessment²⁵³ forms**, compulsory **at the start of the summer** (between 30 May and 17 June).
- **Intensive advice** on preventing heat-related illness, available to companies from June to September.
- The publication of a guide on "the 6 main measures to take in the event of **high concentrations of ozone**".
- The commitment, from June to September, by **the Ministry of Labour and KOSHA to check whether preventive measures against heatstroke have been correctly implemented** by employers and to provide them with advice and guidance to ensure that safety rules are strictly observed.

It should be noted that in this country, heatstroke at work is now considered a "**serious industrial accident**" under the recent **Serious Accidents Punishment Act (SAPA)²⁵⁴**, which came into force in 2022. **Employers must therefore pay particular attention to prevention** in every workplace and strictly comply with basic safety rules to ensure that employees work in a safe and healthy environment²⁵⁵.

In South Korea, despite the absence of a specific law on maximum temperatures at work, prevention efforts are significant, with targeted inspections. **In the event of high temperatures, work is not de facto suspended in all occupations** (except, for outdoor activities, during a limited period from 2pm to 5pm in the event of temperatures above 38°C). As in other countries, as the temperature rises, specific adjustments and solutions are put in place.

Finally, the Korean Occupational Safety and Health Act²⁵⁶ authorises the extension of the construction work period in the event of extreme temperatures and humidity in the summer. In particular, Article 70 provides that "a person placing an order for construction works shall **extend the construction** period unless there is a compelling reason not to do so, where the contractee for the relevant construction works requests that the period be extended **to prevent industrial accidents due to a delay in the construction works caused by any of the following reasons:**

1. In the event of force majeure, including **severe weather** such as typhoons and floods, wars, serious incidents, earthquakes, fire, epidemics, riots, or any other extenuating circumstance beyond the control of the contractual parties;
2. Where the commencement of construction is delayed or construction is interrupted due to reasons attributable to a person placing an order for construction works.

253 The form covers compliance with the 3 rules (water, shade, break) and heatstroke training (prevention, recognising symptoms, managing heatstroke).

254 <https://www.law.go.kr/%EB%B2%95%EB%A0%B9/%EC%A4%91%EB%8C%80%EC%9E%AC%ED%95%B4%EC%B2%98%EB%B2%8C%EB%B2%95>

255 <https://www.moel.go.kr/english/news/moelNewsDetail.do?idx=3095>

256 <https://www.law.go.kr/%EB%B2%95%EB%A0%B9/%EC%82%B0%EC%97%85%EC%95%88%EC%A0%84%EB%B3%B4%EA%B1%B4%EB%B2%95/%EC%A0%9C70%EC%A1%B0>

As KOSHA pointed out to EUROGIP, high temperatures can fall within the concept of “severe weather/extenuating circumstance” beyond the control of the employer (of the worksite).



Working in extreme heat and heatwaves: what legislation and preventive measures at international level?

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Director of publication: Raphaël HAEFLINGER

Author: Annarita PIAZZA

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51 avenue des Gobelins, 75013 Paris - France