



CONSTRUCTION
INDUSTRY COUNCIL
建造業議會



GUIDELINES ON SITE SAFETY MEASURES FOR WORKING IN HOT WEATHER

Disclaimer

Whilst reasonable efforts have been made to ensure the accuracy of the information contained in this publication, the CIC nevertheless would encourage readers to seek appropriate independent advice from their professional advisers where possible and readers should not treat or rely on this publication as a substitute for such professional advice for taking any relevant actions.

Enquiries

Enquiries on these guidelines may be made to the CIC Secretariat at :

CIC Headquarters
38/F, COS Centre,
56 Tsun Yip Street,
Kwun Tong, Kowloon

Tel: (852) 2100 9000

Fax: (852) 2100 9090

Email: enquiry@cic.hk

Website: www.cic.hk

Table of Contents

Preface	Page 4
Terminology	Page 5
Chapter 1 Purpose	Page 6
Chapter 2 Definitions	Page 6
Chapter 3 Introduction	Page 7
Chapter 4 Guidance for Stakeholders	
4.1 Employers	Page 8
4.2 Main Contractors/ Subcontractors	Page 8
4.3 Construction Workers	Page 9
Chapter 5 Safety Measures & Special Arrangements for Working in Hot Weather	
5.1 Work Environment	Page 10
5.2 Work Arrangements	Page 11
5.3 Rest Periods	Page 12
5.4 Provision of Portable Water	Page 12
5.5 Suitable Clothing and Personal Protective Equipment (PPE)	Page 13
5.6 Relevant Training	Page 14
Chapter 6 Heat Stress Assessment at Construction Sites	
6.1 General	Page 15
6.2 Checklist for Heat Stress Assessment	Page 15
6.3 Other Factors for Consideration	Page 15
Reference List	
Annex A Risk Assessment for the Prevention of Heat Stroke at Work, Labour Department	Page 16
Annex B Checklist for Heat Stress Assessment at Construction Sites, Labour Department	Page 31
Annex C Relevant Reference Materials	Page 32

Preface

The Construction Industry Council (CIC) is committed to seeking continuous improvement in all aspects of the construction industry in Hong Kong. To achieve this aim, the CIC forms Committees, Task Forces and other forums to review specific areas of work with the intention of producing Alerts, Reference Materials, Guidelines and Codes of Conduct to assist participants in the industry to strive for excellence.

The CIC appreciates that some improvements and practices can be implemented immediately whilst others may take more time to adjust. It is for this reason that four separate categories of publication have been adopted, the purposes of which are as follows:

Alerts	Reminders in the form of brief leaflets produced quickly to draw the immediate attention of relevant stakeholders to the need to follow some good practices or to implement some preventative measures in relation to the industry.
Reference Materials	Reference Materials for adopting standards or methodologies in such ways that are generally regarded by the industry as good practices. The CIC recommends the adoption of these Reference Materials by industry stakeholders where appropriate.
Guidelines	The CIC expects all industry participants to adopt the recommendations set out in such Guidelines and to adhere to such standards or procedures therein at all times. Industry participants are expected to be able to justify any course of action that deviates from those recommendations.
Codes of Conduct	Under the Construction Industry Council Ordinance (Cap 587), the CIC is tasked to formulate codes of conduct and enforce such codes. The Codes of Conduct issued by the CIC set out the principles that all relevant industry participants should follow. The CIC may take necessary actions to ensure the compliance with the Codes.

If you have attempted to follow this publication, we do encourage you to share your feedback with us. Please take a moment to fill out the Feedback Form attached to this publication in order that we can further enhance it for the benefit of all concerned. With our joint efforts, we believe our construction industry will develop further and will continue to prosper for years to come.

Terminology

CIC	Construction Industry Council
DevB	Development Bureau
HKCA	Hong Kong Construction Association
HKHA	Hong Kong Housing Authority
LD	Labour Department
MC	Main Contractors
OSHC	Occupational Safety & Health Council
RSA	Registered Safety Auditor
RSO	Registered Safety Officer
SC	Subcontractors

1. Purpose

This publication promotes the good practice recommended by the Construction Industry Council (CIC) and provides guidance to the construction industry on measures that may be taken to protect construction workers working in hot weather. (Generally speaking, hot summer months refer to the period of May to September every year.)

2. Definitions

- 2.1 Employer In relation to construction works, means any person or entity that directs the Main Contractor under a construction contract and is obliged to pay for the services/ works provided by the Main Contractor in compensation. (**Remark:** This definition applies to this Guidelines only and it does not apply to Annex A & Annex B – Publications by the Labour Department which has its own definition on it.)
- 2.2 Main Contractor (MC) In relation to construction works, means any person or firm engaged in carrying out construction works by way of trade or business, either on his own account or pursuant to a contract or arrangement entered into with another person, including the private sector, the Government of the Hong Kong Special Administrative Region (HKSAR) or any public body. This includes the registered contractor appointed for a private sector project.
- 2.3 Subcontractor (SC) In relation to the Main Contractor, means any person entered into with another person (whether the Main Contractor or not) into an agreement to carry out the overall or part of construction works sub-contracted by the Main Contractor.
- 2.4 Registered Safety Officer (RSO) It means a person registered as a safety officer under regulation 7 of the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations (Chapter 59Z).
- 2.5 Registered Safety Auditor (RSA) It means a person registered as a safety auditor under the Factories and Industrial Undertakings (Safety Management) Regulations (Chapter 59AF).

3. Introduction

- 3.1 Summer days in Hong Kong are hot and humid, workers who work in hot environment or carry out heat generation tasks for a prolonged period of time, especially those construction workers with heavy manual work, may suffer from heat strokes or other heat-related disorders if no appropriate measures are taken. It can be harmful to workers' health.

- 3.2 In accordance with the "Occupational Safety and Health Ordinance" (Chapter 509) and "Factories and Industrial Undertakings Ordinance" (Chapter 59), every employer must, so far as reasonably practicable, ensure the safety and health at work of all employees. The employer's responsibility includes providing and maintaining systems of work that are, so far as reasonably practicable, safe and without risks to health.

- 3.3 This publication sets out good practices that may be readily implemented by the industry stakeholders during the summer months, in order to minimise the risk towards site personnel working in hot weather. This Guidelines not only ensure safety and health protection to construction workers, but also enhance the work efficiency and productivity, thus creating a win-win situation for both employers and workers.

4. Guidance for Stakeholders

4.1 Employers

- 4.1.1 Employers should render supports to main contractors for implementing the measures recommended in this Guidelines. Employers are also encouraged to mandate the main contractor to adopt this Guidelines by incorporation into contractual provisions.
- 4.1.2 In addition, Employers should consider taking an equitable approach in defining reasonable period for construction stage or/and incorporating appropriate contractual provisions for granting extension of time for delays resulting from unusual hot weather and in assessing requests for extensions of time due to such delays.

4.2 Main Contractors/ Subcontractors

- 4.2.1 Main contractors and /or subcontractors should establish safe systems for working in hot weather by making reference to the good practices in this Guidelines where appropriate and should provide adequate training, information, instruction and supervision to construction workers and site supervisors to facilitate and ensure its adoption.
- 4.2.2 Furthermore, as the Guidelines is not intended to be exhaustive, the main contractors and /or subcontractors should determine the safety measures to be implemented through the risk assessment for site heat stress outlined in Chapter 6 of this Guidelines.
- 4.2.3 Main contractors and /or subcontractors should consider providing training on heat stress management for site management personnel, so as to equip them to identify heat impact on workers and the potential risks arising from heat stress.

4.3 Construction Workers

- 4.3.1 Construction workers should be aware of their physical conditions and avoid over exertion. Workers should inform their colleagues and supervisors upon sensing symptoms of heat stress, and he/she should take rest and suitable drinks immediately.

- 4.3.2 Construction workers should take note of and comply with the relevant site safety guidelines for working in hot weather as set out by main contractors and/or subcontractors.

5. Safety Measures and Special Arrangements for Working in Hot Weather

To prevent heat stroke and other heat-related disorders, the main methods are: reduce worker's heat load and ensure normal body functions under a hot environment. The former requires the elimination or reduction of radiant heat and convective heat in the work environment and heavy manual work, and then heat absorbed and generated by the body will be reduced; the latter is to alleviate the body reaction caused by the hot environment and enhance the body's adaption.¹

Main contractor and/or subcontractor should pay attention to the safety measures and special arrangements for working in hot weather, which include but not limited to:

5.1 Work Environment

5.1.1 Provision of shelters

Main contractors and/or subcontractors should construct temporary covers or provide shelters² such as umbrellas or sun shades at workplace, to prevent direct exposure to sunlight or major heat radiation source.

The category and position of shelter should be outlined in the site safety plan. The shelters should have sufficient ventilation facilities, seats and provision of potable water. In addition, the shelters should be maintained and repaired properly. Moveable shelters can be considered for outdoor locations at site.

1. "Prevention of Heat Stroke at Working in a Hot Environment", Occupational Safety & Health Council

2. If the shelters are in the form of fixed structures falling within the ambit of the Building (Planning) Regulation 53, a contractor's sheds permit is required from the Building Authority. Reference can be made to the Practice Note for Registered Contractors 54 (PNRC 54) – Contractor's Sheds, Buildings Department.

5.1.2 Ventilation facilities

Main contractors and/or subcontractors should ensure good ventilation at workplace, in order to reduce temperature of the work environment, including:

- Isolate heat sources from workplace, such as heat-generating machinery. In case workers cannot be kept away from heat sources, insulating materials should be used to minimise heat radiation;
- Use appropriate ventilation system such as handy fan or blower to increase air flow at workplace; and
- If ventilation is poor in an enclosed area, exhaust pipes or other suitable measures should be considered to exhaust the hot air from the enclosed area.

5.2 Work Arrangements

Main contractors and/or subcontractors should take heed of weather report, especially when the UV index is high, the weather is humid and “Very Hot Weather Warning” is issued, all related safety measures should be strengthened. Those measures include:

- Reschedule works to cooler periods in daytime and cooler places to avoid working in hot environment for prolonged periods of time in so far as possible;
- Reduce the physical demand on workers by minimising manual works through using of mechanical aids (such as tractors, forklifts, loaders, electric saws, and mechanical hoists);
- Allow workers to take regular breaks or rotate to other duties in different locations to cool down and to reduce their exposure to the hot environment;
- Schedule manual works requiring use of personal protective equipment (such as breathing apparatus, apron, long sleeve gloves) to cooler times of the day or places with shelter, so far as reasonably practicable; and
- If workers are yet adaptable to work in hot environment, allow sufficient time for their body to adjust. For example, arrange lighter workload or schedule shorter working time for those who work in hot environment for the first time. Workload should only be increased gradually for worker’s better adaptation.

5.3 Rest Periods

Main contractors and/or subcontractors should let workers cool down by arranging regular rest periods, which can also reduce their period of exposure to the hot environment.

Apart from the regular 30-minute rest period for construction workers during the afternoon work session, an additional 15-minute rest period should be allowed for workers during hot summer months (from May to September every year). Since the nature and scale of each individual site differs, together with the difference in project type and work procedures, each site can determine its own rest periods arrangement where appropriate, such as the number of the rest periods and their respective durations. However, the total duration of the rest periods should not be less than the suggested overall rest period.

(Remarks: According to the relevant study conducted by Hong Kong Polytechnic University in January 2013, it demonstrated the productivity of construction workers can be improved explicitly if appropriate rest period was provided during hot summer months.)

5.4 Provision of Potable Water

Main contractors should provide sufficient cool potable water at the workplace: provision of potable water within 50-metre walking distance in the building site whereas potable water should be delivered to construction workers at their respective work locations in large construction sites such as civil works site.

Main contractors should remind construction workers the significance of preventing heat stress during hot weather through tool-box talk or other relevant occasions, for example, workers should ensure and maintain their water balance, consume moderate amount of water regularly instead of drinking too much water at one time to replenish body fluid and electrolytes after sweating.

Furthermore, alcoholic drinks which could dehydrate the body should be prohibited, whilst drinks containing caffeine (such as tea or coffee) which are diuretic and may aggravate loss of body fluids should also be avoided in work sites.

5.5 Suitable Clothing and Personal Protective Equipment (PPE)

5.5.1 Suitable Clothing

Main contractors and/or subcontractors should encourage construction workers to keep their shirts or other tops on and to wear clothing that are:

- light-coloured to minimise heat absorption and enhance heat dissipation;
- clothing made of heat-resistant material with low heat conductivity, permeability and radiation reflectivity;
- loose-fitting clothing to enhance perspiration (However, clothing that is too loose may be entangled in the moving parts of machines); and
- long-sleeved to avoid the skin from the direct exposure to sunlight when working outdoors.

5.5.2 For construction workers who need to undertake outdoor work, main contractors and/or subcontractors should provide the workers, upon reasonable request, with a pair of sun protection arm sleeves which are made of thin and vapour permeable fabric allowing effective sweat evaporation and have Ultraviolet Protection Factor of at least 50. However, if main contractors and/or subcontractors have provided the workers with long sleeve clothing, they are not required to additionally provide the workers with the sun protection arm sleeves.

5.5.3 Personal Protective Equipment (PPE)

Main contractors and/or subcontractors should encourage construction workers to use naturally ventilated safety helmets to enhance perspiration; and encourage the use of safety helmets with broad brim to provide better shade to the face, neck and back.

For construction workers who need to undertake outdoor work, main contractors and/or subcontractors should provide the workers, upon reasonable request, with neck shades for safety helmets to protect the neck against sunshine and ensure that the neck shades are compatible to the safety helmets. No modification or change of the existing helmets should be made to fit accessories unless advice from the manufacturer has been sought.

Before considering to use safety helmets with broad brim or neck shades, main contractors and/or subcontractors shall conduct a risk assessment first. In special situations where the use of safety helmets with broad brim or neck shades might affect work safety (e.g. affecting the vision of the machinery operator), safety helmets with broad brim or neck shades suitable to the related work should be selected and/or appropriate precautionary measures should be taken to eliminate the risk in light of the risk assessment result.

Personal Protective Equipment (PPE) is an essential gear for construction workers or site visitors. As some PPE may pose greater heat stress, the selection and distribution of appropriate PPE to the construction workers should be considered carefully.

5.6 Relevant Training

Main contractors and/or subcontractors should provide relevant training for site management personnel and construction workers before hot summer months (generally speaking, during the period of May to September every year). The training course should include the following elements:

- Understanding the potential risk for working in hot environment;
- Relevant legal regulations and requirements;
- Impact of heat stress and the respective safety measures;
- Identify risk factors, signs and symptoms of heat stroke;
- Heat stress assessment;
- Demonstration of apparatus in monitoring hot weather and heat stress;
and
- First aid and emergency procedures for heat stroke and its impact to health.

6 Heat Stress Assessment at Construction Site

6.1 General

The earlier parts of this Guidelines have provided some key issues concerning working in hot weather, but given that the nature and scale of each individual site project type and work procedures, main contractors and /or subcontractors should provide and maintain the respective safe work system to fully protect its construction workers from the risk of heat stroke. In addition, main contractors and/or subcontractors should conduct appropriate assessment of the risk of heat stroke and other heat-related disorders risk prone to their workers in hot weather according to their own site conditions. They should take effective preventive measures based on their assessment results.³

6.2 Checklist for Heat Stress Assessment

Labour Department has compiled two relevant documents titled 1) “Risk Assessment for the Prevention of Heat Stroke at Work” and 2) “Checklist for Heat Stress Assessment at Construction Sites”, which are appended at Annex A and Annex B respectively. Main contractors and subcontractors should make reference when making their own checklist for heat stress assessment.

6.3 Other Factors for Consideration

Main contractors and/or subcontractors can also consider the relevant reference materials (Annex C) when defining what presentive measures and special arrangement could be taken against heat stress during hot summer months.

3. “Risk Assessment for the Prevention of Heat Stroke at Work” June 2017, Occupational Safety and Health Branch, Labour Department

Risk Assessment for the Prevention of Heat Stroke at Work



Occupational Safety and Health Branch
Labour Department



Annex A

This booklet is prepared by
the Occupational Safety and Health Branch
Labour Department

This edition June 2017

This booklet is issued free of charge and can be obtained from offices of the Occupational Safety and Health Branch of the Labour Department. It can also be downloaded from website of the Labour Department at <http://www.labour.gov.hk>. For enquiries about the addresses and telephone numbers of the offices, please visit the website of the Department or call 2559 2297.

This booklet may be freely reproduced except for advertising, endorsement or commercial purposes. Please acknowledge the source as "Risk Assessment for the Prevention of Heat Stroke at Work" , published by the Labour Department.

**Risk Assessment for
the Prevention of
Heat Stroke at Work**

Contents

Introduction	3
How to Use the Checklist	4
Heat Stress Assessment Checklist	5
Heat Stress Assessment Checklist (Example for Reference)	10
Other Publications	13
Enquiries	13
Complaints	13

Risk Assessment for the Prevention of Heat Stroke at Work

Introduction

Workers engaged in manual work are at risk of suffering heat stroke in a hot indoor or outdoor environment, especially in the summer days when the temperature and humidity are high. To prevent heat stroke, employers should arrange for a suitable assessment of the risk of heat stress at the workplace and, based on the assessment results, take out effective preventive measures. In most cases, such risk assessments are simple and can be conducted with the help of a checklist. This booklet provides a sample checklist for reference.

Employers may appoint a person who is familiar with the working conditions of the workplace and has basic occupational safety and health knowledge about heat stress to conduct a risk assessment with the checklist.

How to Use the Checklist

- Complete Section I on workplace information. Give a brief description of the work process.
- Section II gives a list of questions covering seven risk factors, namely, temperature, humidity, heat radiation, air movement, workload, clothing and acclimatization. Go through the questions carefully and tick the answer in the box as appropriate.

A “Yes” answer for any question indicates that there may be potential risk of heat stress. The more questions having a “Yes” answer, the higher is the potential risk.

- Summarise the results of the assessment and recommend suitable control measures and their implementation time, as appropriate, in Section III. In drawing up specific control measures for any risk factors identified, you may make reference to the examples given in the corresponding part of Section II.
- For reader’s reference, this booklet also gives an example of a completed checklist for a selected outdoor work activity.
- Where there is doubt about whether the recommended measures can effectively control the risk, e.g. some measures or similar measures are already in place, workers have to wear personal protective equipment (such as respirators and non-breathing protective clothing) at work etc, you should consider the need for engaging a person with knowledge, experience and competence in heat stress risk assessment (including the use of suitable equipment to measure heat stress parameters and interpret the results) to conduct a detailed and comprehensive risk assessment.

Annex A

Heat Stress Assessment Checklist

Section I

Name of Organization / Department: _____

Work location: _____

No. of workers and work description: _____

Section II

	Risk factor	Yes	No	Examples of specific control measures for risk factor
1	Temperature			
	Is the workplace located outdoor?	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> - Take heed of weather report. When the “Very Hot Weather Warning” is in force, enhance control measures, e.g. where practicable, reschedule the work to cooler periods in the daytime (e.g. before 10:00 am or after 4:00 pm) and arrange the work at a cooler place; arrange more frequent rest breaks (e.g. appropriate break after 20-40 minutes of work); provide sheltered resting areas near the work location; provide workers with drinking water and remind them to take plenty of water and stay alert of their physical conditions, etc. - Eliminate or relocate the sources of hot air. - Exhaust hot air out of the workplace. - Provide air conditioning to the workplace.
	Is the workplace directly affected by the temperature of the outdoor environment? (e.g. workplace ventilated by opening windows)	<input type="checkbox"/>	<input type="checkbox"/>	
	Does the temperature of the workplace generally exceed 32°C?	<input type="checkbox"/>	<input type="checkbox"/>	
	Does the air in the workplace feel hot?	<input type="checkbox"/>	<input type="checkbox"/>	

Annex A

2 Humidity				
Is the workplace directly affected by the humidity of the outdoor environment?	<input type="checkbox"/>	<input type="checkbox"/>	-	Take heed of weather report. When the weather is humid, enhance control measures as mentioned above.
Does the relative humidity of the workplace generally exceed 85% ?	<input type="checkbox"/>	<input type="checkbox"/>	-	Remove steam or moisture by exhausting it out of the workplace, particularly workplaces in a confined area.
Is there any source/equipment that produces steam?	<input type="checkbox"/>	<input type="checkbox"/>	-	Increase air flow with appropriate ventilation system, e.g. air-conditioning and/or portable fans.
Is the skin of the worker completely wet?	<input type="checkbox"/>	<input type="checkbox"/>	-	Wear thin and vapour permeable clothing.
3 Heat Radiation				
Do the workers work under direct sunlight?	<input type="checkbox"/>	<input type="checkbox"/>	-	<ul style="list-style-type: none"> - Set up sunshade/shelter over the working positions where practicable. - Wear light-coloured, loose-fitting clothing made of natural materials, where it does not pose safety concern. - Wear light-coloured safety helmets in construction sites. In other workplaces, wear wide-brimmed hat to block away sunlight on the face and neck. - Take heed of weather report. When the UV index is at a high level, enhance sunshade facilities and reduce outdoor work as appropriate.

Annex A

<p>Are there any heat sources / heat generating facilities (e.g. fire, welding, hot surfaces and machinery) in close proximity to workers?</p>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> - Isolate heat generating facilities. - Use suitable materials to cover the radiant surfaces (especially black or dark-coloured surfaces) of the facilities or use facilities with non-radiant surfaces. - Set up suitable screens to reflect radiant heat away from the workers. - Provide reflective protective clothing for the workers.
<p>4 Air Movement</p>			
<p>Is the air stagnant in the workplace where the environment is hot?</p>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> - Increase air flow with appropriate ventilation system, e.g. air-conditioning and/or portable fans.
<p>Is any warm or hot air blowing onto the workers?</p>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> - Keep hot air draughts away from the workers.
<p>5 Workload</p>			
<p>Is the workload heavy? (e.g. carrying a heavy object over a long distance)</p>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> - Provide mechanical aids for workers to minimize physical demand on them.
<p>Do the workers perform intensive manual work at a fast pace?</p>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> - Reorganize the work to reduce intensity and pace of bodily movement of the workers.

Annex A

6 Clothing				
Do the workers wear thick or vapour impermeable clothing?	<input type="checkbox"/>	<input type="checkbox"/>	- Wear thin and vapour permeable clothing. - Reschedule tasks requiring the wearing of thick or vapour impermeable clothing to cooler periods of the day.	
7 Acclimatization				
Are the workers not yet acclimatized to the hot work environment?	<input type="checkbox"/>	<input type="checkbox"/>	- Allow time for acclimatization starting with a lower workload or shorter working duration, and gradually increasing the workload or duration over a number of days.	

Annex A

Section III

a) Summary of risk assessment results:

b) Recommendations for control measures and their implementation time:

Assessor: _____ Signature: _____

Date and time of assessment: _____

Annex A

(Example for Reference)

Heat Stress Assessment Checklist

Section I

Name of Organization / Department:

ABC Construction Company

Work location:

123 XXX Street

No. of workers and work description:

2 workers manually excavating a trench for pipe-laying in Jun 2009

Section II

	Risk factor	Yes	No
1	Temperature		
	Is the workplace located outdoor?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Is the workplace directly affected by the temperature of the outdoor environment? (e.g. workplace ventilated by opening windows)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Does the temperature of the workplace generally exceed 32°C?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Does the air in the workplace feel hot?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Humidity		
	Is the workplace directly affected by the humidity of the outdoor environment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Does the relative humidity of the workplace generally exceed 85% ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Is there any source/equipment that produces steam?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Is the skin of the worker completely wet?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Annex A

3 Heat Radiation		
Do the workers work under direct sunlight?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Are there any heat sources/ heat generating facilities (e.g. fire, welding, hot surfaces and machinery) in close proximity to workers?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4 Air Movement		
Is the air stagnant in the workplace where the environment is hot?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is any warm or hot air blowing onto the workers?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5 Workload		
Is the workload heavy? (e.g. carrying a heavy object over a long distance)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Do the workers perform intensive manual work at a fast pace?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6 Clothing		
Do the workers wear thick or vapour impermeable clothing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7 Acclimatization		
Are the workers not yet acclimatized to the hot work environment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Section III

a) Summary of risk assessment results:

There are risk factors of high temperature, high humidity, intense solar radiation and heavy workload. The risk of heat stroke is high if suitable control measures are not adopted in the workplace.

Annex A

b) Recommendations for control measures and their implementation time:

I) Implement the following before work commences

- *Set up a sheltered resting area near the work location.*
- *Arrange for the provision of adequate supply of cool potable water during work at all times.*
- *Provide portable fans to enhance ventilation to the workers at the work location and resting area.*
- *Provide lighter shovels to reduce the effort of shoveling.*
- *Ensure that the workers are adequately trained on the symptoms of heat stroke, the precautionary measures and the emergency response actions.*

II) Implement the following precautions on every workday after work commences

- *Take heed of weather report. In case of "Very Hot Weather Warning", high UV index or humid weather, reschedule excavation work to periods before 10:00 am or after 4:00 pm, and arrange an appropriate break after 20-40 minutes of excavation work.*
- *Set up temporary sunshade over the working positions of the workers.*
- *Ensure that the workers wear light-coloured safety helmets and light-coloured, loose-fitting clothing made of natural materials.*
- *Arrange regular breaks for the workers.*
- *Remind workers to take plenty of water and stay alert of their physical conditions.*

Assessor: *CHAN Tai-man*

Signature: *XX*

Date and time of assessment: *26 May 2009 11:00 am*

Annex A

Other Publications

Readers may refer to the leaflet, produced by the Labour Department, entitled “Prevention of Heat Stroke at Work in a Hot Environment” for general information about prevention of heat stroke at work.



Enquiries

For enquiries about this booklet on occupational health and hygiene matters, please contact the Labour Department’s Occupational Safety and Health Branch through:

Telephone : 2852 4041

Fax : 2581 2049

Email : enquiry@labour.gov.hk

Information on the services offered by the Labour Department and on major labour legislation can also be found on our website at <http://www.labour.gov.hk>.

Information on the services provided by the Occupational Safety and Health Council can be obtained through its hotline 2739 9000.

Complaints

If you have any complaint about unsafe workplaces and practices, please call the Labour Department’s Occupational Safety and Health complaint hotline on 2542 2172. All complaints will be treated in the strictest confidence.

Heat-generating Machinery

- ◆ Is heat-generating machinery (e.g. diesel air compressors or generators) kept away from workers so far as reasonably practicable?

Working at Poorly-ventilated Areas

- ◆ Are blowers or fans used to increase air flow in poorly ventilated areas (e.g. shafts, underground pipes, enclosed workrooms)?

Performing Heavy Manual Work

- ◆ Are mechanical aids provided or powered lifting machinery used, as appropriate, to minimize physical exertion?
- ◆ Is the work reorganized to minimize intensity and pace of bodily movement of workers so far as reasonably practicable?
- ◆ Are suitable rest breaks (or job rotation) arranged for workers?

Provision of Drinking Water on Site

- ◆ Is sufficient potable drinking water provided on site?
- ◆ Is the drinking water provided at locations within close proximity to all workers?

Clothing

- ◆ Do the workers wear thin and air permeable clothing?
- ◆ Are the reflective vests used by the workers air permeable and fitting their body-build?
- ◆ Are adequate precautions (e.g. providing cooling vests) adopted at workplaces with a higher risk of heat stroke (e.g. in poorly ventilated places with hot machinery in use)?

Acclimatization

- ◆ Are the workers acclimatized to the hot work environment?
- ◆ For workers new to a hot work environment, is a lower workload or shorter working duration arranged for them as a start, with the workload increased gradually over a number of days to help them acclimatize to the hot environment?

Checklist for Heat Stress Assessment at Construction Sites

Occupational Safety and Health Branch
Labour Department



Published by the Labour Department 42010-1-CHK-44

Construction workers generally have a higher risk of heat stroke in summer due to extensive manual work in an outdoor environment, whether or not directly under the sun. In accordance with the Occupational Safety and Health Ordinance (Cap. 509) and Factories and Industrial Undertakings Ordinance (Cap. 59), employers have a duty to ensure, so far as reasonably practicable, the safety and health of their employees at work. Such duty includes the provision and maintenance of systems of work that are, so far as reasonably practicable, safe and without risks to health. Contractors / employers should, therefore, provide and maintain safe systems of work to adequately protect their employees at construction sites from the risk of heat stroke. Contractors / employers should arrange for a suitable assessment of the risk of heat stroke to their workers and, based on the assessment results, take out effective preventive measures.

To assist contractors/employers in assessing the risk of heat stroke at construction sites, the Labour Department has produced this

checklist, setting out a number of relevant factors that should be taken into account in the assessment. **The list of factors merely serves as a reference and should not be construed as exhaustive.** In using the checklist, contractors/employers should, therefore, also consider other factors that are relevant to the particular circumstances of their sites. Contractors/employers may appoint a person who is familiar with the work process and has basic occupational safety and health knowledge about heat stress to conduct the risk assessment. After the assessment, the assessor should, based on the findings, draw a conclusion and recommend necessary measures to prevent the risk of heat stroke. Contractors / employers / assessors are strongly recommended to read this checklist in conjunction with another publication produced by the Labour Department, entitled "Risk Assessment for the Prevention of Heat Stroke at Work", which provides guidance on how to use a checklist to assess the risk of heat stress at a workplace in general and what preventive measures could be taken against heat stress effectively.

Factors to be considered in heat stress assessment at construction sites:

Outdoor Work

For work conducted at a fixed location (e.g. bar-bending, trench digging, constructing a shaft, attending a drilling rig)

- ◆ Is sunshade set up at these locations to block away the sunlight?
- ◆ Are blowers or fans used, as appropriate, to enhance air movement at these locations to facilitate cooling of the workers?

For mobile work (e.g. bar-fixing, concreting, levelling)

- ◆ Are workers provided with light-coloured safety helmets with wide-brim or flaps to block out the sunlight?
- ◆ Is a sheltered resting place set up within a short distance from each working location?

In Case of Very Hot Weather Warning, High Humidity or High UV Level

- ◆ Are administrative control measures (e.g. rescheduling outdoor work to cooler periods during daytime, and arranging job rotation or suitable rest breaks) taken, where reasonably practicable, to avoid prolonged working in a hot environment?
- ◆ Is cool drinking water provided and readily accessible to workers?
- ◆ Are workers reminded to take plenty of water and stay alert of their own physical conditions?

Annex C

1. The Impact on Body Heat Dissipation and Risk Factors when Working in Hot Weather

When construction workers work in hot weather, if no appropriate preventive measures are taken, the body may fail to adapt and dissipate heat, then the workers may suffer from heat stroke and other heat-related disorders. Risk factors leading to the above situation include:

1.1 Environmental factor⁴

In terms of environmental factor, the key issues affecting human body to dissipate heat include: air temperature, air humidity, air velocity and radiant heat etc. Although the different combination of the above four factors will have different impact on the body heat dissipation, we should take all four elements into consideration when identifying measures for environment control.

1.1.1 Impact from air temperature

The thermal effect created by the production workflow around the work environment can increase the air temperature. When the air temperature becomes higher than the skin temperature, the body cannot dissipate heat as usual and feels uncomfortable.

1.1.2 Impact from air humidity

Air humidity is the content of water vapour in the air, normally known as absolute humidity. Since the difference in air temperature directly affects the water vapour content, therefore, you need to consider the air temperature together in an evaluation of humidity's impact on body heat dissipation. For example, if the absolute humidity in a hot environment is higher than that on skin surface, body heat cannot be evaporated easily through perspiration; on the contrary, if the absolute humidity is low, then body sweating will be heavy, leading to the loss of water and electrolytes. If they are not replenished promptly, it will cause heat-related disorders.

1.1.3 Impact from air velocity

The intensity of air velocity can affect the heat dissipation level in human body. In a hot workplace, when the environment temperature is lower than that on skin, the higher air velocity can help body to dissipate heat; on the contrary, it will cause heat transmitted or heat conduction to human body when the environment temperature is higher than the skin temperature.

4. "Guidelines for work under very hot weather", Green Cross, May/June 2008, Occupational Safety and Health Council

1.1.4 Impact from radiant heat

Radiant heat is transmitted in the form of infrared ray, therefore, when we receive energy from radiation (such as sunlight) , we can feel the heat. Since radiant heat does not need any medium, its transmission is fast and can cause heat-related hazard unconsciously.

1.2 Individual Factor

How the body moves the heat from core to surface was affected by variety of individual factors. The individual factors that contribute to efficiency of heat transfer include:

1.2.1 Age

As the body ages, the functioning of sweat glands also deteriorates. Therefore, the older the worker is, the lesser resistant to heat stress he/she is.

1.2.2 Body Mass Index (BMI)

The body mass index (BMI) is a heuristic proxy for human body fat based on an individual's weight and height. It is calculated as weight (kg) divided by height squared (m²). Overweight people are more risky in hot environments because of both their higher energy consumption and insulating fat will make heat transfer less efficient. On the other hand, underweight people have less skin area for sweating and thus are less efficient in evaporative cooling.

1.2.3 Physical Fitness

Being physically fit aids the body's ability to cope with increased heat demands. Again fitness can be developed along with the process of acclimatisation.

1.2.4 Heart Disease or High Blood Pressure

For heat to be transferred from core organs to the body surface, the vascular and blood circulation system plays an important role. People with high blood pressure or heart disease are less efficient in this heat transfer in their body.

1.2.5 Illness and Medication

Certain illnesses and medication make the body less efficient in heat transfer. Certain drugs cause heat intolerance by reducing sweating or increasing urination. If such workers need to work in hot weather, they should consult their doctor before taking medication.

1.2.6 Lifestyle issues

Alcohol or caffeine intake can increase the metabolic rate of the body and dehydrate the body quickly. Thus all sites should prohibit alcohol, as alcohol consumption is one of the risks factors of heat stress.

Smoking dehydrates the body. Smokers should be aware of this risk in managing heat stress as well as its effect on fitness.

1.3 Other Factors

1.3.1 Work Procedures

It concerns whether the specific work requires large or intense manual labour.

1.3.2 Perspiration and water replenishment

Fluid lost through sweat, but not replaced through drinking leads to dehydration. Dehydration can lead to fatigue, slowed reaction time and poor decision making. Potable water or electrolyte supplement drinks is the recommended.

2 Monitoring Workers' Health⁵

Main contractors and/or its subcontractors should be especially alert to the report of worker's discomfort caused by hot weather. Workers should also be educated to take heed of their body conditions, such as early symptoms of heat stroke, and inform their supervisors immediately upon sensing similar symptoms, in order to implement appropriate preventive measures. Certain workers might feel more difficult to cope with a hot work environment because of their specific physical conditions; in work assignment, contractors and subcontractors should take individual physical conditions and advice from doctor into consideration.

For those working in hot weather, body check should be conducted before their employment and also regularly during the employment. Those who suffer from chronic diseases such as heart and lung diseases, prolonged high blood pressure, serious internal organ lesions, disease related to central nervous system and other patients recovered poor from acute infectious diseases should not work in hot weather.

The occupational health hazard of work environment should not be neglected, contractors and subcontractors should adopt a comprehensive work system to protect those working in hot weather as well as establishing effective management.

5. "Guidelines for work under very hot weather", Green Cross, May/June 2008, Occupational Safety and Health Council

3 First Aid Procedures and Handling of Heat-related Disorders

Main contractors should develop first aid and emergency procedures and provide appropriate training on this to site supervisors and construction workers through talks and regular drills; and provide first aid immediately to any workers who show symptoms of heat-related disorders following the guidance in below table.

Table: The category of heat-related disorders, cause, symptoms and first aid procedures.⁶

Category of Heat-related disorders	Cause	Symptoms	First Aid Procedures
Heat stroke (Ineffective Thermoregulation)	Doing manual work under hot environment, if heat generated and absorbed from manual work and environment exceeds the speed of body heat dissipation. Heat will be accumulated in the body. The consequence of overheating will cause functional disorder of the central nervous system, including the malfunction of body thermoregulation. This will lead to further increase in body temperature.	<ul style="list-style-type: none"> • Different from other type of heat stroke, the patient will gradually reduce or even stop sweating; • skin turns dry and boils; • Weak and rapid pulse, short of breath; • fainting, in a state of delirium and even loss of consciousness; • Muscles cramps may occur; • Body temperature approaches 41 degree Celsius 	<ul style="list-style-type: none"> • When heat stroke happens, the victim must be removed from the hot environment immediately; • remove excess clothing from the victim; • fan and spray the body with cool water; and • If the victim can drink, provide drink without alcohol or caffeine to the victim; If the victim is unconscious, the victim should be taken to hospital immediately.

6. "Prevention of Heat Stroke at Working in a Hot Environment", Occupational Safety & Health Council

Category of Heat-related disorders	Cause	Symptoms	First Aid Procedures
Heat Exhaustion	Heat exhaustion results from serious dehydration after heavy sweating. It usually happens after prolonged period of manual work of young people, including marathon runners, sportsman, discipline workers and construction workers, etc. It is caused by the loss of water and salt in the body, leading to exhaustion in blood flow, which can also be seen as the preliminary stage of heat stroke. If not treated properly, it will develop into heat stroke eventually.	<ul style="list-style-type: none"> • Extremely thirsty, tired and weakness of limbs; • Nausea and headache; • Fainting and transient loss of consciousness; • Clammy skin and paleness; • Weak and rapid pulse. 	<ul style="list-style-type: none"> • move the person to a cool shaded area; • loosen or remove excess clothing; and • provide cool water or electrolyte supplement drink to the victim.
Heat Cramp (Imbalance of body fluid and electrolytes)	Labour in hot environment, heavy sweating can lead to serious loss of potassium in the body. If too much water is consumed at that time, cellular edema will occur and cause muscle cramp.	<ul style="list-style-type: none"> • Muscle contractions and painful cramps that last 1 to 3 minutes. 	<ul style="list-style-type: none"> • The victim should be moved to a cool area; • loosen clothing; gently massage and stretch affected muscles; and • provide cool water or electrolyte supplement drink to the victim.
Heat Syncope (affected blood circulation)	Due to overheat, peripheral blood vessels dilate and dehydrate, causing a reduction in blood supply to the brain and hence results in serious symptoms of heat stroke.	<ul style="list-style-type: none"> • Fainting; • Clammy skin; • Weakening pulse. 	<ul style="list-style-type: none"> • The victim should be moved to a cool area; • loosen or remove excess clothing; and • provide cool water to the victim.



Feedback Form

[Guidelines on Site Safety Measures for Working in Hot Weather (Version 3)]

Thanks for reading this publication. To pursue improvement in our future versions, we appreciate your valuable suggestions.

(Please put a "✓" in the appropriate box)

1. As a whole, I feel that the publication is:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Informative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comprehensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Useful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Does the publication enable you to understand more about the Site Safety Measures for Working in Hot Weather?	Yes <input type="checkbox"/>		No <input type="checkbox"/>		No Comment <input type="checkbox"/>
3. Have you made reference to the publication in your work?	Quite Often <input type="checkbox"/>		Sometimes <input type="checkbox"/>		Never <input type="checkbox"/>
4. To what extent have you incorporated the recommendations of the publication in your work?	Most <input type="checkbox"/>		Some <input type="checkbox"/>		None <input type="checkbox"/>
5. Overall, how would you rate our publication?	Excellent <input type="checkbox"/>	Very Good <input type="checkbox"/>	Satisfactory <input type="checkbox"/>	Fair <input type="checkbox"/>	Poor <input type="checkbox"/>
6. Other comments and suggestions, please specify (use separate sheets if necessary).					
Personal Particulars (optional)* :					
Name : <u>Mr. / Mrs./ Ms./ Dr./ Prof./ Ir / Sr ^</u>					
Company : _____					
Tel : _____					
Address : _____					
E-mail : _____					

* Personal information collected here is for survey analysis only. CIC shall treat it confidential and handle by the Council only.

^ Circle as appropriate.

Please send this feedback form to :

CIC, Construction Safety - Industry Development

E-mail : enquiry@cic.hk

Address : 38/F, COS Centre, 56 Tsun Yip Street, Kwun Tong, Hong Kong

Fax No : (852) 2100 9090

