

Construction Industry Council

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Guidelines on Site Safety Measures for Working in Hot Weather

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Enquiries

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

Rm 2001, 20/F, Alliance Building
130-136 Connaught Road Central
Hong Kong.

Tel. no. : 3571 8716
Fax no. : 3571 9848
E-mail : enquiry@hkcic.org

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Guidelines on Site Safety Measures for Working in Hot Weather

Purpose

This publication provides guidance to contractors on measures that may be taken to protect site personnel working in hot weather.

Introduction

2. The hot and humid summers in Hong Kong may lead to working under high temperatures on construction sites. It will therefore be crucial to take appropriate safety measures to protect site personnel working in hot weather. Ideally, these measures should be linked to heat stress on workers (i.e. the physical and physiological reactions of the worker to temperatures that fall outside normal comfort zone). As further development works are required for adopting such system in Hong Kong, this publication sets out some of the good practices that may be readily implemented by contractors during the summer months to enhance the safety of site personnel. CIC will conduct further research on assessment of heat stress and may refine the guidelines in future.

(A) Role of client organizations

3. Client organizations should render supports to their contractors for implementing the measures recommended in these guidelines and are encouraged to mandate their adoption by incorporation into contractual provisions. Client organizations should consider taking an equitable approach in incorporating appropriate contractual provisions for granting extension of time for delays resulting from unusual hot weather and in assessing requests for extensions of time made for such delays.

(B) Role of contractors

4. Contractors should establish safe systems for working in hot weather (making reference to the good practices in this publication where appropriate) and provide adequate training, information, instruction and supervision to workers and site supervisors to facilitate and ensure its adoption. Furthermore, as the guidelines are not intended to be exhaustive, contractors should determine the safety measures to be implemented through the risk assessment procedures outlined at Annex A.

(C) Role of workers and site supervisors

5. Workers and site supervisors should take note and observe the provisions of the guidelines which are relevant to them (for example wearing light-coloured clothing).

Risks of Working in Hot Weather

6. The common heat-related disorders are –

- heat syncope (fainting);
- heat exhaustion; and
- heat stroke.

7. Heat syncope occurs when blood pools in the lower parts of the body causing a temporary reduction in blood supply to the brain and hence a transient loss of consciousness.

8. Heat exhaustion results from high body temperature caused by reduction of blood flow and could drive up core body temperature to 39°C. The reduction of blood flow may result from dehydration under hot conditions or extremely fast heartbeat caused by high temperature and intense physical labour.

9. The symptoms of heat exhaustion are –

- tiredness, thirst, dizziness;
- numbness or tingling in fingers and toes;
- breathlessness, palpitations and low blood pressure;
- blurred vision, headache, nausea and fainting;
- clammy skin that may be either pale or flushed; and
- lowering of mental alertness.

10. Heat stroke occurs when the core body temperature approaches 41°C thus affecting the co-ordination of the nervous system and thermal regulation mechanism. Heat stroke carries a high risk of fatality from cardiac or respiratory arrest and must be treated as a medical emergency.

11. Symptoms of heat stroke includes –

- thirst, fatigue and lethargy;
- nausea and headache;
- fainting and transient loss of consciousness;
- clammy skin and paleness; and
- weak and rapid pulse, and uncontrolled muscular contractions even muscle cramps.

12. While the symptoms of heat stroke may be similar to other less severe heat-related disorders, its onset may be sudden and dramatic.

Safety Measures for Working in Hot Weather

13. Work arrangements

- (a) avoid working in hot environment or under direct sunlight for prolonged periods

of time;

- (b) take heed of weather report (including very hot weather warning);
- (c) reschedule works to cooler periods (such as early morning) and cooler places (such as sheltered or shaded areas) in so far as possible;
- (d) schedule works requiring use of personal protective equipment (PPE) such as breathing apparatus, apron, long sleeve gloves to cooler times of the day;
- (e) enable workers to adapt to the hot environment before taking on full workload;
- (f) reduce the physical demand on workers by minimizing manual work through use of mechanical aids (such as tractors, forklifts, electric saws, and mechanical hoists);
- (g) avoid working under direct sunlight. Where this is not possible –
 - (i) provide shade/shelter where possible on ground level or floors exposed to sunlight; and
 - (ii) ask workers to apply sunscreen of sun protection factor not less than 15 on exposed skin;
- (h) avoid working in enclosed areas with poor ventilation. Where this is not possible –
 - (i) keep workers away from heat sources or, where this is not possible, insulate the heat sources to minimize heat radiation;
 - (ii) remove hot air from the works area by exhaust pipes or other suitable means; and
 - (iii) ventilate the works area by using fans or blowers.

14. Work – break cycle and cool down facilities

- (a) enable workers to cool down and reduce their exposure to hot environment through taking regular breaks and rotating duties and worksites;
- (b) make arrangements for workers to rest in cool or shady place during hot periods;
- (c) provide shower and washing facilities for washing and external cooling; and
- (d) provide cooling devices such as cooling fans with atomized water spray.

15. Drinks

- (a) provide sufficient cool (10-15°C) drinking water at easily accessible drinking points;
- (b) encourage workers to take plenty of water to replenish the body fluid and electrolytes lost through sweating. In general, a worker will need to drink at least half a litre of water each hour while working under hot weather. However, drinks designed to replace body fluids should be consumed only in moderation since excess can result in electrolytes imbalance;
- (c) prohibit consumption of alcoholic drinks which could dehydrate the body; and
- (d) avoid drinks containing caffeine (such as tea or coffee) which are a diuretic and may aggravate loss of body fluids.

16. Clothing and protective equipment

- (a) encourage workers to keep their shirt or other top on and to wear clothing that is –
 - (i) light-coloured (to minimize heat absorption and enhance heat dissipation);
 - (ii) loose-fitting (to enhance perspiration. However, clothing that is too loose are not suitable because of the risk of entangling in the moving parts of machines);
 - (iii) made of natural materials (to enhance heat dissipation); and
 - (iv) long-sleeved (to minimize exposure of the skin to sunlight when working outdoors);
- (b) encourage the use of naturally ventilated helmet to enhance perspiration; and
- (c) encourage the use of helmet with broad brim to provide better shade to the face, neck and back.

17. Health of workers

- (a) train supervisors and workers to recognize symptoms of heat-related disorders;
- (b) ask workers to inform their supervisors immediately upon sensing or observing any symptoms of heat-related disorders; and

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- (c) avoid assigning workers who may have difficulties in coping with heat to work under hot environment. Consider the advice of their attending doctors if necessary.

18. First aid procedures and facilities

- (a) develop first aid and emergency procedures and provide appropriate training on these to site supervisors and workers through talks and regular drills; and
- (b) provide first aid immediately to any workers who show symptoms of heat-related disorders following the procedures at Annex B.

Annex A

Guidelines for Risk Assessment for Heat Stress

Introduction

In planning and executing construction works, duty holders (i.e. the main contractor or its subcontractor in direct control of any construction works) should assess the risks resulting from hot weather and take appropriate measures to protect site personnel from heat stress through risk assessment procedures outlined below.

Risk Assessment Procedures

(A) Assessment of Risks

2. Duty holders should identify risks that may affect site personnel, assess their likelihood of occurrence and their possible consequences taking into account all relevant factors, including –

- (a) the capability, skill, experience and age of persons doing the work;
- (b) the nature and location of construction operations;
- (c) the work practices;
- (d) the anticipated durations of working;
- (e) the type of plant, machinery and equipment to be used;
- (f) findings of inspection of the workplace and direct observation of similar construction works;
- (g) discussion with workers;
- (h) records of accidents and “near misses”;
- (i) literature and advice provided by equipment and material suppliers;

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- (j) relevant legislations and related codes of practice, international standards and guidelines issued by industry organizations; and
 - (k) relevant research findings.
3. The following factors are particularly relevant to risk assessment for heat stress –
- (a) high temperature resulting from work in hot weather, or heat generated by plant and machinery;
 - (b) exposure to direct sunlight;
 - (c) high humidity resulting from humid weather or plant or processes generating moisture;
 - (d) insufficient ventilation in enclosed areas;
 - (e) heavy physical work; and
 - (f) wearing of protective clothing which affect heat dissipation from the body.
4. The risks identified should be summarized in the form of list containing the following details to facilitate development of a safety plan –
- (a) the nature of the risks;
 - (b) the locations where they will be encountered;
 - (c) factors giving rise to the risks; and
 - (d) personnel which will be affected.

(B) Mitigation of risks

5. Duty holders should mitigate the risks of heat stress by implementing appropriate control measures in the following hierarchy of control adopting measures in the higher tiers in so far as possible –
- (a) elimination of risks - for example by re-scheduling the construction works, using mechanical aid to replace manual work and providing adequate ventilation for enclosed environment;

- (b) reduction of risks – for example by using equipment that generates less heat to reduce the temperature of the works area;
- (c) administrative controls and safe work practices – for example by providing appropriate training and work instructions; and
- (d) personal protective equipment – for example provision of light clothing or face shields.

(C) Monitoring and Review

6. The findings of risk assessment process and the risk mitigation measures should be monitored and reviewed regularly to ensure their validity and effectiveness. Review should be conducted upon the occurrence of the following events –

- (a) injuries or illness resulting from heat stress;
- (b) availability of evidence that the risk assessment is no longer valid; and
- (c) significant changes in location of works, work practices, or work procedures.

7. Changes should be made to the risk mitigation measures taking into account the findings of the review where appropriate.

Annex B

First Aid to Workers Showing Symptoms of Heat-Related Disorders

- Move the patient to a cooler place.
- Lower his body temperature by –
 - remove some of the patient's clothes (where necessary)
 - wipe the patient's body with a towel soaked in cold water
 - fan the patient.
- If the patient is unconscious, place him in a recovery position.
- DO NOT give the patient any food or drink whether he is conscious or not.
- Send the patient to hospital as soon as possible.