

Electricity Industry Occupational Health Advisory Group



Guidance Note 3.1

Working in Adverse Thermal Environments

The Occupational Health Advisory Group for the Electricity Industry (OHAG) is an independent body of senior occupational physicians. They all have a professional role to provide advice to individual companies in the electricity industry and they meet together three times a year to discuss matters of common interest and to promote good practice in occupational health across the industry. The main route for doing this is by the preparation of guidance notes on topics of interest to the industry. The remit of OHAG and its guidance covers all aspect of the industry from generation, through transmission and distribution to retail and supply.

Until now the promulgation of this OHAG guidance has largely been by means of paper copies of the documents circulating within individual companies in the electricity industry. OHAG recognises that there is a need to make these papers more widely available and is grateful for the support provided by the Energy Networks Association (ENA) in hosting these documents on their website, and the links to them from the websites of the Association of Electricity Producers (AEP) and the Energy Retail Association (ERA).

The guidance notes will be of interest to managers, employees and occupational health professionals within the industry. They give general advice which has to be interpreted in the light of local circumstances. Health professionals using the guidance, retain an individual responsibility to act in accordance with appropriate professional standards and ethics. This guidance is offered in good faith and neither the individual members of OHAG, the companies they support, the ENA, AEP or the ERA can accept any liability for actions taken as a result of using the guidance.



Working in Adverse Thermal Environments

1. Introduction

Extremes of the thermal environment may be encountered in work in the electricity industry. Typically these will be cold outdoor environments or hot indoor environments. Work in such situations has to be adequately risk assessed to comply with legislation. In these extreme circumstances it may be impossible to completely remove the risk of adverse health effects arising and so the medical assessment of workers to be exposed to these environments is an important risk reducing measure. Health monitoring during exposure may further reduce the risk of harm but is only likely to be practical in indoor work situations.

Guidance on the medical supervision of workers exposed to extreme thermal environments is given in ISO publication 12894. This gives more comprehensive advice than is contained in this guidance note. That document suggests that such exposures can be considered as regular, where they take place on a relatively routine basis, exceptional where they are more infrequent, such as occasional planned maintenance, and emergency where a response to life threatening situations arises as in the work of the emergency services. It will be helpful to consider this broad classification when planning how to reduce risks of harm arising.

2. Aims of this Document

The aims of this document:

- to provide an introduction to the principles of managing the health of workers exposed to extreme adverse thermal environments.
- to provide an overview of the health problems that might arise in such situations and the type of measures that can be used to reduce the risk of harm arising.

3. Relevant Legislation

- Management of Health and Safety at Work Regulations 1999

4. Relevant Guidance

- Ergonomics of the thermal environment - Medical supervision of individuals exposed to extreme hot or cold environments (BS EN ISO 12894:2001)
- 'The thermal environment' BOHS Technical Guide No 12, 2nd edition, 1996 available on the BOHS web site, www.bohs.org under publications



5. Work in extreme cold

a. Exposure scenarios

In the UK linesmen and others have to work in extremely severe weather conditions repairing lines brought down by snow or ice and some maintenance workers at hydro generating stations may be working in extreme cold at times. Windfarms, both on and off shore, will be constructed in locations that are exposed to strong winds and cold. Typically exposure conditions in the UK will be cold and wet. There are now some plants overseas which are in very cold locations. These are more likely to be cold dry conditions.

b. Hazards

These include:

- Hypothermia, ranging from mild to life threatening in severity
- Increased risk of accidental injury
- Injury of the extremities, such as frost bite, or non freezing cold injury, resulting from vascular damage.

c. Organisational arrangements

A risk assessment should be conducted in all cases and, where appropriate, expert occupational health advice sought. The main protective measure is likely to be appropriate waterproof clothing and adequate insulation, especially on the hands and feet. In some fixed locations it may be practical to provide shelters. First aid and rescue arrangement will need to be considered in pre work planning.

d. Training and Education

Adequate training and education should be given to all persons who are going to work in extremely cold conditions and this should cover at least:

- Appreciating the hazards and risks
- Recognising hypothermia in themselves and others
- Appropriate first aid measures for cold casualties
- The use of any necessary personal protective equipment
- The harmful effects of alcohol and drugs



e. Health Assessments

Employees who may be called upon to work in these adverse conditions should have periodic health assessments. Individuals with any of the following medical conditions may be at special risk:

- Peripheral vascular disease
- Raynaud's phenomenon
- Ischaemic heart disease
- Insulin dependent diabetes
- Metabolic disorders including thyroid and adrenal conditions
- Respiratory conditions including asthma and COPD

f. Health monitoring

The scope for health monitoring is limited in such situations as is well explained in BS EN ISO 12894. People should operate a buddy system to observe any early signs of cold injury. Provision of a reliable system of communications as a means of summoning assistance should this be required will be an important aspect of risk management.

6. Work in extreme heat

a. Exposure scenarios

Exposure to extremely hot conditions may occur during maintenance work on thermal and nuclear generating stations. These will usually be routine exposures during planned maintenance although some exceptional exposures may be encountered. Operators own fire services may be exposed to emergency exposures to heat in the event of being called out to a fire. Exposures to heat in these situations are complicated by the effect of wearing protective clothing, possibly impermeable, and possible high work rates. Exposures to high ambient temperatures in overseas locations will allow the possibility of physiological acclimatisation.

b. Hazards

These include:

- Heat stroke: **This is a medical emergency**
- Dehydration and heat exhaustion
- Heat syncope
- Prickly heat due to failure of acclimatisation
- Transient heat fatigue
- Burns from direct contact or radiant heat



c. Organisational arrangements

- i. In all cases a risk assessment should be performed and this should include occupational hygiene assessments of the thermal environment and the exertional load required for the job which will produce metabolic and cardiovascular strain. Expert occupational health advice will usually be required.
- ii. Administrative measures will be required to control the duration and timing of tasks and to monitor the personnel involved.
- iii. First aid and rescue arrangements will need to be included in pre work planning.
- iv. Measure which may be used to mitigate the effects of working in extreme heat include the following:
 - Work regimes which include regular breaks in a cool environment
 - Reducing the thermal load by measures such as shading from radiant heat, or increasing convective heat losses by increasing air flow (assuming the air temperature is less than body temperature)
 - Using mechanical aids to limit metabolic heat production
 - Use of protective clothing such as air cooled suits or ice vests
 - Ensuring that workers are adequately hydrated. Half a litre of fluid should be taken before commencing work and regular drinks taken every 15- 30 minutes regardless of thirst.
Plain water is adequate and the addition of salt is not required. Alcohol or effervescent beverages should be avoided.
This recommended frequency of drinking may not be practical in situations where full protective equipment against environmental contamination is being worn.

d. Training and Education

All people who are going to work in extremely hot conditions should be adequately trained and prepared for the task. As a minimum they should receive training about the following issues:

- Appreciating the hazards and risks
- Recognising adverse symptoms in themselves and others
- Appropriate first aid measures for heat casualties
- The use of any necessary personal protective equipment
- The harmful effects of alcohol and drugs
- The dangers of minor illnesses and prescription or self medications
- The benefits and limitations of acclimatisation



e. Health Assessments

Individuals who may be called upon to work in these conditions should have a periodic health assessment. The following medical conditions may put individuals at special risk and should be seriously considered:

- Cardiovascular conditions such as angina, high blood pressure and general fitness
- Metabolic conditions such as obesity and insulin dependent diabetes
- General medical conditions such as renal insufficiency and inflammatory bowel disease
- Pregnancy
- Chronic skin disease
- Neurological conditions such as multiple sclerosis
- Use of certain medications and drug and alcohol misuse
- Anxiety or phobic conditions

Individuals should also declare any ill health they may be suffering, or medication they are using, on the day of the exposure. If there is any doubt about fitness further advice should be sought before permitting exposure.

f. Health monitoring

When new exposures are started on a routine basis it may be possible to arrange for some form of physiological monitoring of workers by means of their subjective responses and clinical signs until a pattern of response has been established. The exposure criteria can be modified in the light of these responses.

For exceptional exposures where the situation is less likely to be well controlled it may be necessary to arrange for a suitably trained observer to monitor the responses of workers as a safeguard. They may need to advise withdrawal from exposure in some circumstances.

In emergency exposures reliance will need to be placed on a buddy system of monitoring as well as administrative controls to ensure safety.

7. Recommendations

All workers who will be exposed to adverse thermal environments should be screened for their suitability for such work. This can be done initially by means of a suitable questionnaire with appropriate follow up.



8. Summary

Within the Electricity Industry there will be occasions when individuals have to be exposed to thermal environments with the potential to cause ill health. This is acceptable provided that appropriate precautions are put in place. These are outlined in this guidance. Employers who are planning such work will most likely need to obtain more specialist advice from an occupational hygienist and occupational health professional as this guidance note gives only an introduction to the subject.

9. References & Sources of Further Information

1. Ergonomics of the thermal environment- Medical supervision of individuals exposed to extreme hot or cold environments (BS EN ISO 12894:2001)
2. The thermal environment' BOHS Technical Guide No 12, 2nd edition, 1996 available on the BOHS web site, www.bohs.org under publications
3. 'Human thermal environments. The effect of hot, moderate and cold environments on human health, comfort and performance' Parsons K Taylor and Francis, 2003, 2nd edition, London, ISBN 0-415-23793-9