

## STORAGE AND USE OF THORIATED TUNGSTEN ELECTRODES

### INTRODUCTION

1 This document contains internal guidance which has been made available to the public. The guidance is considered good practice but is not compulsory. You may find it useful in deciding what you need to do. However, the guidance may not be directly applicable in all circumstances and any queries should be directed to the appropriate enforcing authority.

### BACKGROUND

2 Thorium is a naturally occurring radioactive element which is used in a wide range of industrial processes. It is incorporated into some tungsten welding electrodes as the oxide thoria and is generally finely dispersed in the tungsten matrix, but the so-called composite electrodes are made up of a pure tungsten core with an oxide coating. Thorium is a highly radio toxic material which emits alpha and gamma radiation. The main hazard is associated with inhalation of dust particles generated during tip grinding.

### PRECAUTIONS

#### Storage

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- (1) When not in use, electrodes should be kept in a suitable store, the nature of which will depend upon the number of electrodes. For those holding up to a few hundreds of electrodes it may be most convenient to keep them in a metal cabinet or box since such a store would normally provide adequate shielding against external gamma radiation from bundles of electrodes. Those storing thousands of electrodes may find it more convenient to store them in a separate room. The shielding properties of the walls of the room will be more than adequate. Since the occupancy of a separate room should be very low, metal cabinets within the room would not be necessary.
- (2) The number of electrodes in store should be kept to a minimum, taking account of expected usage and availability of further stock from manufacturers/suppliers.

## **Use**

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- (1) Users of thoriated tungsten electrodes should consider the use of alternative electrodes. BS EN 26848: 1991 Specification for tungsten electrodes for inert gas shielded arc welding and for plasma cutting and welding, provides guidance on the specification for tungsten electrodes.
- (2) Operatives undertaking manual TIG welding should retain no more than one day's supply of electrodes. The external gamma radiation from a few electrodes is low in comparison to that from bundles of electrodes and special arrangements for limited numbers are not considered to be necessary.

## **Tip grinding**

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- (1) Regrinding of electrode tips should be carried out at abrasive wheels which are suitable for use with hard metal.
- (2) Local exhaust ventilation should be provided at the grinding operation. Consideration should be given to the use of a dedicated grinding machine for this work so as to limit the number of machines contaminated by radioactive dust.

## **Cleanliness**

6 Surfaces surrounding the grinding machine should be cleaned daily, when electrodes have been ground, to remove deposits of dust. A vacuum method of cleaning is preferable as this is the easiest means of removing dust without causing it to become airborne. Dust should not be removed by dry sweeping which may cause the dust to become airborne. If users of small numbers of thoriated electrodes do not have access to suitable vacuum cleaners it would be acceptable for the dust to be damped down and then removed by wiping or brushing into a container.

## **Disposal of dust etc**

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- (1) Where a grinding machine is dedicated to work with thoriated electrodes the removal and disposal of dust from the exhaust ventilation dust collector should be carried out in accordance with a safe system of work. Such a system should include respiratory protective equipment and disposable overalls for the operator. Respiratory protective equipment should be selected and maintained in

accordance with HSE Guidance Note EH53 Respiratory protective equipment for use against airborne radioactivity.

- (2) The spent tips and dust from the collection unit should be disposed of in a sealed container to a landfill disposal site. The external dose rate from the dust collected following grinding is very low. The thorium is diluted by a relatively large amount of inactive material and a container made from a material such as plastic will be adequate with regard to its shielding properties for external radiation. The container should be sealed to prevent the spread of dust; adhesive tape is adequate.

### **Supervision**

8 A manager or supervisor should be given the responsibility for implementation and supervision of these precautions or other safeguards which achieve equivalent standards.

### **Choice of electrodes**

9 It is not always necessary to use thoriated tungsten electrodes to obtain the necessary quality of weld. BS EN 26848: 1991 lists 10 specifications for electrodes. Alternative oxide additives listed in the BS are zirconia, lanthanum oxide and cerium oxide. Although these substances may contain radioactive isotopes, the level of risk is substantially less than for thoria. Electrodes are also available to the American Standard ANSI/AWS A5 12-92 Specification for tungsten and tungsten alloy electrodes for arc welding and cutting. This lists similar compositions to BS EN 26848 but also includes the classification EWG under which electrodes are available containing yttria, which does not contain radioactive isotopes.

May 1995