



Collection and treatment of Xenon lamps

Xenon lamps used in cinema applications contain low level radiation from Thorium 232, and are also highly pressurised. Such waste lamps are routinely collected and treated in the UK.

Recolight offer the following guidance to our members, their end users, and Recolight contracted lamp recyclers and hauliers.

Collection

1. Xenon lamps for cinema applications contain less than 2000 Bq, with a maximum product weight of around 2Kg. For comparison, HID lamps (which are widely collected and recycled) typically contain 70 or less Bq, but weigh around 200g. As a result, the activity levels per Kg are broadly equivalent.
2. [The HSE have issued an exemption for the storage](#), handling and treatment of HID lamps containing Krypton- 85, which recognises the minimal risk associated with lamps containing low level radiation. A similar exemption effectively exists in the UK for Thorium containing lamps as the material is not added specifically for its radiation properties.
3. For transportation of lamps the movement of goods is covered by international regulations and as such the ADR limits on transport of materials containing low levels of radioactivity apply to the labelling and transportation of goods. This means that a shipment of end of life Xenon lamps containing 5 lamps, will be below the 10,000 Bq limit to qualify as an exempt consignment.

Shipments above 5 lamps may require marking with "UN2911" on the transport package, the word "RADIOACTIVE" inside on one side of the outer package and the text "UN2911" in the transport document. The manufacturer's stated activity of all the waste lamps should be considered when determining if a package is exempt.

4. The quantity and weight of the maximum exempt consignment is too low to be considered as a Recolight collection point, and so end users will need to make their own arrangements for transporting the end of life lamps.

Where end users contact Recolight in advance of making arrangements, Recolight will arrange to finance the treatment of its members' obligated xenon lamps, once delivered to a recycler nominated by Recolight.

5. The lamps are highly pressurised, and so present a risk of flying glass if they were to break. As a result, all end of life xenon lamps should be transported in the primary packaging in which they were delivered as new lamps, packed individually in a safe inner packaging. These individually wrapped/packaged lamps should themselves be placed in a suitable container that ensures they cannot move excessively, up to the limit of an exempt consignment.

6. Given the need for the use of primary packaging to secure the xenon lamps, Recolight do not recommend that xenon lamps be mixed with any other gas discharge lamps during collection and transport. Xenon lamps should be collected and transported separately from other types of lamp. In the same way, they should not be accepted at a Recolight network collection point.
7. Except for an exempt consignment, the lamps should be transported by a company with a proper consignment note indicating "UN2911" in the text.
8. The end user and transporter should also follow any other guidance provided and by the lamp producer, with particular attention to the use of personal protective equipment and care in handling.
9. **End of life Xenon lamps should not be intentionally broken by the end user. They should be left intact and stored safely and securely pending collection.**

Treatment

1. [The Health Protection Agency undertook a study](#) (HPA-CRCE-021) commissioned by the European Lamp Companies federation into the transport and treatment of lamps containing tritium, krypton, and thorium. Although the study did not directly consider the compressed gas (noble gas) in the recycling of xenon cinema lamps, the conclusions it comes to are nevertheless helpful in assessing the implications for recyclers of treating xenon cinema lamps, given that they contain Th-232, which was considered under the study.
2. This study indicates that the most appropriate method of disposal is to recycle the lamps along with other gas discharge lamps. This blending has the effect of diluting the already very small quantities of radioactivity.
3. Recyclers should undertake their own risk assessments relating to all aspects of the receipt, storage, treatment, and disposal of such lamps, including the output fractions. Particular attention should be paid to operator health and safety.

Given the high pressure nature of these lamps, and the consequent risk of flying glass in the event of breakage, Recolight recommends that this should include full face, neck, and body protection for those operators who may have to handle the lamps.

4. The HPA study specifically noted that such lamps are "too large to be processed by the machinery in lamp recycling facilities..." and so recyclers should also take all necessary steps to satisfy themselves that the particular recycling equipment they use is able to process the lamps appropriately before accepting the lamps for treatment.

5. Extract from HPA-CRCE-021:

In summary, despite the cautious assumptions made in the assessment, all the estimated doses from the recycling and disposal processes calculated in this study were below the radiological dose criteria for exemption.

The estimated doses given in this report were based on the assumption that lamps containing low levels of radioactive material, ie, the metal halide lamps and glow switches in first generation non-integrated compact fluorescent lamps, are mixed with other lamps. This was observed to be current recycling practice at the lamp recycling facilities visited. If lamps containing radioactive material are separated out from other lamps and processed by fewer lamp facilities, ie, effectively concentrating the radioactive material, the doses to lamp recycling workers and some of the other exposure groups have the potential to be higher than those presented in this study and could be higher than $10 \mu\text{Sv y}^{-1}$, using the assumptions of this assessment.

Prior to being received at recycling plants the lamps are amassed at collection points. The study did not consider the doses that may be received by personnel at these collection points. However, given that these workers will only come into contact with a fraction of the lamps compared to recycling workers, it would be expected that their doses would be significantly lower than those received by recycling workers.

The purpose of this study was to assess the doses to individuals most exposed during recycling and disposal of lamps containing low levels of radioactive material and as such provides useful information for any discussions with regulators. However, the assessed doses are just one of a number of factors that regulatory authorities will consider when deciding whether to grant exemption.