



EFUP Discussion Paper 5/2/2007

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Note: This paper is based on information contained in the RoHS-International, China RoHS Guidance Notes, also written by this author and available from www.rohs-international.com

Abstract

There has been much confusion on the Chinese RoHS Environmentally Friendly Use Period (EFUP) also referred to as the Environmental Protection Use Period (EPUP). This has arisen from a number of sources, not least from the introduction of a new concept to industry, but also possibly from lack of technical knowledge applied during translating the EFUP drafts into English. To date there has been no technical discussion publicly available on this subject, although there has been some discussion between various consultants in the RoHS support field.

The final standard is expected in March, after the enactment date of the legislation.

The issue

The EFUP is defined in the ACPEIP (Administration on the Control of Pollution caused by Electronic Information Products)¹ in Article 3 as *"The term during which toxic and hazardous substances or elements contained in electronic information products will not leak out or mutate, thus eliminating the possibility of serious environmental pollution resulting from the use by users of electronic information products or serious harm to their persons and properties resulting from such use"*.

This definition appears to restrict the scope of determining the EFUP to components that contain toxic or hazardous substances or elements - which in turn are defined as the familiar 6 RoHS Substances (Lead, Cadmium, Mercury, Hexavalent Chromium, PBB and PBDE) plus "other toxic and hazardous substances or elements as specified by the state". However, the methods for determining the EFUP, as described in the Draft EFUP Standard of August 2006² may indicate that the EFUP is based on all components, substances and elements.

Discussion

The EFUP Draft Standard of August 2006² gives five methods for calculating the EFUP, split into two categories.

Technical based EFUP

1. The Practical Method
2. Experimental Method

Theoretical based EFUP

3. Technical Life Method
4. Safe Use Period Method
5. Comparison Method

It is stated in the EFUP Draft General rule August 2006² that if the technical based EFUP is known then this should be used.

Technical Based methods

- 1) Practical Method

This appears to have been a difficult one to translate. The AeA translation² states *“Under the normal use condition of the EIP, when the cases/pieces number of hazardous and toxic substances or elements leak or mutate exceed 5, the shortest rounding number of year is the Technical EFUP of this product”*.

We believe this actually means if there are five or more known cases where the product has leaked or mutated hazardous or toxic elements then this can be used as the basis for the EFUP. A logical extension of this, is the practical usable life of the product. When a product is disposed of, either through recycling or landfill it is reasonable to expect that the product will be subject to conditions that will start to cause any hazardous or toxic substances or elements to leak or mutate. This could be leachate from landfill or the processing of recycling plants.

Hence it is postulated that it is reasonable to interpret the Practical Method as being based on the known or predicted usable life of the product.

- 2) Experimental Method.

The AeA translation² is *“When there is not a case under the normal use condition of the EIP the hazardous and toxic substances or elements leak or mutate, the EFUP is defined according to the method and experimental technique in Chapter 6 of this standard.”* Chapter (section) 6 states *“Press two board on a wire, the hazardous and toxic substance or element will be transfer to the board within a certain time and temperature, use the testing Method Standard to test the*

Hazardous and toxic substance or element on the board, and then reckon the EFUP of the wire”.

The example given in the standard as translated above is rather confusing, and we can only conclude that either the translation is inaccurate, or that we have missed the point completely. However, following normal practice for experimental methods for determining the life of a product we postulate that this method is actually accelerated life testing. This is based on the same premise as above, that the hazardous or toxic substances or elements will leak or mutate upon disposal.

Theoretical based Methods

3) Technical Life Method

The AeA translation² states:

“The formula to calculate the EFUP by using Technical Life:

$$EFUP = \text{Technical Life} / (\text{average daily working life} \times 365) \quad (1)$$

$$EFUP = \text{Technical Life} / (\text{average daily working life} \times 365) \times 125\% \quad (2)$$

Formula (1) applies to EIP that can not be repaired; Formula (2) applies to EIP that can be repaired”

It is postulated that the correct translation of Technical Life is actually Mean Time Between Failure (MTBF). The multiplier of 1.25 for repairable product is a standard multiplier for this method and is hence a strong indicator of the original intent. It is suggested that the correct translation should be as follows:

EFUP = MTBF / (average daily working life x365) for products that cannot be repaired.

EFUP = MTBF / (average daily working life x365) x 125% for products that can be repaired.

The MTBF can be a theoretical calculation based on the MTBF of components that are identified as the most likely to fail first through a Failure Modes Effect Analysis (FMEA) or similar, or based on/confirmed through accelerated life testing. If Accelerated Life Testing is carried out then the EFUP calculation method should be classified as “Experimental” under the preferred “Technical Based Method” heading.

4) Safe Use Period Method

The AeA translation² states: *“If the product has a safe use period, should use the Safe Use Period as the EFUP”.*

Q16 of the May 2006 FAQ document gives some information on the difference between the Safe Use Period and the EFUP in the following: *“The EIP EFUP is*

not equivalent to the Safe Use Period as in defining the time frame it does not take into consideration such factors as electronic performance safety and electromagnetic safety.” The EFUP might be longer or shorter than the EFUP”

This is could be construed as contradictory to the EFUP Draft standard including the option to use the Safe Use Period as the EFUP. However in legal precedence the EFUP Standard would have more weight than the FAQ document.

Due to confusion surrounding the Safe Use Period, and the number of other methods, it is unlikely that this method will be used by many companies.

5) Comparison method.

The AeA translation² states *“The new EIP without defined Technical Life and Safe Use Period should adopt the EFUP of same or similar product as its EFUP”*

The Appendix A of the Draft EFUP Standard² has some normative EFUP figures for major categories of products. These range from 50 years for Digital exchange/Switching Platform (Central Office exchange equipment) to 5 years for a cell phone (which, in the opinion of the author is probably too high).

Other parameters

For any of the above methods the Draft Standard² states that typical operating conditions must be taken into consideration when determining the EFUP. These include, but would not be limited to; temperature, altitude, humidity, on time/off time/standby time, etc. These are all typical parameters for MTBF calculation and Accelerated Life Testing algorithms.

Commercial considerations

It is stated in the March 2006 FAQs³ (question 16) that the EFUP, at present, is not subject to examination and approval of the government. This gives companies, and industry at large great freedom to consider the commercial aspects of the EFUP. If the EFUP is too low then the product looks less “green” and there is potential for future legislation/clarification to require a product to be disposed of when it’s EFUP has expired. The possible intention of this is indicated in the answer to Question 16 of the March 2006 FAQs³ which states *“Products outliving its environmental friendly use period shall enter the link of disposal and be recycled, treated and recovered, or there might be leakage or permeation.”*

On the other hand the same FAQ answer states *“The longer an enterprise sets its safe use period, the longer an enterprise has to take up the responsibility for that.” This could infer that a company may be held responsible for disposal of its products if they fail or are discarded prior to the end of the EFUP.*

Conclusions

- 1) The author concludes that, in a practical sense the EFUP is not confined to the 6 RoHS substances. All methods for determining the EFUP with the exception of the Safe Use Period Method appear to be based on the actual usable life of the product as whole.
- 2) The preferred methods are the Technical Based EFUP methods, the easiest one being the Practical Method. This method will be driven by market data on the typical useful life of the product in the market place. If the product is innovative and the practical useful life cannot be reliably determined then the MTBF confirmed with Accelerated Life Testing is the next preferred option.
- 3) There is potential for the EFUP number to be used by future extended producer responsibility (WEEE style) legislation.

Follow-up and further assistance

The author runs a commercial enterprise and is therefore not able to enter into discussion on this paper as it is not funded or sponsored. However this content is drawn from the 23 page document “China RoHS Guidance Notes” also written by this author and available from www.rohs-international.com . These Guidance Notes have been purchased by many companies since their release in December 2006 with 100% positive feedback. The author is willing to enter into discussion on EFUP with purchasers of these Guidance Notes as part of our customer service philosophy.

Disclaimer

This discussion paper is informative only, and contains the views of the Author as they stand at present, which he is sharing to stimulate discussion. As information changes, the views of the Author may change. This paper has no legal authority and is not legal advice. As with EU RoHS the regulations themselves should always be read and understood, as they constitute the law. The original Standards in Chinese are the only documents with legal authority.

You should refer to the Standards themselves for a full statement of the legal requirements and in the case of any doubt take your own legal advice, The standards may be revised from time to time, so information may change. Whilst all endeavors have been made as to the accuracy of the information in this guidance document, RoHS-International Ltd, and it’s Directors accept no liability whatsoever for the accuracy of the content, or liability for any damages or financial loss resulting from use of this document whether in contract, or tort or otherwise. This document is informational only. It is not legal advice, and readers are advised to seek their own independent legal advice.



References

- 1: This document is also translated by the AeA as “Management Methods for Controlling Pollution by Electronic Information products”. However the document is generally known as the ACPEIP.
- 2: AeA translation of the August 29 2006 “General rule of Environmental-Friendly Use Period of Electronic Information Products”
- 3: MII FAQ Document March 2006, translation by AeA entitled Material of 2006 National Meeting on Electronic Information Product Pollution control