CETEHOR
Département technique du Comité FRANCÉCLAT

ROHS exemptions No. 6c

Copper alloy containing up to 4 % lead by weight

As a Technical Department of the COMITE FRANCECLAT (French Watch, Clock, Jewellery, Silverware & Tableware Centre), CETEHOR provides the following comments about the use of leaded copper alloy for quartz watch movement parts.

Question 1.

1st proposal: to renew the exemption under the same terms

2nd proposal: to renew the exemption lowering the authorised lead content to 1 % by weight.

1.a. choice: 1st proposal

1.c. Explain the choice using technical arguments as per the criteria of Article 5(1)(a) :

The replacement of leaded copper alloys is technically impractical. Dimensional conformity is highly important in the manufacture of parts for quartz watch movements, with tolerances of between 5 and 10 µm. Attempts to substitute leaded copper alloys with unleaded copper allows have not produced satisfactory results: the absence of lead leads to the formation of large burrs as chips are not fractioned, the dimensions are therefore not respected. It is therefore impossible to guarantee that the manufactured components have the required performance levels. The reliability of substitute products cannot therefore be guaranteed.

Furthermore, unleaded copper alloys require longer machining cycles and cause significantly more wear on tools, leading to higher energy consumption and additional production costs in an already severe context of competition with countries where labour costs are low.

Question 2.

2.**a. Applications :**

Parts for quartz watch movements: plates, bridges, cogs, gears, screws, nuts, pins, pivots. All these parts are extremely small. They are turned or cut and then shaped with moduli of less than 0.1 mm. Watch movements are 80 % made of leaded copper alloys.

NB: a watch movement is the mechanism inside the watch which measures and indicates time.

2.**b and 2.c. Functions of lead :**

Lead considerably improves machinability, in that the CuZn39Pb3 alloy is the benchmark, with a machinability index of 100 %. The absence of lead increases machining times and creates greater wear on tools: tools therefore need to be sharpened and replaced more often. Lead facilitates fractioning of the chips, prevents the formation of burrs and avoid the management of chips on the machine. Leaded copper alloys are easy to machine with precision and the dimensional aspect is fully controlled, preventing rejected parts. The manufacture of very small parts for quartz watch movements requires very close tolerances of between 5 and 10 µm, burring is therefore not permitted. Dimensional conformity is very important, this prevents the use of unleaded copper alloys.

Question 3.

Annual French production of quartz watches: 0.5 million

Estimated average mass of brass per movement: 8 g

Maximum lead content of the brass: 3 %

Giving a total quantity of lead of 120 kg.

Question 4.

Tests to replace leaded copper alloys with unleaded copper alloys have not been successful for the following reasons :

Technical problems :

- parts present significant burring

- dimensions non-conforming

Financial problems:

- longer machining cycle required

- greater wear on tools: more frequent sharpening, higher consumption rates of tools

- chips must be managed at the machine

Questions 5 and 6.

Tests using unleaded copper alloys have not allowed an alternative to be identified to date.

Questions 7.

7.a and 7. b.

Precision and dimensional conformity: tolerances of between 5 and 10 µm

7.c. Relationships between the various properties and impacts on performance :

Dimensional conformity is directly linked to machinability. The operation and performance of the quartz watch movement (accuracy of measurement and indication of time) are linked to dimensional conformity.

7.d. Formulation of the exemption adapted to needs regarding these properties :

The use of copper alloys containing 3 % lead is essential in our applications. The formulation of the exemption cannot be modified, to ensure that alloy suppliers are able to guarantee that the composition complies with the regulatory limit.

Question 8.

1) Regulatory aspect

Directive 2011/65/EU stipulates in its consideration (28) :

"When reviewing this Directive, a thorough analysis of its coherence with Regulation (EC) No 1907/2006 should be carried out by the Commission."

and in Article 6 :

"The review and amendment of the list of restricted substances in Annex II shall be coherent with other legislation related to chemicals, in particular Regulation (EC) No 1907/2006, and shall take into account, inter alia, Annexes XIV and XVII to that Regulation. "

Entry 63 of Annex XVII of Regulation (EC) No 1907/2006, indicates that lead and its compounds

"1. Shall not be placed on the market or used in any individual part of jewellery articles if the concentration of lead (expressed as metal) in such a part is equal to or greater than 0,05 % by weight.

2. For the purposes of paragraph 1 :

(i) "jewellery articles" shall include jewellery and imitation jewellery articles and hair accessories, including :

(a) bracelets, necklaces and rings ;

(b) piercing jewellery ;

(c) wrist watches and wrist-wear ;

(d) brooches and cufflinks ;

(ii) "any individual part" shall include the materials from which the jewellery is made, as well as the individual components of the jewellery articles.

4. By way of derogation, paragraph 1 shall not apply to :

(a) crystal glass as defined in Annex I (categories 1, 2, 3 and 4) to Council Directive 69/493/EEC (*) ;

(b) internal components of watch timepieces inaccessible to consumers ;

(c) non-synthetic or reconstructed precious and semiprecious stones (CN code 7103, as established by Regulation (EEC) No 2658/87), unless they have been treated with lead or its compounds or mixtures containing these substances ;

(d) enamels, defined as vitrifiable mixtures resulting from the fusion, vitrification or sintering of minerals melted at a temperature of at least 500 °C. "

Components of the movements of quartz watches are internal components and inaccessible to consumers, they are therefore exempt from the prohibition on the use of lead. So that Directive 2011/65/EU remains consistent with Regulation (EC) n° 1907/2006 when it stipulates, authorisation for lead to be used in copper alloys must be maintained.

2) Environmental aspect :

Quartz watch movement parts are easily and completely removable and recyclable. The reuse of materials reduces the production of alloys and the release of lead into the environment.

3) Financial aspect :

The manufacture of parts from leaded brass represents 20% of turnover for manufacturers of quartz watch movements. These companies are mostly SMEs, they would not be able to support a prohibition when faced with low-cost foreign competition.