

**Technical Requirement for Environmental Products**  
**The Certifiable Technical Requirement for Environmental Labelling Products**  
**Solar-Powered Watches and Clock** **HBC 10 - 2001**

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### **1 Scope**

This technical requirement specifies classification, definition, basic requirements, technical contents and test method of environmental labelling for solar-powered watches and clock.

This technical requirement shall apply only to environmental labelling product certification for watches and clocks powered by solar-battery system.

### **2 Standards cited**

Provisions in the following standards are cited in this technical requirement, and therefore form the provisions of the standard.

GB/T 6044 - 92 Analogue quartz watches

GB/T8647.6 - 1998 Nickel--Determination of cadmium, cobalt, copper, manganese, lead and zinc contents--Flame atomic absorption spectrophotometric method

In case of the criteria above are revised, the latest version should be applied.

### **3 Definition**

"Solar-powered watches and clocks" refer to various watches and clocks that only powered by solar battery system.

"Solar battery system" in this technical requirement refers to photoelectric element which translate light energy into electrical energy to provide entire power for watch and chargeable battery or condenser which store electrical energy.

### **4 Basic requirements**

4.1 Performance of solar-powered watches and clocks should conform to the requirement in GB/T 6044-92.

4.2 Pollutant emission of the company should be obliged to conform with pollutant emission standards nationally or locally.

### **5 Technical contents**

5.1 Chargeable batteries or condensers of the products are not allowed to contain heavy metals such as mercury, cadmium and their compounds.

5.2 No hazardous substances such as CFC gases, carbon tetrachloride and trichloroethylene are allowed to use in the production procedure of product or raw material.

5.3 Fully charged electricity store parts should run normally within 7 days while they are put in place where cannot charge (namely, in dark).

5.4 Products should have overcharge prevention device.

5.5 In the case of normal use, life of solar-powered battery system should be at least 7 years.

5.6 The design of products should ensure that it cannot work normally if common battery is used.

### **6 Test**

6.1 Contents in 5.1 of technical requirement should be tested according to annex A, annex B in test method.

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6.2 Contents in 5.2, 5.5 of the technical requirement should be verified through field inspection.

6.3 Contents in 5.3, 5.4 and 5.6 of the technical requirement should be verified by documentatin review in field inspection.

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**Annotations :**

This technical requirement has been prepared by Department of science and technology, standards of State Environment Protection Administration.

The State Environment Protection Administration keeps the right of interpretation for this technical requirement.

## Annex A (annex of the standard)

## Test method of trace mercury in battery-- cold atomic absorption method

## A.1 Experiment condition

## A.1.1 Instrument

Instrument: mercury vapor analyzer or atomic absorption spectrophotometer.

## A.1.2 Agents

Nitric acid ( 1.42g/ml);

Hydrochloric acid ( 1.19g/ml);

Nitric acid ( 1 + 99);

Hydrochloric acid ( 1 + 1);

Potassium bichromate solution ( 50 g/L);

Tin dichloride solution ( 200 g/L): take 20g tin dichloride ( $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ ), add 1+1 hydrochloric acid 100ml, resolve by heating;

Mercury reserve solution( 0.100 0mgHg/ml): take 0.1353g mercuric chloride ( $\text{HgCl}_2$ ) and dissolve in water, add in 66ml 1.42g/ml nitric acid, transfer it into 1000 ml measuring flask, dilute with water to the scale, and stir throughly.

Mercury standard solution ( 0.10  $\mu\text{gHg/ml}$ ): take 1.00ml aliquot from reserve solution in the 1000ml measuring flask, add in 3ml potassium bichromate and 66ml 1+ 99 nitric acid, dilute with water to the scale, and stir throughly.

## A.2 Experimental procedure

## A.2.1 Analytical procedure

Weigh the battery to 0.1 g (as for button cells, weigh accurately to 0.001g), detach the battery and remove the outer packing, copper cap, false bottom and sealant. Put both positive and negative polarity materials of the battery in a beaker of 250-1000ml, add in water according to amount in table 1, add in 1.42g/ml nitric acid serially, and put in 1.19g/ml hydrochloric acid after reaction becomes quiet; then heat to boil slightly for 15min (pay attention not to spill colored substances such as acetylene black out of beaker).

Table 1 Battery type and agent amount added in

Battery type	Water /ml	Nitric acid /ml	Hydrochloric acid /ml	Total volume /ml
LR20	50	80	80	500
LR14、R20	40	40	40	250
LR6、R14	25	25	25	250
R03	20	8	8	100
LR03、R6	20	15	15	100
Button cell	20	8	8	100

Cool it a little while, filter the solution by qualitative filter paper, collect filtered solution and lotion into a measuring flask. See table 1 for total volume. Wash the beaker 3 times by using 1 + 99 nitric acid, precipitate wash filter paper 5 times, and dilute with water to the scale after cooling down, shake to uniformity.

Accurately take 0.01-2ml sample solution into 25ml mercury-vapour generating bottle (take by micropipet if it's  $\leq 0.1\text{ml}$ ; add in 5 drops of 1+1 hydrochloric acid if sample solution taken is less than 0.5ml), dilute with water to 9ml, add in tin dichloride solution 1ml, fasten down mercury vapor generating bottle by bottle block quickly, read out the maximum absorbance.

## A.2.2 Work curve

Take 0.000, 0.100, 0.200, 0.300  $\mu\text{g}$  mercury standard solution into a series of mercury-vapour generator, respectively. Add in 5 drops of 1+1 hydrochloric acid, and then dilute with water to 9ml, add in 1ml tin dichloride solution, fasten down mercury-vapour generator by block promptly, read out the maximum absorbance, draw the work curve.

## A.2.3 Calculation

Mass percent of mercury should be calculated according to the equation below:

$$Hg(\%) = \frac{C}{m \times \frac{V_1}{V_2} \times 10^6} \times 100$$

Where : C—Read mercury level from work curve,  $\mu\text{g}$  ;

M—Battery mass , g ;

V1— Total volume of sample solution, ml ;

V2— Taken sample solution volume, ml。

## Annex B (Annex of the standard)

### Determination for Cd in battery

#### B.1 Experiment condition

##### B.1.1 Instrument

See section 3 in GB8647.6.

##### B.1.2 Agent

See section 2 in GB8647.6.

#### B.2 Experimental procedure

##### B.2.1 Blank experiment

It should be conducted according to 4.2 of GB8647.6.

##### B.2.2 Analytical procedure

1. Weigh the battery accurately to 0.1 g (for button cell, to 0.001g); detach the battery and remove outer packing, copper cap, false bottom and sealant; put materials of terminal on either polarity and isolating layer into a 500ml beaker; if there is extra outer packing for either polarity of battery, flush inner wall of outer packer 3 times by 1+19 nitric acid, put washing liquid into the beaker holding the sample, and abandon the outer packing.

2. Add in distilled water to completely submerge the sample, put in nitric acid by the way of every 10ml 1+1 nitric acid per gram sample; dissolve the sample.

3. Determination should be conducted according to 4.3.3-4.3.4 in GB 8647.6.

##### B.2.3 Work curve

It should be conducted according to 4.4 of GB8647.6.

##### A.2.3 Calculation

It should be conducted according to 5 of GB8647.6.