

INTERNATIONAL STANDARD

**Primary batteries –
Part 3: Watch batteries**

<https://standards.iteh.ai/catalog/standards/sist/74407bf-8af7-4439-9205-15db2f74ce1a/iec-60086-3-2011>



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRIMARY BATTERIES –

Part 3: Watch batteries

FOREWORD

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International Standard IEC 60086-3 has been prepared by IEC technical committee 35: Primary cells and batteries, and ISO technical committee 114: Horology.

This third edition cancels and replaces the second edition (2004) and constitutes a technical revision.

The major technical changes with respect to the previous edition are the drawings, a review of the table of electrochemical systems and a harmonization of the marking clause with the other standards of the IEC 60086 series. Moreover, the table of the leakage levels was extended by adding drawings with better visualization.

This publication is published as a double logo standard.

The text of this standard is based on the following documents:

| FDIS | Report on voting |
|--------------|------------------|
| 35/1286/FDIS | 35/1289/RVD |

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table. In ISO, the standard has been approved by 8 P members out of 8 having cast a vote.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60086 series, under the general title: *Primary batteries*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of September 2011 have been included in this copy.

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INTRODUCTION

The technical content of this part of IEC 60086 provides specific requirements and information for primary watch batteries. This part was prepared through joint work between IEC TC 35 and ISO TC 114 to benefit primary battery users, watch designers and battery manufacturers by ensuring the best compatibility between batteries and watches.

This part will remain under continual scrutiny to ensure that the publication is kept up to date with the advances in both battery and watch technologies.

NOTE Safety information can be found in IEC 60086-4 and IEC 60086-5.



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PRIMARY BATTERIES –

Part 3: Watch batteries

1 Scope

This part of IEC 60086 specifies dimensions, designation, methods of tests and requirements for primary batteries for watches. In several cases, a menu of test methods is given. When presenting battery electrical characteristics and/or performance data, the manufacturer specifies which test method was used.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60086-1:-1, *Primary batteries – Part 1: General*

IEC 60086-2:-2, *Primary batteries – Part 2: Physical and electrical specifications*

IEC 60086-4:2007, *Primary batteries – Part 4: Safety of lithium batteries*

IEC 60086-5:-3, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

ISO 2859 (all parts), *Sampling procedures for inspection by attributes*

ISO 3951 (all parts as applicable), *Sampling procedures for inspection by variables*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60086-1 as well as the following terms and definitions apply.

3.1

capacitive reactance

part of the internal resistance, that leads to a voltage drop during the first seconds under load

3.2

capacity

electric charge (quantity of electricity) which a cell or battery can deliver under specified discharge conditions

NOTE The SI unit for electric charge is the coulomb (1 C = 1 As) but, in practice, capacity is usually expressed in ampere hours (Ah).

1 To be published in 2011.

2 To be published in 2011.

3 To be published in 2011.

3.3

fresh battery

undischarged battery 60 days maximum after date of manufacture

3.4

ohmic drop

part of the internal resistance that leads to a voltage drop immediately after switching the load on

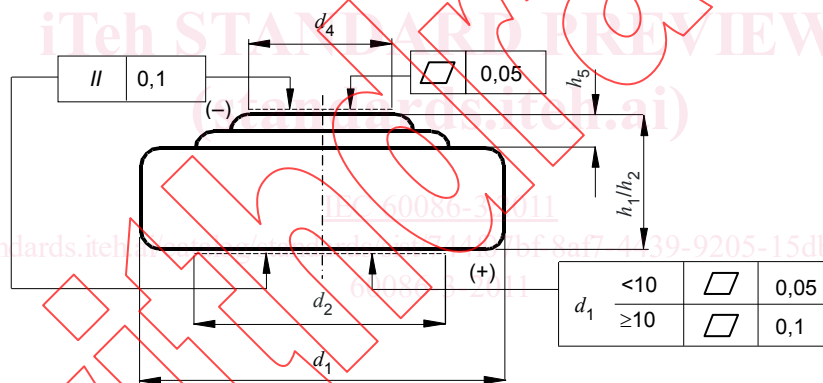
4 Physical requirements

4.1 Battery dimensions, symbols and size codes

Dimensions and tolerances of batteries for watches shall be in accordance with Figure 1, Table 1 and Table 2. The dimensions of the batteries shall be tested in accordance with 7.1.

The symbols used to denote the various dimensions in Figure 1 are in accordance with IEC 60086-2, Clause 4.

Dimensions in millimetres



IEC 155/11

Key

- h_1 maximum overall height of the battery
- h_2 minimum distance between the flats of the positive and negative contacts
- h_5 minimum projection of the flat negative contact
- d_1 maximum and minimum diameter of the battery
- d_2 minimum diameter of the flat positive contact
- d_4 minimum diameter of the flat negative contact

NOTE This numbering follows the harmonization in the IEC 60086 series.

Figure 1 – Dimensional drawing

Table 1 – Dimensions and size codes

Dimensions in millimetres

| Code ^a | Diameter | | d_4 | Height h_1/h_2 | | | | | | | | | | | | | | | | | |
|-------------------|----------|--------------|--------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|
| | d_1 | Tolerance | | Code ^a | | | | | | | | | | | | | | | | | |
| | | | | 10 | 12 | 14 | 16 | 20 | 21 | 25 | 26 | 27 | 30 | 31 | 32 | 36 | 42 | 54 | | | |
| | | | | Tolerance | | | | | | | | | | | | | | | | | |
| 4 | 4,8 | 0 -0,15 | 0 -0,15 | 0 -0,15 | 0 -0,15 | 0 -0,18 | 0 -0,20 | 0 -0,20 | 0 -0,20 | 0 -0,20 | 0 -0,20 | 0 -0,20 | 0 -0,20 | 0 -0,25 | 0 -0,25 | 0 -0,25 | 0 -0,25 | 0 -0,25 | 0 -0,25 | | |
| 5 | 5,8 | 0 -0,15 | 1,05 | 1,25 | 1,45 | 1,65 | 1,65 | 2,15 | 2,15 | 2,15 | 2,60 | 2,70 | | | | | | | | | |
| 6 | 6,8 | 0 -0,15 | 1,05 | 1,25 | 1,45 | 1,65 | 1,65 | 2,15 | 2,15 | 2,15 | 2,60 | | | | | | | | | | |
| 7 | 7,9 | 0 -0,15 | 1,05 | 1,25 | 1,45 | 1,65 | 1,65 | 2,10 | 2,10 | 2,60 | 2,60 | | | 3,10 | | 3,60 | | | 5,40 | | |
| 9 | 9,5 | 0 -0,15 | 1,05 | 1,25 | 1,45 | 1,65 | 2,05 | 2,05 | | | | 2,70 | | | | 3,60 | | | | | |
| 11 | 11,6 | 0 -0,20 | 1,05 | 1,25 | 1,45 | 1,65 | 2,05 | 2,05 | | | 2,60 | | 3,05 | | | 3,60 | | 4,20 | 5,40 | | |
| 12 | 12,5 | 0 -0,25 | | 1,20 | | | 1,60 | 2,00 | | 2,50 | | | | | | | | | | | |

NOTE: Open boxes in the above matrix are not necessarily available for standardisation due to the concept of overlapping tolerances.

^a See Annex A.

Table 2 – Dimensions and size codes

Dimensions in millimetres

| Diameter | | | d_4 | Height h_1/h_2 | | | | | |
|-------------------|-------|--|-------|--|--|--|--|--|--|
| Code ^a | d_1 | Tolerance | | Code ^a | | | | | |
| | | | | 12 | 16 | 20 | 25 | 30 | 32 |
| | | | | Tolerances | | | | | |
| | | | | $\begin{matrix} 0 \\ -0,20^b \end{matrix}$ | $\begin{matrix} 0 \\ -0,20^b \end{matrix}$ | $\begin{matrix} 0 \\ -0,25^b \end{matrix}$ | $\begin{matrix} 0 \\ -0,30^b \end{matrix}$ | $\begin{matrix} 0 \\ -0,30^b \end{matrix}$ | $\begin{matrix} 0 \\ -0,30^b \end{matrix}$ |
| 16 | 16 | $\begin{matrix} 0 \\ -0,25 \end{matrix}$ | 5,00 | 1,20 | 1,60 | 2,00 | 2,50 | | 3,20 |
| 20 | 20 | $\begin{matrix} 0 \\ -0,25 \end{matrix}$ | 8,00 | 1,20 | 1,60 | 2,00 | 2,50 | | 3,20 |
| 23 | 23 | $\begin{matrix} 0 \\ -0,30 \end{matrix}$ | 8,00 | 1,20 | 1,60 | 2,00 | 2,50 | | |
| 24 | 24,5 | $\begin{matrix} 0 \\ -0,30 \end{matrix}$ | 8,00 | 1,20 | 1,60 | | | 3,00 | |

NOTE Open boxes in the above matrix are not necessarily available for standardisation due to the concept of overlapping tolerances.

^a See Annex A.

^b To be reduced in the future.

4.2 Terminals

Negative contact (-): the negative contact (dimension d_4) shall be in accordance with Tables 1 and 2. This is not applied to those batteries with a two-step negative contact.

Positive contact (+): the cylindrical surface is connected to the positive terminal. Positive contact should be made to the side of the battery but may be made to the base.

4.3 Projection of the negative terminal (h_5)

The dimension h_5 shall be as follows:

$$h_5 \geq 0,02 \text{ for } h_1/h_2 \leq 1,65$$

$$h_5 \geq 0,06 \text{ for } 1,65 < h_1/h_2 < 2,5$$

$$h_5 \geq 0,08 \text{ for } h_1/h_2 \geq 2,5$$

NOTE The negative contact should be the highest point of the battery.

4.4 Shape of negative terminal

The space requirements shall be contained within an angle of 45° (see Figure 2).

The minimum values of l_1 , for different heights of h_1/h_2 , are given in Table 3.