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Radio-controlled clocks — Signal receiving measurement methods

Horloges de radiocontrolées — Méthode de mesure pour la réception de signaux

ICS: 39.040.20

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This document was prepared by Technical Committee ISO/TC 114, *Horology*, Subcommittee SC 14, *Table and wall clocks*.

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Introduction

The radio-controlled clocks are the products representing the high and new technology of current horological industry, and are widely used in many countries around the world because of its advantages of automatically receiving standard time signals and regulating indicating time. Each year there is a large amount of sales and international trade, but in the global horological industry, there is no international standard for the technology or products of radio-controlled clocks and watches. In order to promote the international trade more equitable and standard, help the enterprises better enter the international market, and facilitate the convenience of international trade, this Standard *Radio-controlled clocks — Signal receiving measurement method* is developed.

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Radio-controlled clocks — Signal receiving measurement methods

1 Scope

This document specifies the terms and definitions, signal receiving general measurement method for radio-controlled clocks.

It is applicable to the analogue or/and liquid crystal display or/and LED display radio-controlled clocks, and the radio-controlled clock movements may also refer to it.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
radio-controlled clock
quartz clock which can receive standard time signal and automatically regulate time and calendar according to the received signal

3.2
standard time signal
time code modulation signal broadcasted from the national statutory time service institution by means of long wave

3.3
receiving state
state when the radio-controlled clock receives the standard time signal

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4 Signal receiving measurement method

4.1 Test conditions

4.1.1 General environment

The test ambient temperature shall be 18 °C to 25 °C, the temperature fluctuation shall not be greater than 2 °C during the whole test and the relative humidity is 30% to 70%.

4.1.2 Power supply

The supply voltage for samples to be tested shall be the nominal operating voltage.

4.1.3 Pre-running

The samples to be tested shall run for at least the specified time in the environment specified in 4.1.1 before the test.

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4.2 Apparatus and equipment

The maximum permissible errors of the test apparatus and equipment are given in Table 1.

Table 1 — Test apparatus and equipment

Test apparatus and equipment	Resolution	Maximum permissible error
Field-strength meter	1 dBμV/m	—
Standard time signal transmitter	frequency deviation: ± 0.5 ppm	
Shielded room	Have a shielding effect which does not affect the signal receiving measurement.	
Note: When users purchasing the shielded room equipment, it is recommended to purchase the shielded room with a shielding effectiveness level corresponding to its environmental noise.		

4.3 Test preparation

4.3.1 Use the field strength meter to verify that the background noise strength in the measurement frequency band at the measurement location in the shielded room is lower than the specified value, and confirm that the background noise does not affect the measurement.

4.3.2 Put the standard time signal transmitter outside the shielded room, and put the connect antenna as well as the sample to be tested inside the shielded room.

4.3.3 Start the standard time signal transmitter and preheat it for at least 30 minutes.

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4.4 Test procedure

4.4.1 Set the transmitted signal strength of the standard time signal transmitter to the specified value.

4.4.2 According to the user manual of the time signal transmitter, use the field strength meter to verify that the signal strength conforms to the specified value at the test position and direction of the test sample built-in antenna.

4.4.3 Put the built-in antenna of the test sample at the position and direction which the signal strength has been verified to conform to the requirement, so that the receiving sensitivity becomes the highest.

4.4.4 Set the transmitter time of the signal transmitter different from the indication time of the test sample, or adjust the indication time of the test sample different from the transmitter time of the signal transmitter. The time difference between both of them shall be within the specified range of the product.

4.4.5 Operate the test sample under the receiving state, after the time period specified with the product, observe whether the indication time of the test sample is the same as the transmission time of the transmitter and confirm whether it receives the signal.

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Annex A
(informative)

The major low frequency time code signal in the world

Time code	Country	Transmitting station name	Transmitting station location	Transmitting station geographical coordinates	Carrier frequency
ALS162	France	TDF radio station	Allouis/Cher (18)	47°10’ N, 02°12’ E	162 kHz
BPC	China	BPC Shangqiu Low-Frequency Time-Code Radio Station	Shangqiu/Henan	34°27’ N, 115°50’ E	68.5 kHz
DCF77	Germany	Mainflingen Transmitting Station	Mainflingen/Hessen	50°01’ N, 09°00’ E	77.5 kHz
JJY	Japan	Ohtakadoya-Yama LF Station	Mount Otakadoya/ Fukushima	37°22’ N, 140°51’ E	40 kHz
		Hagane-Yama LF Station	Mount Hagane/ Saga	33°28’ N, 130°11’ E	60 kHz
MSF	the United Kingdom	Anthorn Radio Station	Anthorn/Cumbria	54°55’ N, 03°15’ W	60 kHz
WWVB	the United States	NIST Radio Station WWVB	Fort Collins/ Colorado	40°40’ N, 105°03’ W	60 kHz

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