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**Photography — Synchronizers, ignition  
circuits and connectors for cameras and  
photoflash units — Electrical  
characteristics and test methods**

*Photographie — Interrupteurs synchronisés, circuits d'amorçage et  
connecteurs pour appareils de prise de vue et sources d'éclairs —  
Caractéristiques électriques et méthodes d'essai*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10330 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 10330:1992), of which it constitutes a minor revision.

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## Introduction

When a camera is used in conjunction with a photoflash unit, the photoflash unit can fail to fire, depending upon the combination. The possible causes include a failure of the camera or photoflash unit, poor electrical contact at the connection between both, and the signal transferred to the photoflash unit for firing it being improper.

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# Photography — Synchronizers, ignition circuits and connectors for cameras and photoflash units — Electrical characteristics and test methods

## 1 Scope

This International Standard specifies the electrical requirements of the camera synchronizer, the ignition circuit in the photoflash unit and the cable to connect these, and the test methods to secure positive firing of the photoflash unit.

## 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.

ISO 516:1999, *Photography — Camera shutters — Timing*

ISO 518:1977, *Photography — Camera accessory shoes, with and without electrical contacts, for photoflash lamps and electronic photoflash units*

ISO 519:1992, *Photography — Hand-held cameras — Flash-connector dimensions*

ISO 8581:1994, *Photography — Electronic flash equipment — Connectors to synchro-cord*

## 3 Terms and definitions

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

### 3.1

#### **synchronizer**

device provided in a camera or shutter unit which fire the photoflash unit in synchronization with the operation of the camera shutter and which consists of synchronizer terminals, a synchronization switch and a circuit that connects them

NOTE For details of synchronization, refer to ISO 516.

### 3.2

#### **synchronizer terminals**

part of the synchronizer which couples the camera or shutter unit with the photoflash unit as does the accessory shoe with electrical contacts defined in ISO 518 and the socket defined in ISO 519

### 3.3

#### **ignition circuit terminals**

parts of the photoflash unit which are connected to the synchronizer terminals to couple the camera or shutter unit with the photoflash unit to permit firing operation, as does the foot with electrical contacts defined in ISO 518, the plug defined in ISO 519 and the sockets defined in ISO 8581

**3.4**

**synchronization switch**

switch provided for firing the photoflash unit

NOTE It may be a mechanical or electronic switch.

**3.5**

**synchronizer leakage current**

current flowing through the synchronizer when the specified voltage is applied across the synchronizer terminals with the synchronization switch turned off

**3.6**

**dynamic characteristics of synchronizer**

variation with time of the voltage appearing across the synchronizer terminals when the camera synchronizer is operated

**3.7**

**ignition circuit**

part of the photoflash unit provided to receive the signal from the synchronizer and fire the electronic flash tube or flash bulb

**4 Requirements**

**4.1 Polarities for synchronizer terminals and ignition circuit terminals**

The polarities of the synchronizer terminals in a camera and that of the ignition circuit terminals in a photoflash unit coupled with the camera are defined in 4.1.1 and 4.1.2. The polarity of the camera synchronizer terminals shall be matched to that of the ignition circuit terminals in the coupled photoflash unit. When more than one photoflash unit is connected to a single camera in parallel by use of a device such as an adapter, it is recommended that a reverse current prevention circuit be incorporated in the adapter or the respective photoflash units to avoid an electrical interference of one photoflash unit with another.

**4.1.1** For the “camera accessory shoe with electrical contacts”, defined in ISO 518, and the “foot of photoflash equipment with electrical contacts”, the contact P shown in Figure 1 shall be the positive pole, while the surface Q shall be the negative pole and, when the photoflash unit is connected to the camera, the potential for P shall be higher than that for Q.

**4.1.2** For the “socket and plug in small flash connections for hand-held cameras” defined in ISO 519, the part P shown in Figure 2 shall be the positive pole, while the part Q shall be the negative pole and, when the camera is connected to photoflash unit, the potential for P shall be higher than that for Q.

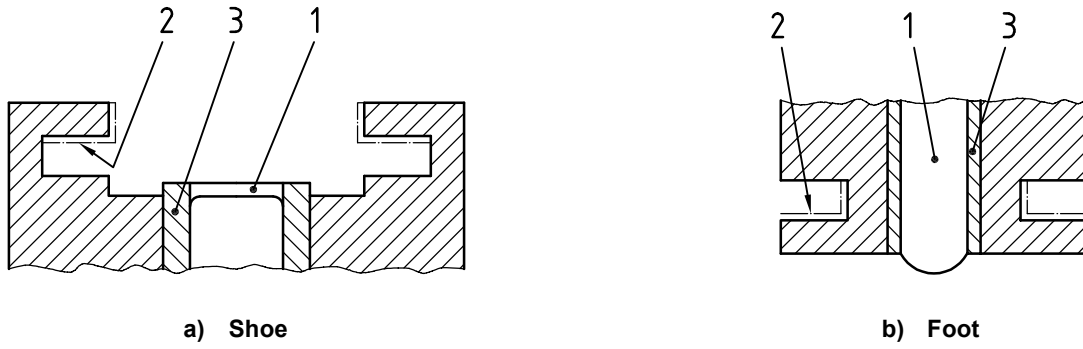
**4.2 Voltage across and current through synchronizer terminals and ignition circuit terminals**

The voltage applied across the camera synchronizer terminals and that developed across the ignition circuit terminals in the photoflash unit shall not exceed 24 V d.c.

NOTE The 24 V d.c. value is the same as the value of the “safety extra low voltage” specified in 8.1 in IEC 60335-1:2001.

The synchronization current flowing through the camera synchronizer terminals shall be 100 mA at maximum and the current flowing through the ignition circuit terminals in any one of the photoflash units shall be 30 mA at maximum.



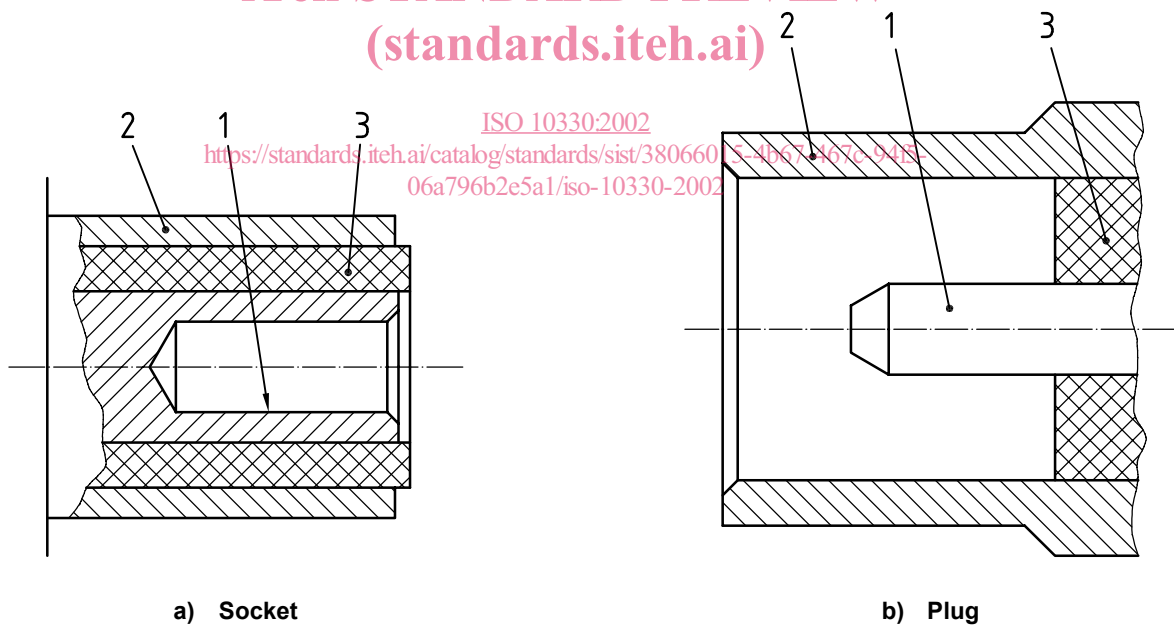


**Key**

- 1 Part P
- 2 Part Q
- 3 Insulation

**Figure 1 — Polarities for camera accessory shoe with electrical contacts and foot of photoflash equipment with electrical contacts**

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**Key**

- 1 Part P
- 2 Part Q
- 3 Insulation

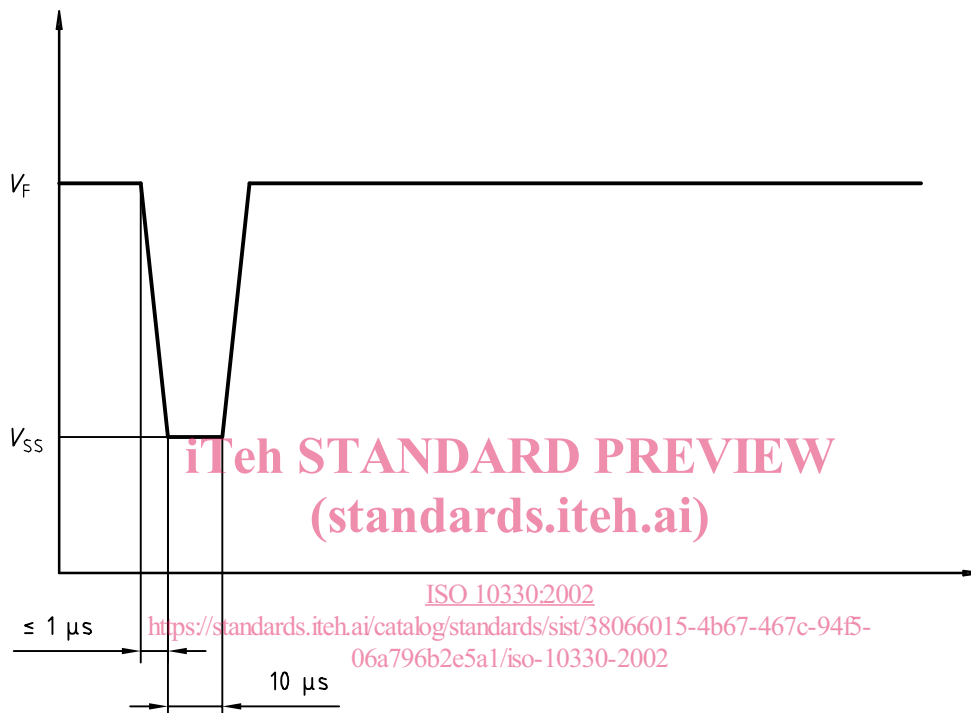
**Figure 2 — Polarities of sockets and plug in small flash connection for hand-held cameras**

### 4.3 Ignition circuit operation

When a 4,4 MΩ resistor is connected across the ignition circuit terminals and a pulse voltage as shown in Figure 3 is applied across the terminals, the photoflash unit shall be fired.

NOTE 1 The resistance value of 4,4 MΩ is specified in consideration of the synchronizer leakage current and the cable insulation resistance.

NOTE 2 See A.2 for the requirements for a photoflash unit having an ignition circuit which is equipped with precautions against accidental firing and failure to fire due to noise or chattering of the synchronization contacts.



$V_F$  is the voltage developed across ignition circuit terminals in a photoflash unit and is equal to 24 V d.c. maximum.  
 $V_{SS}$  is equal to 1,6 V.

Figure 3 — Voltage waveform across ignition circuit terminals

### 4.4 Dynamic characteristics of synchronizer

When the camera is operated with a 24 V d.c. power supply and 240 Ω resistor connected across the camera synchronizer terminals in series (see Figure 6) and the synchronizer has an electronic switch, then the terminal voltage for the synchronizer shall be maintained at 1,5 V or less until the synchronization switch is turned off (see the continuous thick line in Figure 4).

On the other hand, when the synchronizer has a mechanical switch, at least one of the time periods ( $T_1$  to  $T_2$ ) between the moment the synchronizer terminal voltage reaches 21 V and the moment a time of 150 μs elapses and during which the voltage across the synchronizer terminals is maintained at a value of 1,5 V or less, shall be 10 μs or more (see the broken line in Figure 4).

NOTE 1 When the synchronizer has a mechanical synchronization switch, it is desirable that after a time of 150 μs elapses, the synchronizer terminal voltage be maintained at 1,5 V or less over as long a time period as possible.

NOTE 2 It is desirable that the synchronization switch be opened after the shutter closing operation is started

## 4.5 Synchronizer leakage current

When a 24 V d.c. voltage is applied across the camera synchronizer terminals with the camera synchronization switch turned off, the leakage current shall be 5  $\mu$ A or less.

## 4.6 Electrical characteristics of cable

### 4.6.1 Cable resistance

When the cable is short-circuited at one end, the resistance across the terminals at the other end shall be 2  $\Omega$  or less.

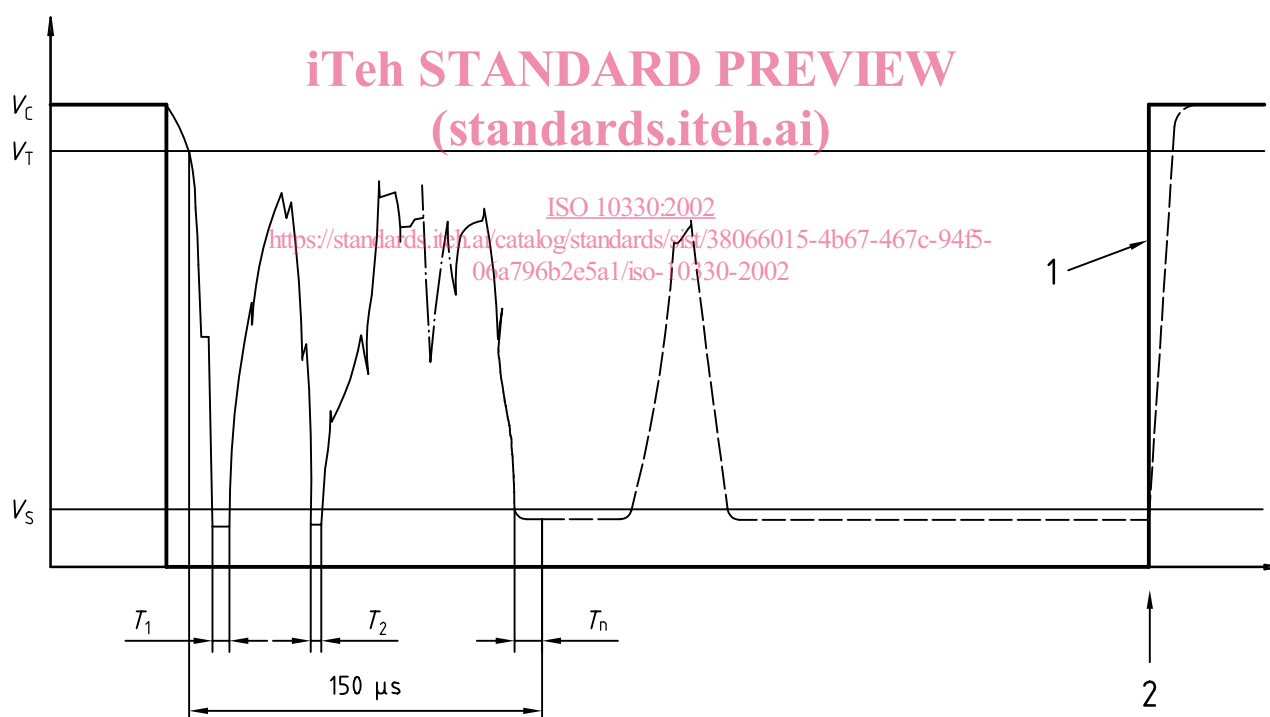
When an extremely long or special cable is used, it should be checked for inductance and capacitance.

### 4.6.2 Cable capacitance

The cable shall have a capacitance of 3 000 pF or less.

### 4.6.3 Cable insulation resistance

The insulation resistance of the cable shall be 50 M $\Omega$  or higher at 100 V d.c.



### Key

- 1 Ideal dynamic characteristic curve
- 2 Shutter closing operation is started

$V_C$  is the testing voltage and is equal to 24 V.

$V_T$  is the defined synchronizer starting voltage and is equal to 21 V.

$V_S$  is the upper limit of defined synchronizer on-state voltage and is equal to 1,5 V.

**Figure 4 — Dynamic characteristics of the synchronizer**