INTERNATIONAL STANDARD 1229

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Photography — Expendable photoflash lamps — Determination of the light output

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1229 (originally Draft International Standard ISO/DIS 1072.2) was drawn up by Technical Committee ISO/TC 42, *Photography*.

It was approved in April 1969 by the Member Bodies of the following countries :

Belgium	Iran	Spain
Czechoslovakia	Italy	Sweden
Egypt, Arab Rep. of	Japan	Thailand
France	Netherlands	United Kingdom
Germany	New Zealand	U.S.A.
Greece	South Africa, Rep. of	U.S.S.R.

No Member Body expressed disapproval of the document.

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Photography — Expendable photoflash lamps — Determination of the light output

1 SCOPE

This International Standard specifies methods for determining the light output of expendable photoflash lamps. The test apparatus described makes it possible to obtain :

a) a recording of the light versus time curve;

b) total light output in lumen seconds (lm·s), determined from the curve, a) above, by integration, or directly by a suitable integrating circuit for the photoelectric current.

2 FIELD OF APPLICATION

The test procedures apply to photoflash lamps in which the light is produced by an electrically initiated combustion within a transparent envelope. The procedures enable the luminous flux versus time to be determined.

3 TEST APPARATUS

3.1 Cathode-ray oscilloscope, having a beam intensity modulation and a single sweep circuit with sweep times of approximately 20 to 100 ms.

3.2 Oscillator, capable of supplying calibrated output frequencies of 0.4 to 2 kHz, for connection to the beam intensity modulation terminals of the oscilloscope.

3.3 Integrating sphere, of the type generally used for the measurement of the lumen output of incandescent lamps.

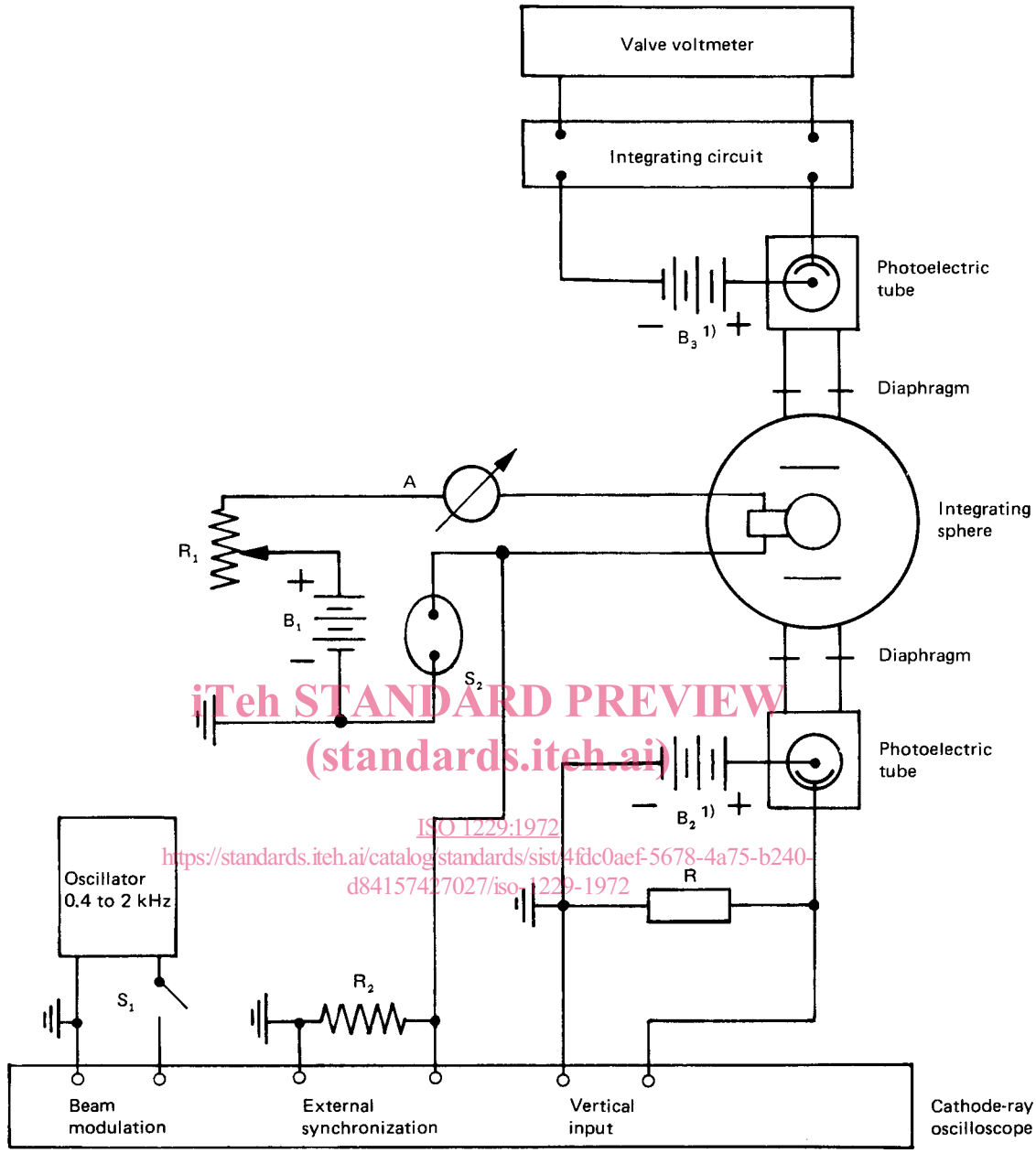
3.4 Vacuum phototube and filter combination, having a spectral response approximating to the luminosity curve of the International Commission on Illumination (CIE) standard observer.

3.5 Integrating circuit, for the measurement of the light output in lumen seconds.

3.6 Direct current supply, of 3.0 ± 0.1 V, applied using an internal resistance such that a current of 3.0 A can be obtained.

3.7 Camera, capable of providing satisfactory photographs of the cathode-ray tube screen.

3.8 Phototube circuit, connected to the vertical deflection circuit of the cathode-ray tube in the oscilloscope, and **Tripping circuit** both as shown in the lower portion of Figure 1.



A – Ammeter

R – Resistor

R_1 – Variable resistor

R_2 – Fixed resistor (depends on type of oscilloscope and lamp supply circuit)

S_1 – Manual switch

S_2 – Mercury switch

B_1 – Direct current source, 3V

B_2 – Direct current source, 90 to 450 V[1)]

B_3 – Direct current source, 90 to 450 V[1)]

FIGURE 1 – **Test circuit for determining the light output of photoflash lamps**

1) Actual voltage within this range shall be no greater than the manufacturer's recommended value for the photoelectric tube used.

4 PHOTOMETRIC TESTS

The photometric tests on the photoflash lamps are carried out in an integrating sphere equipped with a photocell-filter combination. Record the luminous flux versus time curve (see Figure 2) by means of a suitable direct current oscilloscope using the apparatus described in section 3 and the circuit shown in Figure 1.

5 CALIBRATION OF APPARATUS

A calibrated incandescent standard of luminous flux of at least 15 klm is used to calibrate the Y or lumen axis. The resistor R in the circuit diagram of the lower part of Figure 1 will govern the deflection in the Y axis direction. For the measurement of photoflash lamps, this resistor shall be chosen in such a way that with a suitable amplification setting of the oscilloscope amplifier the flash curve covers about two-thirds of the total screen-height available.

During calibration with an incandescent standard lamp, the resistor R will have to be replaced by a resistor chosen in such a way that the resulting resistance of the resistor and the input impedance of the Y axis terminals will, with the same amplification setting, give a deflection of the same order as with the flash lamp under test (for example, approximately one-third of the peak of the flash lamp). The deflection is then increased by the ratio of this resistance to 2 MΩ.

In addition, in order to obtain deflection of the same order of magnitude with flash lamps having widely different peak lumen outputs, a set of diaphragms of known transmission shall be available for use in the sphere window when photoflash lamps are measured. The calibration of the ordinates of the luminous flux versus time curves obtained is given by the following formula :

$$\text{lumens} = \frac{F}{r} \times \frac{d}{D} \times \frac{R_c}{R_t}$$

where

F is the luminous flux, in lumens, of the incandescent standard;

d is the deflection of the cathode-ray beam during testing of the photoflash lamp;

D is the deflection of the cathode-ray beam during calibration with standard lamp operated at specified voltage and without diaphragm in sphere window;

r is the transmission factor of diaphragm used with photoflash lamp under test;

R_c is the effective photocell load resistance, in ohms, used in calibration;

R_t is the effective photocell load resistance, in ohms, used during testing.

6 TIME CALIBRATION

Time calibration shall be carried out by means of the marker pulses introduced by the beam intensity modulation (see 3.1).

7 TESTING PROCEDURE

7.1 Using the direct current supply specified in 3.6[1], insert a shorting plug in the photoflash lamp socket, close the mercury switch S_2[2], (see Figure 1), and adjust variable resistor R_1 until the ammeter reads 3A.

7.2 Open the mercury switch and remove the shorting plug. Adjust the single sweep control of the oscilloscope until it trips with the operation of the mercury switch S_2. A 1Ω resistance across the test lamp socket is necessary when making this adjustment. With the photoflash lamp under test in its socket, start the oscillator by closing switch S_1, open the camera shutter, and close the mercury switch S_2.

7.3 Set the intensity adjustment of the oscilloscope so that the trace is faint but visible until with modulation it alternates between complete blanking out and strong intensification.

7.4 An example of a luminous flux versus time curve made with this apparatus is shown in Figure 2. The zero line is obtained by operating the tripping switch without a photoflash lamp in the sphere.

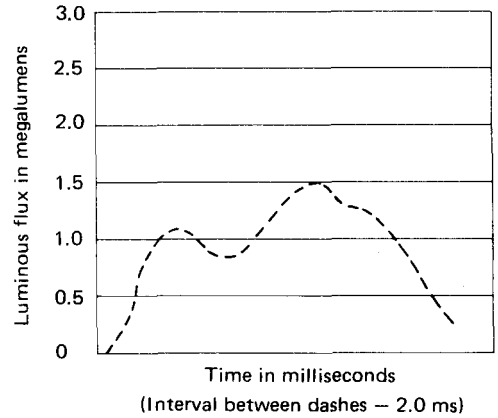


FIGURE 2 – **Luminous flux versus time curve**

1) To obtain significant ratings, measurements shall be at definite reproducible input values which conform to actual practice. Peak time ratings of photoflash lamps are therefore measured using a 3V source and a 3A short circuit current because this approximates to most field applications.

2) Instead of the mercury switch a suitable electronic switching circuit may be used.

8 METHOD FOR DETERMINING THE QUANTITY OF LIGHT (LUMEN SECONDS)

The method of directly measuring the quantity of light from photoflash lamps is based on the use of a suitable integrating circuit for the photoelectric current. This circuit is indicated in the upper portion of Figure 1.

The integrating apparatus is calibrated by using an incandescent standard lamp of known luminous flux in the integrating sphere. The photoelectric current is integrated during an accurately known time period. This time period is determined by an electronic gate which starts and stops the integration.

The luminous flux of the above standard lamp shall be at least 5 klm; the time period shall be chosen in such a way that the quantity of light during calibration is of the same order of magnitude as that of the photoflash lamps to be tested.