

# INTERNATIONAL STANDARD

# ISO 4834

Second edition  
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## **Cinematography — Magnetic sound test films excluding striped release prints — Basic technical characteristics**

*Cinématographie — Films magnétiques sonores étalons à l'exclusion des  
copies d'exploitation — Caractéristiques techniques de base*

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**ISO 4834:1997(E)****Foreword**

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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.

International Standard ISO 4834 was prepared by Technical Committee ISO/TC 36, *Cinematography*.

This second edition cancels and replaces the first edition (ISO 4834:1986), of which it constitutes a technical revision.

Annexes A and B of this International Standard are for information only.

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## Introduction

Two types of magnetic test films have been in wide use. They have differed in the manner of measuring the magnetic flux level and in the detailed procedures of measurement that had been anticipated for their application to systems evaluation and adjustment. It has now been possible to achieve agreement as follows:

**Type 185** — Magnetic flux levels are measured by the procedures of ANSI S4.6<sup>[2]</sup> and IEC 94-3<sup>[3]</sup>. The reference level is 185 nWb/m. The frequency series is 6 dB below reference level. These films were developed for use with a mains frequency of 60 Hz, and for measurement with Standard Volume Indicator (SVI) meters conforming to ANSI C16.5<sup>[6]</sup>.

**Type 320** — Magnetic flux levels are measured by the procedures of DIN 45 520<sup>[4]</sup>. The reference level is 320 nWb/m. The frequency series is 10 dB below reference level. The calibrations differ from those obtained by type 185 test film, and generally indicate a result about 1 dB higher for identical flux levels. These films were developed for use with a mains frequency of 50 Hz, and for measurement with Standard Peak Programme (SPP) meters conforming to IEC 268-10<sup>[7]</sup>.

A compromise format has been developed that provides the functional advantages of both previous series and meets the needs each had served. This International Standard describes that universal format.

# Cinematography — Magnetic sound test films excluding striped release prints — Basic technical characteristics

## 1 Scope

This International Standard specifies basic technical characteristics for the magnetic sound test films for checking, adjusting and measuring sound reproducing channels of dubbing motion-picture installations.

It also specifies types and technical characteristics of magnetic test films made on 35 mm, 17,5 mm and 16 mm motion-picture films.

This International Standard includes test films intended for the checking, adjusting and measuring of

- a) inclination angle (azimuth) of the magnetic head gaps;
- b) output level balance of multi-channel systems;
- c) frequency response of the sound reproduction channel;
- d) non-uniformity of film velocity (flutter).

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 69:1990, *Cinematography — 16 mm motion-picture and magnetic film — Cutting and perforating dimensions.*

ISO 162:1985, *Cinematography — Head gaps and sound records for three-, four-, or six-track magnetic sound records on 35 mm and single-track on 17,5 mm motion-picture film containing no picture — Positions and width dimensions.*

ISO 266:1997, *Acoustics — Preferred frequencies.*

ISO 491:1995, *Cinematography — 35 mm motion-picture film and magnetic film — Cutting and perforating dimensions.*

ISO 1188:1984, *Cinematography — Recorded characteristic for magnetic sound on full-coat 16 mm motion-picture film — Specifications.*

ISO 1189:1986, *Cinematography — Recorded characteristic for magnetic sound records on 35 mm motion-picture film excluding striped release prints — Specifications.*

ISO 4242:1980, *Cinematography — Recording head gaps for two sound records on 16 mm magnetic film — Positions and width dimensions.*

### 3 Specifications common to all types of magnetic sound test films

**3.1** Test films shall be made on motion-picture raw stock film, the cutting and perforating dimensions of which are in accordance with the following ISO Standards:

- for 35 mm film: ISO 491
- for 16 mm film: ISO 69

**3.2** The location and width dimensions of sound records shall be in accordance with the following ISO Standards:

- for 35 mm film: ISO 162
- for 16 mm film: ISO 4242

**3.3** Magnetic recording characteristics for multifrequency test film shall be in accordance with the following ISO Standards:

- for 35 mm film: ISO 1189
- for 16 mm film: ISO 1188

**3.4** Test films shall be splice-free, except where a splice is intended as part of the test film.

**3.5** Test films shall be recorded at the following frame rates for 16 mm, 17,5 mm and 35 mm test films: at either 24 or 25 frames per second.

Use at other frame rates is admissible, in which case the frame rate shall be stated. All frequency tolerances refer to the stated frame rate.

**3.6** Within the multifrequency films, each frequency shall be identified by voice announcements preceding that frequency segment. The peak level of voice announcements shall not exceed the peak level of modulation of the test signal.

**3.7** Each test film shall be provided with written identification on the outside of the container, stating function of the film, nature (acetate or polyester) and thickness of the base, frame rate, date, and place of recording.

**3.8** If multi-track test films are made on a single strip of motion-picture film, the individual records shall be made in accordance with this International Standard, including the specific International Standards referenced in clause 2, applicable to the film stock and to each sound record.

**3.9** It shall be clearly stated which of the recording formats (see 3.2 and 3.3) are intended for evaluation with this test film.

**3.9.1** In the event that the test film is recorded with a magnetic head extending the full width of the film, or extending to any greater width than the normal for the specific format, the test film shall nevertheless meet the requirements of this International Standard when reproduced in accordance with the International Standard for the specific format.

**3.9.2** Test films recorded to a wider track width than the reproducing head will cause the head to gather fringe effect flux at long wavelengths. Guidelines for the correction of fringe effect shall be given for known standard head stacks that may be aligned with the test film.

**3.10** This International Standard specifies the minimum requirements for motion-picture magnetic sound test films. Additional test signals may be added if desired; if added, they shall be identified as described in 3.6.

**3.11** The test signals for measurement and adjustment of azimuth (see table 1), reference level (see table 2) and frequency response may be presented as individual test films, or they may be grouped with two or more functions within a single test film. A flutter test film should be a separate film.

**3.11.1** The frequency response is defined for all possible frequencies within the appropriate bandwidth, by specification of one or more time constants to define the response curve.

**3.11.2** The relative short-circuit flux levels for multifrequency test films are given in table 3 and represent the appropriate time constant characteristic. The test film levels (after application of incremental corrections supplied when necessary with each individual test film) shall agree within the tolerances defined in this International Standard.

**3.11.3** If additional specific frequencies are to be included within the test film, they shall be chosen from the 1/3 octave and 1/6 octave series of ISO 266.

**3.11.4** Test films for use in equipment sensitive to a.c. stray fields at the mains frequency may include other signal frequencies that are not simple multiples of the mains frequency.

NOTE — In countries where the power mains are operated at 60 Hz, the frequencies of 63 Hz and 125 Hz may be replaced by 50 Hz and 100 Hz, to minimize the effects of narrow band noise caused by stray a.c. fields at the mains frequency.

**3.12** If a pink noise section is included on the test film, the pink noise shall be recorded in such a way that the level within a 1/3 octave band with the centre frequency equal to any of the frequencies given in the appropriate series in table 3 shall be within the tolerances set out in table 3. The recorded level of the pink noise shall not be sufficient to cause saturation of the tape.

**3.13** An alternative test film, enabling the azimuth setting of a single track head to be determined without physically changing its setting, comprises alternate short sections of a high-frequency recording with azimuth positions at equal angles in opposite rotations from the correct position. A correctly aligned reproducing head will give equal outputs from both alternating sections. The absolute values of the angles shall not differ by more than 2'.

**Table 1 — Characteristics of test signal for checking and adjusting azimuth**

| Characteristic                                | Unit            | Film                                  |              |
|---|-----------------|---------------------------------------|--------------|
|   |                 | 35 mm/17,5 mm                         | 16 mm        |
| Frequency                                     | kHz             | 12,5                                  | 10,0         |
| Frequency tolerance                           | %               | ± 3                                   | ± 3          |
| Output uniformity                             | dB              | ± 0,5                                 | ± 0,5        |
| Azimuth tolerance                             | angular minutes | ± 1                                   | ± 1          |
| Optional additional azimuth values (see 3.13) | angular minutes | + 20<br>- 20                          | + 10<br>- 10 |
| Modulation                                    |                 | 10 dB below reference level, Type 320 |              |
| Duration of signal                            | s               | 60                                    | 60           |

**Table 2 — Characteristics of test signal for checking and adjusting reference level electrical output**

| Characteristic                      | Unit  | Film          |       |
|-------------------------------------|-------|---------------|-------|
|                                     |       | 35 mm/17,5 mm | 16 mm |
| Signal frequency                    | Hz    | 1 000         | 400   |
| Frequency tolerance                 | %     | ± 3           | ± 3   |
| Reference level 320 <sup>1)</sup>   |       |               |       |
| Short-circuit flux                  | nWb/m | 320           | 320   |
| Flux tolerance                      | nWb/m | ± 15          | ± 15  |
| Reference level 185 <sup>1)</sup>   |       |               |       |
| Short-circuit flux                  | nWb/m | 185           | 185   |
| Flux tolerance                      | nWb/m | ± 10          | ± 10  |
| Output uniformity                   | dB    | ± 0,5         | ± 0,5 |
| Harmonic distortion, total          | %     | < 1           | < 1   |
| Flutter, IEC weighted <sup>2)</sup> | %     | ≤ 0,1         | ≤ 0,1 |
| Duration of signal                  | s     | 30            | 30    |

1) Because of the differences in calibration procedures, reference level, Type 185 is actually only about 3,8 dB below reference level, Type 320.

2) Weighted flutter measurements should be made in accordance with IEC 386<sup>5)</sup>.

**Table 3 — Characteristics of test signal for the checking and adjusting of frequency response**

| Characteristic  | Unit | Film   |                      |
|---|------|--|----------------------|
|   |      | 35 mm/17,5 mm  | 16 mm                |
| Reference frequency   | Hz   | 1 000  | 400                  |
| Recorded output level of reference frequency <sup>1)</sup>                            |      | 10 dB below reference level, Type 320                        |                      |
| Time constant characteristic  | µs   | 35   | 70                   |
| Frequency series in order of their location in the test film:                         |      | Relative short-circuit flux with respect to operating level: |                      |
| 31,5 Hz   | dB   | + 0,20   | + 0,13 <sup>2)</sup> |
| 40 Hz   | dB   | + 0,20   | + 0,13               |
| 63 Hz (See 3.11.4)  | dB   | + 0,20   | + 0,13               |
| 125 Hz (See 3.11.4)   | dB   | + 0,20   | + 0,12               |
| 160 Hz <sup>2)</sup>  | dB   | + 0,20   | + 0,11               |
| 250 Hz  | dB   | + 0,19   | + 0,08               |
| 400 Hz  | dB   | —  | 0,00 <sup>1)</sup>   |
| 500 Hz  | dB   | + 0,15   | —                    |
| 1,0 kHz   | dB   | 0,00 <sup>1)</sup>   | - 0,64               |
| 2,0 kHz   | dB   | - 0,56   | - 2,36               |
| 4,0 kHz   | dB   | - 2,28   | - 5,99               |
| 6,3 kHz   | dB   | - 4,45   | - 9,25               |
| 8,0 kHz   | dB   | - 5,92   | - 11,13              |
| 10,0 kHz  | dB   | - 7,46   | - 12,95              |
| 12,5 kHz  | dB   | - 9,12   | - 14,81              |
| 14,0 kHz  | dB   | - 10,00  | —                    |
| 16,0 kHz <sup>2)</sup>  | dB   | - 11,06  | —                    |
| Frequency tolerance   |      | ± (3 % + 2 Hz)   | ± (3 % + 2 Hz)       |
| Output deviation within each frequency  | dB   | ± 0,3  | ± 0,5                |
| Short-circuit flux tolerance  | dB   | ± 0,5  | ± 0,5                |
| Output uniformity for all frequencies   | dB   | ± 0,25   | ± 0,25               |
| Duration of signal at reference frequency   | s    | 8  | 8                    |
| Duration of signal at all other frequencies   | s    | 8  | 8                    |
| 1) Reference frequency and normalization point for the response curve.                |      |  |                      |
| 2) Optional frequencies.  |      |  |                      |
| NOTE — The series proceeding from low frequency to high frequency is normal practice. |      |  |                      |



**Table 4 — Characteristics of test signals for measuring non-uniformity of film velocity**

| Characteristic   | Unit | Film                         |        |
|--|------|------------------------------|--------|
|  |      | 35 mm/17,5 mm                | 16 mm  |
| Frequency at stated velocity   | Hz   | 3 150 for all formats        |        |
| Tolerance on frequency   | Hz   | ± 25 for all formats         |        |
| Recorded output level  |      | Equal to reference, Type 320 |        |
| Output uniformity  | dB   | ± 1 for all formats          |        |
| Total weighted wow and flutter content, measured according to IEC N 386 <sup>[5]</sup> | %    | < 0,04                       | < 0,07 |
| NOTE — This test film may not be suitable for use with some older flutter meters.      |      |                              |        |

## **Annex A** (informative)

### **Bibliography**

#### **Characteristics of test materials**

- [1] IEC 94.2:1994, *Magnetic tape sound recording and reproducing systems — Part 2: Calibration tapes.*

#### **Test methods for calibration tapes and standardization**

- [2] ANSI S4.6, *Method of measuring recorded flux of magnetic sound records at medium wavelengths.*
- [3] IEC 94-3:1979, *Magnetic tape sound recording and reproducing systems — Part 3: Methods of measuring the characteristics of recording and reproducing equipment for sound on magnetic tape.*
- [4] DIN 45 520, Jan. 1973, *Magnetic tape recorders — Measurement of absolute level of magnetic flux and its frequency response on magnetic tapes.*
- [5] IEC 386:1972, *Method of measurement of speed fluctuations in sound recording and reproducing equipment.*
- [6] ANSI C16.5, *Standard practice for volume measurements of electrical speech program waves.*
- [7] IEC 268-10:1991, *Sound system equipment — Part 10: Peak programme level meters.*

## **Annex B** (informative)

### **Additional data**

The magnetic flux of reference level 185 is measured by the method given in ANSI S4.6<sup>[2]</sup>, where a special reproducing head with two symmetrical gaps is used. The magnetic film to be measured is run in contact with the front gap and then in contact with the rear gap. The flux can be calculated from the two EMF values and the data of the head.

The magnetic flux of reference level 320 is measured according to DIN 45 520<sup>[4]</sup>, where a search coil senses the flux of a very long wavelength recording. The recording head is then fed with the same current, but at the reference frequency to produce a recording for calibrating a high-efficiency reproducing head.

The azimuth tolerances specified are valid when phase relationships among several records are not critical. For phase-sensitive material, a smaller azimuth tolerance and/or a tolerance on time-coherence of the signals may be required, and written identification of this should be included on the film.

Users of test film should make certain that they match the behavioural characteristics of the film base for which the equipment is being aligned. The concern is varying dimensional changes caused by temperature, humidity and ageing. Currently this means that a polyester-based test film should not be used to align equipment using triacetate film, and a triacetate-based test film should not be used to align equipment using polyester film.

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**ICS 37.060.20**

**Descriptors:** cinematography, sound recording, magnetic recording, motion-picture film, tests, sound reproduction, test equipment, characteristics.

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