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Cinematography — Test films for the reproduction of 70 mm motion-picture release prints with magnetic stripes — Specifications

Cinématographie — Films étalons pour la reproduction sonore des tirages cinématographiques sur films de 70 mm avec pistes magnétiques — Spécifications

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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.

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 8395 was prepared by Technical Committee ISO/TC 36, *Cinematography*.

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

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Cinematography — Test films for the reproduction of 70 mm motion-picture release prints with magnetic stripes — Specifications

1 Scope

This International Standard specifies basic technical characteristics for magnetic sound test films used for checking, adjusting and measuring 70 mm motion-picture projector sound systems and sound reproduction channels of motion-picture installations.

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

a) azimuth of the magnetic head gaps (azimuth alignment test film; see table 1);

b) output level balance of several motion-picture projectors or systems and interchannel balance on each projector or system (signal level test film; see table 2);

c) frequency response of the sound reproduction channels (multi-frequency test film; see tables 3 and 4);

d) non-uniformity in velocity of film travel (flutter) (flutter test film; see table 5).

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 266:—[1]), *Acoustics — Preferred frequencies.*

ISO 2404:1986, *Cinematography — Six-track magnetic sound records on 70 mm striped release prints — Locations and dimensions.*

ISO 3023:1995, *Cinematography — 65 mm and 70 mm unexposed motion-picture film — Cutting and perforating dimensions.*

ISO 8590:1994, *Cinematography — Audio records on 70 mm motion-picture release prints with magnetic stripes — Recorded characteristic.*

ANSI S4.6:1982, *Recorded flux of magnetic sound records at medium wavelengths, methods of measuring.*

ANSI/IEEE 152:1992, *Audio Program Level Measurement.*

CCIR Report 79-2:1994, *Measurement of the characteristics of sound signals recorded on magnetic tape.*

DIN 45 520:1973, *Magnetic tape recorders; measurement of the absolute level of the magnetic flux and its frequency response on magnetic tapes.*

EBU Technical Document 3205-E, 1979, *The EBU standard peak-programme meter for the control of international transmissions.*

1) To be published. (Revision of ISO 266:1975)

IEC 386:1972, *Method of measurement of speed fluctuations in sound recording and reproducing equipment.*

3 Types of test film

It is recognized that two different types of magnetic test film are used for the evaluation and adjustment of magnetic film reproducers. These test films differ in the way their magnetic flux levels are measured, and in the detailed procedures of their application in system evaluation and adjustment. In this International Standard, both types of magnetic test film are specified, according to the following definitions.

a) **Type 185**

Magnetic flux levels are measured using the procedures specified in ANSI S4.6 and CCIR 79-2. The reference short-circuit flux level shall be 185 nWb/m. The test film signal output level shall be 6 dB below the reference flux level. These test films were developed for use generally in countries with a mains frequency of 60 Hz, and for measurement with VU meters conforming to ANSI/IEEE 152.

NOTE 1 The method for measuring magnetic flux level given in ANSI S4.6 uses a special reproducing head with two symmetrical gaps. The magnetic film to be measured is run in contact with the front gap and then in contact with the rear gap. The flux is calculated from the two EMF values and the head data.

b) **Type 320**

Magnetic flux levels are measured using the procedures specified in DIN 45 520. The reference short-circuit flux level shall be 320 nWb/m. The test film signal output level shall be 10 dB below the reference flux level. These test films were developed for use generally in countries with a mains frequency of 50 Hz, and for measurement with SPP meters conforming to EBU Technical Document 3205-E.

NOTE 2 The method for measuring magnetic flux level given in DIN 45 520 uses a search coil to sense 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 calibration of a magnetic film reproducer resulting from the use of a Type 320 magnetic test film will differ from that obtained from the use of a Type 185 magnetic test film, and will generally give a result about 1 dB higher for identical flux levels.

4 Specifications

4.1 Test films shall be made on motion-picture film, the cutting and perforating dimensions of which are in accordance with ISO 3023. (See also annex A).

4.2 Location and width dimensions of sound records shall be in accordance with ISO 2404.

4.3 Magnetic recording characteristics for multifrequency test film shall be in accordance with ISO 8590.

4.4 Test films shall be splice-free, except where joins are an essential part of the test film.

4.5 70 mm test films shall be recorded at a film velocity equivalent to 24 frames (120 perforations) per second [nominally 570 mm (22,4 in) per second]. All frequency and velocity tolerances shall relate to this stated velocity.

4.6 Each test film shall be provided with written identification on the outside of the container, including the following information:

— type of test film (Type 185 or Type 320),

— function of the film,

— base material (triacetate or polyester),

— date and place of recording, and

— a statement that the test film conforms to this International Standard.

4.7 Within multifrequency test 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.

4.8 If multi-track test films are made on a fully magnetic coated motion-picture film, the individual records shall be made in accordance with this International Standard, including the specific International Standards referenced in clause 2.

Table 1 — Characteristics of test signal for checking and adjusting azimuth (azimuth alignment test film)

Characteristic	Value
Signal frequency	16 kHz
Frequency tolerance	± 3 %
Azimuth tolerance for each track	± 3′
Type 185 signal output level	6 dB below reference flux level
Type 320 signal output level	10 dB below reference flux level
Output uniformity	± 0,5 dB
Minimum duration of signal	100 s

Table 2 — Characteristics of test signal for checking and adjusting reference flux electrical output (signal level test film)

Characteristic	Value
Signal frequency	1 000 Hz
Frequency tolerance	± 3 %
Type 185 reference short-circuit flux	185 nWb/m
Type 320 reference short-circuit flux	320 nWb/m
Reference flux tolerance	± 10 nWb/m
Output uniformity	± 0,5 dB
Harmonic distortion, total	< 2 %
Flutter, IEC weighted	< 0,1 %
Minimum duration of signal	60 s
NOTE — Because of the differences in calibration procedures, Type 185 reference flux is actually only about 3,8 dB below Type 320 reference flux (see clause 3, notes 1 and 2).	

Table 3 — Characteristics of test signal for checking and adjusting frequency response (multi-frequency test film)

Characteristic	Value
Reference signal frequency	1 000 Hz
Type 185 signal output level at reference frequency	6 dB below 185 nWb/m
Type 320 signal output level at reference frequency	10 dB below 320 nWb/m
Short-circuit flux tolerance at all frequencies	± 0,5 dB
Output uniformity at all frequencies	± 0,5 dB
Output deviation within each frequency	± 0,3 dB
Time constant characteristics	3 180 µs and 35 µs
Frequency tolerance at all frequencies	± (3 % + 2 Hz)
Minimum duration of signal at reference frequency	20 s
Minimum duration of signal at all other frequencies	8 s

Table 4 — Calculated relative levels in decibels against frequency (see 4.12.1)

Frequency series in order of their location in the test film Hz	Short-circuit flux[1] nWb/m		Relative level[2] dB
	Type 185	**Type 320**	
1 000 [3]	92,7	101,2	0
20 [4]	255,5	278,9	8,80
25 [4]	212,2	231,6	7,19
31,5	178,0	194,3	5,66
40	151,9	165,7	4,29
50	134,1	146,4	3,21
63	121,1	132,1	2,32
80	111,8	122,0	1,63
125	102,1	111,4	0,84
160 [4]	99,3	108,4	0,59
250	96,6	105,4	0,35
315	95,8	104,5	0,28
400	95,2	103,9	0,23
500	94,7	103,4	0,19
1 000 [3]	92,7	101,2	0
2 000	86,8	94,8	−0,57
3 150	78,0	85,1	−1,51
6 300	55,5	60,6	−4,46
8 000	46,9	51,1	−5,93
10 000	39,2	42,8	−7,47
12 500	32,4	35,4	−9,13
16 000	25,9	28,3	−11,07

1) See notes 1 and 2 in clause 3.

2) Calculation based on a normalizing constant of 0,194 244 3.

3) Reference frequency and normalization point for the response curve.

4) Optional frequency.

Table 5 — Characteristics of test signals for measuring non-uniformity in velocity of film travel (flutter) (flutter test film)

Characteristic	Value
Signal frequency at stated velocity	3 150 Hz
Tolerance on frequency	± 25 Hz
Type 185 signal output level	6 dB below 185 nWb/m
Type 320 signal output level	10 dB below 320 nWb/m
Output uniformity	± 1 dB
Total weighted wow and flutter content measured according to IEC 386	< 0,04 %
NOTE — This film may not be suitable for use with some older flutter meters.	

4.9 Test films recorded to a wider track width than the reproducing head will cause the head to gather fringe effect flux at long wavelengths. A correction shall, therefore, be applied to simulate the normal effect on the head of a standard width track. The values and application of such corrections shall be clearly stated on a correction sheet accompanying each individual test film.

4.10 This International Standard specifies the minimum test signals for magnetic sound test films. Additional test signals may be added if desired. If such test signals are added, they shall be identified (see 4.6 and 4.7).

4.11 The test signals for measurement and adjustment of azimuth, reference level, and frequency response may be presented as individual test films, or two or more functions may be grouped within a single test film. A flutter test film shall be a separate film.

4.12 Frequency response is defined for all possible frequencies within the appropriate bandwidth by the specification of time constants to define the response curve.

4.12.1 The relative levels for multifrequency films (see table 4) are representative points along the locus defined by the time-constants, 35 µs and 3 180 µs, given in table 3 (defined in ISO 8590). 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.

NOTE 3 This International Standard calls for 3 180 µs low-frequency equalization. Equalization with no low-frequency record boost (a low-frequency time constant of infinity) has been shown to better use the overload characteristics versus frequency of the magnetic medium when recording typical programme material. However, there is some theatre equipment in the field which reproduces a flat response only when low-frequency record boost has been applied to recorded material. The use of a 3 180 µs time constant is seen as a transitional compromise between the best practice that can be obtained currently and the desired future practice with a low-frequency time constant of infinity. In addition, some older prints may exist which were recorded to a 1 590 µs time constant, and which must, on occasion, be accommodated.

4.12.2 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.

Annex A
(informative)

Behavioural characteristics of film base

Cellulose-triacetate base film suffers from significant dimensional changes resulting from variations in temperature and humidity, and a further dimensional change caused by ageing. It has been determined that polyester base film shows a much improved dimensional stability.

Due to unequal moduli of the two base materials, they are often offered at different thicknesses in an effort to compensate for their different mechanical behaviour with respect to magnetic head contact and picture projection. Technical committees have yet to determine conditions under which complete interchangeability of films on the different film bases can be achieved. Consequently, users should make certain that test materials match the behavioural characteristics of the film base for which the projector is being aligned. Currently, this means that a polyester-based test film should not be used to align a projector for showing of triacetate release prints, and a triacetate-based test film should not be used to align a projector for showing of polyester release prints.

Due to the environmental sensitivity of cellulose triacetate base films, test films made on this material may have a very short life under some conditions of storage and use. It is therefore recommended that all test films have the date of manufacture marked on them, and to ensure accuracy, the films in use should be compared periodically with a new issue of the same film.

Annex B
(informative)

Bibliography

[1] IEC 94-2:1975, *Magnetic tape sound recording and reproducing systems — Calibration tapes.*