BS ISO 12612:2016

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Cinematography — Interchange of post-production sprocket-based materials

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National foreword

This British Standard is the UK implementation of ISO 12612:2016. It supersedes BS ISO 12612:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CPW/36, Cinematography.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL STANDARD

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Cinematography — Interchange of post-production sprocket-based materials

Cinématographie — Échange de matériaux post-production dentés

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 36, *Cinematography.*

This second edition cancels and replaces the first edition (ISO 12612:1997), of which it constitutes a minor revision.

INTERNATIONAL STANDARD **ISO 12612:2016(E)**

Cinematography — Interchange of post-production sprocket-based materials

1 Scope

This International Standard specifies certain parameters and technical characteristics of post-production motion-picture materials used in the international exchange of 35 mm and 70 mm picture and sound elements.

This International Standard further specifies a method for the evaluation of picture-image quality based on a standardized test image contained in the post-production picture elements.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5-2, *Photography and graphic technology — Density measurements — Part 2: Geometric conditions for transmittance density*

ISO 5-3, *Photography and graphic technology — Density measurements — Part 3: Spectral conditions*

ISO 162, *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 491, *Cinematography — 35 mm motion-picture film and magnetic film — Cutting and perforating dimensions*

ISO 1039, *Cinematography — Cores for motion-picture and magnetic film rolls — Dimensions*

ISO 2467, *Cinematography — Image area produced by 65 mm/5 perforation motion-picture camera aperture and maximum projectable image area on 70 mm/5 perforation motion-picture prints — Positions and dimensions*

ISO 2906, *Cinematography — Image area produced by camera aperture on 35 mm motion-picture film — Position and dimensions*

ISO 2907, *Cinematography — Maximum projectable image area on 35 mm motion-picture film — Position and dimensions*

ISO 2910, *Cinematography — Screen luminance and chrominance for the projection of motion pictures*

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

ISO 4241, *Cinematography — Projection leader (time-based), trailer and cue marks — Specifications*

ISO 4834, *Cinematography — Magnetic sound test films excluding striped release prints — Basic technical characteristics*

ISO 5758, *Cinematography — Labelling of containers for motion-picture film and magnetic material — Minimum information for exchange of materials*

ISO 6038, *Cinematography — Splices for use on 70 mm, 65 mm, 35 mm and 16 mm motion-picture films — Dimensions and locations*

ISO 9525, *Cinematography — Recording head gaps for two sound records on 17,5 mm magnetic film — Positions and width dimensions*

3 Requirements for post-production picture elements

3.1 Cutting and perforating dimensions

Cutting and perforating dimensions for photographic films shall be in accordance with ISO 491 and ISO 3023.

3.1.1 For 35 mm original negatives, master positives and duplicate negatives: ISO 491 (preferred Type N perforation and 4,74 mm perforation pitch).

3.1.2 For 35 mm projection prints: ISO 491 (Type P perforation and 4,75 mm perforation pitch).

3.1.3 For 65 mm original negatives, master positives and duplicate negatives and for 70 mm projection prints: ISO 3023.

3.2 Position and dimensions of picture areas

Position and dimensions of picture areas shall be in accordance with ISO 2906, ISO 2907, and ISO 2467.

3.2.1 For 35 mm: ISO 2906 and ISO 2907.

3.2.2 For 65 mm and 70 mm: ISO 2467.

3.3 Splices

Splices shall be in accordance with ISO 6038.

3.4 Requirements for photographic characteristics

The photographic characteristics of post-production picture materials to be interchanged shall be evaluated using densitometric measurements of a test image which is spliced into the original picture rolls and reproduced through the successive stages of duplication.

The control method is based upon the Laboratory Aim Density system (LAD system) (see A.1 for a reference concerning the implementation of this system), which assigns specific density values to a control patch in a test image which is spliced into the original camera film, and is then read at each stage throughout the sequence to the projection print. All scenes within the motion picture are graded (timed) relative to the test image which is considered as a "perfect" scene.

Density aim values are chosen so that the print-through equivalent neutral densities on each film in the post production sequence fall approximately at the mid-point of the straight line portion of that film's characteristic curves.

This achieves the following two objectives:

a) most significant picture information is placed on the linear portion of the duplicating film's characteristic curve, carrying a maximum of highlight and shadow information;

b) a neutral grey scale is maintained throughout the post-production, aiding, in colour grading (timing).

A suitable LAD control image begins as a camera image incorporating a uniform neutral patch of sufficient size for convenient densitometric measurements. This patch may be positioned within a scene suitable for subjective evaluation. An 18 % reflectance grey card under scene illumination is usually appropriate. This LAD control image is spliced into the roll of original negative as specified in 3.5.3.

Ultimately, picture quality will be reviewed subjectively, but within the tolerances of normal film, printer and process variability, and the characteristics of specific duplicating film systems, objective measurements of the LAD system assist in readily obtaining consistent duplicates with good tone and colour reproduction characteristics.

3.4.1 Densitometry

The densities of all picture materials intended for reproduction shall be measured using ISO standard diffuse status M transmission densitometry (according to ISO 5-2 and ISO 5-3). Densities of picture materials intended for viewing by projection shall be measured using ISO standard diffuse status A transmission densitometry.

3.4.2 Density of the original camera negative LAD test image (LAD control patch)

The densities of the LAD control patch (see A.2) shall be chosen to be representative of the centre of scene density range normally obtained on a modern (colour-masked) colour negative film with normal exposure and processing.

3.4.3 Density of the LAD test image in master positive

The LAD control patch should be printed to the centre of the usable straight-line portion of the duplicating film. These aim densities are specified by the film manufacturer for the particular duplicating stock.

3.4.4 Density of the LAD test image in duplicate negative

The LAD control patch should be printed according to the aim densities specified by the film manufacturer for the particular duplicating stock. These densities are normally near the centre of the usable straight-line portion of the characteristic curve, but may be different from those specified for the master positive in order to aid intercutability with original camera negatives and to facilitate high-speed printing.

3.4.5 Density of the LAD test image in projection print

The LAD control patch should be printed to a neutral grey of 1,00 density (1,00 equivalent neutral density) on the print. The status A densities corresponding to a 1,00 neutral grey are specified by the film manufacturer, and will depend upon the dyes in the print film and the viewing illumination in accordance with ISO 2910.

3.5 Leaders for picture materials

3.5.1 Head and tail leaders for picture materials shall be in accordance with ISO 4241.

3.5.2 A synchronizing mark, clearly identified as “Head Sync”, shall be placed on the “Picture Gate” frame (frame 192) of the head leader.

3.5.3 The test image referred to in 3.4 shall be located in or before the head leader in a position which ensures that the printing machine has reached full and steady speed when the test image is exposed. It is recommended that the test image replaces from one to six of the head leader frames 97 to 102

3.5.4 Additional requirements for head and tail leaders are subject to agreement between the parties involved.

4 Requirements for post-production sound elements

4.1 Cutting and perforating dimensions

Cutting and perforating dimensions for 35 mm magnetic recording films shall be in accordance with ISO 491 (Type P perforation and 4,75 mm perforation pitch).

The use of 17,5 mm magnetic film is permissible only by prior agreement between all parties involved.

4.2 Position, dimensions and track assignments

Position, dimensions and track assignments of sound tracks shall be in accordance with ISO 162 for 35 mm magnetic film and ISO 9525 for 17,5 mm magnetic film.

4.3 Nominal velocity

The nominal velocity of 35 mm magnetic sound records shall be in agreement with the intended projection frame rate of the accompanying picture, normally 24 frames per second which is equivalent to 96 perforation holes per second or approximately 45,6 cm/s.

4.4 Recordings

Recordings shall be made on magnetic film containing no splices. No more than two editorial splices shall be allowed in any roll of magnetic film.

4.5 Sound records to be interchanged for making monophonic release prints (see A.3)

By agreement between the parties involved, sound records shall be recorded using the following:

— a one-track standard on separate magnetic film;

— a three-track or four-track standard on a single magnetic film.

4.5.1 Three sound records shall be recorded on a single three-track magnetic film with the following track assignments:

— Track 1: Dialog record;

— Track 2: Music record;

— Track 3: Sound effects record.

4.5.2 Four sound records shall be recorded on a single four-track magnetic film with the following track assignments:

— Track 1: Dialog record;

— Track 2: Music record;

— Track3: Sound effects record;

— Track 4: Special components record.

NOTE Special components may include original language or alternate dialogue for reference, sound tracks of synchronized noises corresponding to the noises of the synchronized dialogue sound records, crowd noise, musical accompaniment for soloists to be added at later stages, a laugh track, special sound effects, etc.

4.6 Components of sound records to be interchanged for making 35 mm stereophonic release prints (see also A.3)

By agreement between the parties involved, sound records shall be interchanged as either three or four components in either matrix encoded or discrete channel formats with the track assignments given in 4.6.1 and 4.6.2.

4.6.1 Stereophonic matrix encoded components

— Track 1: Special components record

NOTE 1 Special components may include original language or alternate dialogue for reference, sound tracks of synchronized noises corresponding to the noises of the synchronized dialogue sound records, crowd noise, musical accompaniment for soloists to be added at later stages, a laugh track, special sound effects, etc.

— Track 2: Music and sound effects Left total record

— Track 3: Music and sound effects Right total record

The original language dialogue track is customarily supplied for translation and timing, either as a monophonic magnetic record or as a photographic record on a standard release print.

NOTE 2 In the United States, it is customary to use the following track assignments:

— Track 1: Music and sound effects Left total record;

— Track 2: Music and sound effects Right total record;

— Track 3: Special components record (see Note 1).

4.6.2 Stereophonic discrete components

— Track 1: Left music and sound effects record

— Track 2: Centre music and sound effects record

— Track 3: Right music and sound effects record

— Track 4: Surround music and sound effects record

By agreement between the parties involved, sound records may be interchanged as six components as given below:

— Track 1: Left music and sound effects record;

— Track 2: Centre music and sound effects record;

— Track 3: Right music and sound effects record;

— Track 4: Surround music and sound effects record;

— Track 5: Special components record;

— Track 6: Special components record.

For masters containing two-channel surround records, the track assignments shall be made by agreement between the parties involved.

The original language dialogue track is customarily supplied for translation and timing, either as a monophonic magnetic record or as a photographic record on a standard release print.

4.7 Sound records to be interchanged for making 70 mm release prints (see also A.3)

Sound records shall be interchanged as six components with the following track assignments:

— Track 1: Left channel music and sound effects record;

— Track 2: Left-extra channel music and sound effects record;

— Track 3: Centre channel music and sound effects record;

— Track 4: Right-extra channel music and sound effects record;

— Track 5: Right channel music and sound effects record;

— Track 6: Surround channel music and sound effects record.

The original language dialogue track is customarily supplied as a separate monophonic film for reference.

By agreement between the parties involved, there may be other assignments of the sound tracks, which shall be marked on the label.

4.8 Requirements for sound record characteristics

The peak level of each of the individual records should be controlled so that a simple sum of the records at equal levels does not exceed the capabilities of the format in which the print is to be released to commercial theatres.

4.8.1 Frequency range and response: as specified in ISO 4834.

4.8.2 Recording level: each component of the sound records shall be recorded using the reference level specified in ISO 4834.

4.8.3 The relationship between the recording levels of the individual sound components in a complete mixed sound record should ensure that dialogue can be easily understood.

4.8.4 Sound records shall be free of defects affecting the sound quality. Noticeable limitations of frequency range or response, nonlinear distortion, wow and flutter, and extraneous noise shall not be present in the sound records.

4.8.5 Cross-talk between the tracks of multitrack magnetic films shall be attenuated by at least 40 dB between 100 Hz and 10 kHz inclusive.

4.8.6 A complete set of component magnetic sound tracks shall include a special test roll with the following signals, recorded in-phase on all tracks without the use of noise-reduction systems:

— recording of pink noise at a level of 10 dB below nominal with a duration of at least 30 s;

— recording of reference level tone for alignment of noise-reduction systems with a duration of at least 30 s;

— other additional signals by agreement between the parties involved.

It is recommended that a test roll be spliced at the head of one of the magnetic sound components.

4.9 Leaders for sound materials

4.9.1 Each roll of magnetic film material shall use a protective, unrecorded section of head leader not less than 8 min in length. The protective tail leader on each roll of magnetic film shall be not less than 5 min in length.

4.9.2 A recording of a 1 000 Hz sine wave tone at reference level, which is in-phase on all tracks, shall be recorded on all rolls of magnetic film material, following the protective section, for a duration of at least 30 s.

4.9.3 A recording of pink noise at reference level, which is in-phase on all tracks, shall be recorded on all rolls of magnetic film material following the 1 000 Hz tone for a duration of at least 30 s.

4.9.4 Other signals (such as alignment signals for companding noise-reduction systems, etc.) may be included in the head leaders by agreement between the parties involved.

4.9.5 No magnetic recorded test signals shall intrude in the area of film opposite the picture leader specified in ISO 4241, except as specified below.

4.9.6 Each roll of magnetic film material shall have a synchronizing mark clearly identified as "Head Sync" placed on the magnetic film in editorial sync (level sync) with the "Picture Gate" frame (frame 192) of the leader specified in ISO 4241 (see 3.5.2).

4.9.7 Each roll of magnetic film material shall have a 1 000 Hz sine wave tone at reference level recorded for a duration of one frame in editorial sync with the "2" frame (frame 48) of the leader specified in ISO 4241.

4.9.8 Each roll of magnetic film material shall have a 1 000 Hz sine wave tone at reference level recorded for a duration of one frame in editorial sync with the END frame of the tail leader specified in ISO 4241.

4.9.9 The tail leader shall include a recording of the beginning of the subsequent sound track roll for a duration of at least 30 frames.

5 Packing and marking

5.1 Photographic films and magnetic recording films shall be wound on reels or cores as specified in ISO 1039.

5.2 Cans in which post-production materials are transported and/or stored shall have identification labels containing the information specified in ISO 5758.

For magnetic recording films, the following additional information is required on the label:

— title of the film;

— roll number;

— designation of sound component(s);

— track format (1, 3, 4 or 6 track);

— track assignments (see 4.5, 4.6 and 4.7);

— total roll length, including head and tail leaders and protection leaders;

— type of noise-reduction system;

— test signals contained in the leader between protective and synchronizing sections.

Annex A
(informative)

Additional information

A.1 Reference material on implementation of LAD system

See Reference [13].

A.2 Specific densities of LAD test image in post-production picture materials

The specific densities of LAD test images for post-production materials of various types and manufacturer shall be as given in Table A.1.

Table A.1 — LAD densities

Material	**Films manufactured by Eastman Kodak®**[a]	**Films with other levels of colour masking** (density over fog and mask)
Original negative		
Status M Red	0,80 ± 0,02	0,60 ± 0,02
Status M Green	1,20 ± 0,02	0,60 ± 0,02
Status M Blue	1,60 ± 0,02	0,60 ± 0,02
Master positive	As specified by the film manufacturer	
Duplicating negative		
Projection print		

[a] Eastman Kodak is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

A.3 Note on language usage in sound tracks

Careful consideration must be given to the use of language in sound tracks, as not all language-related information appears in the "dialog" channel all of the time. In the case of scenes with a crowd, for example, the crowd noise might contain utterances in the primary language of the film, but the treatment of such material in post-production often places "crowd noise" in a sound effects record.

Placing all of the language-related content in the dialogue track will simplify replacing all of the language-related information, but will complicate the process of dubbing into alternative languages because so much new content will be required for a dub. No easy solution exists and the resulting problems are to be handled on a case-by-case basis.

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[2] ISO 18906, *Imaging materials — Photographic films — Specifications for safety film*

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

[4] ISO 2404, *Cinematography — Six-track magnetic sound records on 70 mm striped release prints — Locations and dimensions*

[5] ISO 2939, *Cinematography — Picture image area on 35 mm motion-picture release prints — Position and dimensions and analogue and digital photographic sound to picture record displacement*

[6] ISO 3640,[1)] *Cinematography — Motion-picture prints and sound records for international exchange of television programmes — Specifications*

[7] ISO 4246, *Cinematography — Vocabulary*

[8] ISO 7343, *Cinematography — Two-track photographic sound records on 35 mm motion-picture prints — Positions and width dimensions*

[9] ISO 8567, *Cinematography — Maximum permissible area for subtitle on 35 mm and 16 mm motion-picture release prints — Dimensions and locations*

[10] ISO 8590, *Cinematography — Audio records on 35 mm and 70 mm motion-picture release prints with magnetic stripes — Recorded characteristic*

[11] ISO 8687, *Cinematography — Signal-to-noise ratio of 8 mm Type S, 16 mm and 35 mm variable-area photographic sound records — Method of measurement*

[12] ISO 12611, *Cinematography — Audio head tones for use in international exchange of 35 mm analogue magnetic film masters — Specifications and location*

[13] Pytlak John P., & Fleischer Alfred W. A Simplified Motion-Picture Laboratory Control Method for Improved Colour Duplication, *SMPTE Journal* October 1976, pp. 781-786

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