INTERNATIONAL STANDARD

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# Cinematography — Spectral response of photographic audio reproducers for analog dye sound tracks on 35 mm film

*Cinématographie — Réponse spectrale de lecteurs audio avec des pistes sonores analogiques de couleurs sur film de tirage 35 mm*

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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# Foreword

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ISO 20859 was prepared by Technical Committee ISO/TC 36, *Cinematography*.

# Cinematography — Spectral response of photographic audio reproducers for analog dye sound tracks on 35 mm film

## 1 Scope

This International Standard specifies the spectral response of the photographic audio reproducer light source and receptor as a unit, including any optical filtering that can be interposed.

The analog sound track formats suitable for reproduction using such a reproducer include the cyan dye-only track (without redevelopment of silver) and both conventional and "high magenta" soundtracks (with redevelopment of silver).

## 2 Spectral response

**2.1** The peak or maximum response of the combined audio reproducer light source, filter and receptor shall be 660 nm $^{+20}_{-30}$ nm.

**2.2** The integrated response of the unit to all wavelengths greater than 800 nm shall be less than 5 % of the total integrated response measured from 400 nm to 800 nm.

# Annex A
(informative)

# Additional data

The reproduction of analog photographic sound tracks has long employed a tungsten light source and an infrared-sensitive photocell. The light beam is modulated by changes in the infrared energy absorption of the silver sound track image. This practice dates from black and white practice. When colour release prints were introduced, the practice of redeveloping a silver sound track, which consists of silver, magenta dye and cyan dye, was employed in order to maintain compatibility with all existing infrared-sensitive reproducers fitted to projectors. A change to dye-only sound tracks is taking place in order to provide environmental and other benefits. The elimination of the need for silver sound track redevelopment will allow a simplification of the colour positive process with savings in the use of hazardous chemicals and water. Discontinuation of silver redevelopment in release prints will eliminate the discharge of silver into the environment because, when used, release prints are ultimately destroyed. The red-sensitive sound reproducers required for dye tracks employ solid-state light emitting diodes (LED) or lasers with a longer lifetime than tungsten lamps, providing increased reliability of sound reproduction in theatres.

The conversion of sound reproducers from infrared-sensitive devices (for silver sound tracks) to red-sensitive devices (for cyan dye sound tracks) requires an intermediate sound track format called “high magenta”. The “high magenta” sound track eliminates the cyan dye from the silver sound track, thus making the transmission level from 600 nm to 1 000 nm almost equal. This almost equal transmission range produces good sound quality, including cancellation of cross-modulation distortion, for infrared-sensitive readers and all types of red-sensitive readers.

A dye-only soundtrack needs to use the dye density to modulate the scanning beam. Unlike the silver density that exists at all wavelengths, the cyan dye in film does not have sufficient density to modulate the scanning beam at wavelengths of less than 600 nm and at wavelengths of greater than 750 nm. Reading the cyan dye-only soundtrack too far away from its wavelength of maximum absorption will cause degradation of sound quality (higher cross-modulation distortion, lower high-frequency response and lower signal-to-noise ratio). The purpose of limiting the spectral response of the audio reproducer is to use advantageously the absorption of the cyan dye image to modulate the scanning beam and to maintain the maximum sound quality of which the cyan dye record is capable.

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