



EASTMAN EXR

Sound Recording Film 2378 / 3378

TECHNICAL DATA / SOUND RECORDING FILM

EASTMAN EXR Sound Recording Film 2378 / 3378 is a high contrast, orthochromatic black-and-white film designed for recording variable-area soundtrack negatives with a tungsten light source, and/or producing digital soundtrack negatives.

This film gives excellent results when exposed and processed to print soundtracks on any of the following films: KODAK VISION Color Print Film 2383 / 3383 KODAK Black-and-White Print Film 2302 / 3302

BASE

EASTMAN EXR Sound Recording Film 2378 / 3378 has a gray ESTAR safety base.

DARKROOM RECOMMENDATIONS

Use a LED Safelight (660 nm red) or a KODAK 2 Safelight Filter / Dark Red, with a 15-watt bulb, no closer to the film than 1.2 meters (4 feet) or handle in total darkness.

STORAGE

Store unexposed film at 13°C (55°F) or lower. For extended storage, store at -18°C (0°F) or lower. Process exposed film promptly.

Store processed film according to the recommendations in ISO 18911:2010, *Imaging Materials - Processed Safety Photographic Films - Storage Practices*. For medium-term storage (minimum of ten years), store at 25°C (77°F) or lower, preferably below 21°C (70°F), at a relative humidity not exceeding 60 percent; for extended-term storage (for preservation of material having permanent value), store at 21°C (70°F) or lower at a relative humidity of 20 to 50 percent. For active use, store at 25°C (77°F) or lower, at a relative humidity of 50 +/- 5 percent. This relates to optimized film handling rather than preservation; static, dust-attraction and curl-related problems are generally minimized at the higher relative humidity. After usage, the film should be returned to the appropriate medium- or extended-term storage conditions as soon as possible.

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EXPOSURE

Analog Sound Negatives:

This film should be exposed to tungsten illumination to produce a sound-track visual negative density (including base density) between 2.5 and 3.8

For each specific print density, there exists an optimal negative density that will result in minimum distortion, with the proper image spread, in the reproduced sound. The density of the negative having this desired amount of image spread can be determined on the basis of cross-modulation and listening tests.¹

Digital Sound Negatives:

As with analog tracks, the optimum negative density is determined by recording a series of densities, and then printing them. The best quality is then determined through playback on the Quality Control system being used in each instance.

PROCESSING

The following process recommendations should be used as starting points for a typical continuous-immersion processing machine using formulas presented in [KODAK Publication No.H-24.15, Manual for Processing KODAK Motion Picture Films, Module 15](#). The processing times may require modification for a particular machine.

Processing Step	Temperature	Time	Replenishment Rate (mL per 100 ft)	
			35 mm	16mm
KODAK Developer D-97 ^[1]	75 +/-1/2°F (23.9 +/-0.3°C)	4 min ^[2]	650 (D-97RS)	325 (D-97RS)
Stop Rinse ^[3]	75 +/-2°F (24 +/-1°C)	50 sec	12,000	6,000
KODAK Fixing Bath F-5 ^[1]	75 +/-2°F (24 +/-1°C)	9 min	600	300
Wash (counter-current)	75 +/-2°F (24 +/-1°C)	10 min	12,000	6,000
Dry	95°F (35°C)	- ^[4]		

^[1] Provide agitation in the developer and fixing bath by recirculation through submerged spray jets that impinge on the film strands.

^[2] Do not overdevelop this film to the point where it greatly increases fog level. This will cause a reduction in sound quality.

^[3] Use a countercurrent flow of fixer-laden water overflow from the wash tank, pH about 6.

^[4] Drying depends on many factors such as air temperature, relative humidity, volume and rate of air flow, flow distribution pattern, final squeeze, etc. In a typical motion picture film drying cabinet with air at about 95°F (35°C) and 40 to 50 percent RH, satisfactory drying will require 15 to 20 minutes. Film leaving the drying cabinet when it has reached room temperature should be in equilibrium with room air at approximately 50 percent RH.

¹J. O. Baker and D. H. Robinson, "Modulated High-Frequency Recording As a Means of Determining Conditions for Optimal Processing," Journal of the SMPTE, 30:3-17, January 1938, or SMPTE Recommended Practice RP104-1994, "Cross Modulation Tests for Variable-Area Photographic Sound Tracks," obtainable from SMPTE, WHITE PLAINS PLAZA, 445 HAMILTON AVE STE 601, WHITE PLAINS NY 10601-1827, tel (914) 761-1100, web site URL: <http://www.smpte.org>.

IDENTIFICATION

After processing, the words 'EASTMAN Safety Film', the strip number, and year symbol are visible along the length of the film.

IMAGE STRUCTURE

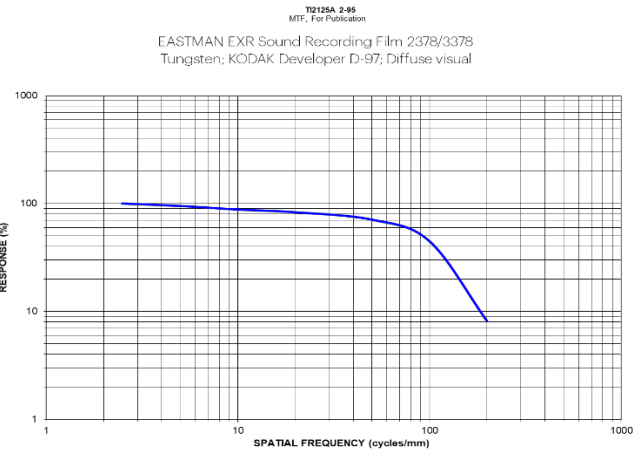
rms Granularity

Granularity = 6

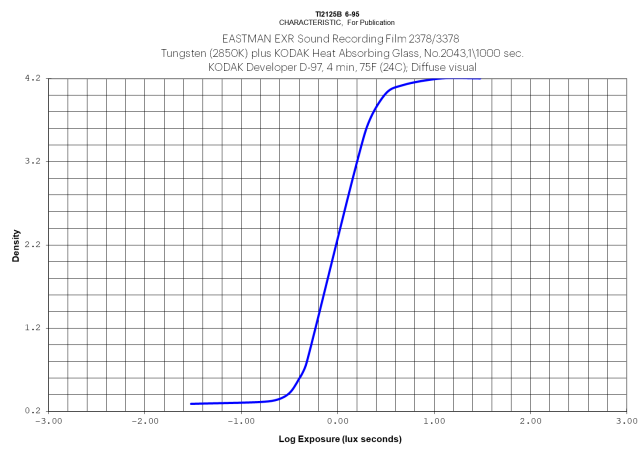
The diffuse rms granularity data was generated from samples of 2378 Film exposed with tungsten light and processed as recommended in KODAK Developer D-97 at 75°F (24°C). Read at a net diffuse visual density of 1.0 using a 48-micrometer aperture.

CURVES

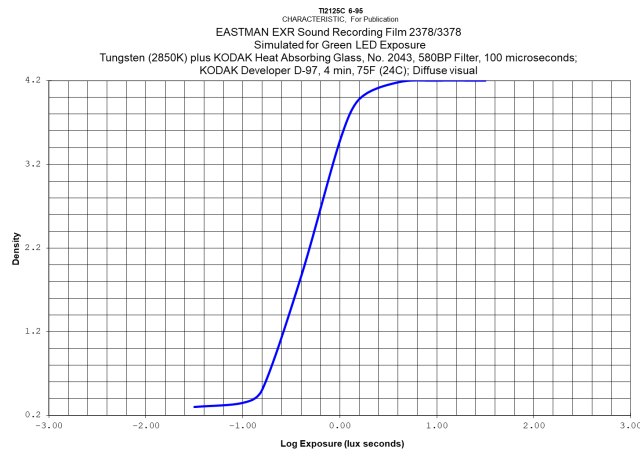
MTF



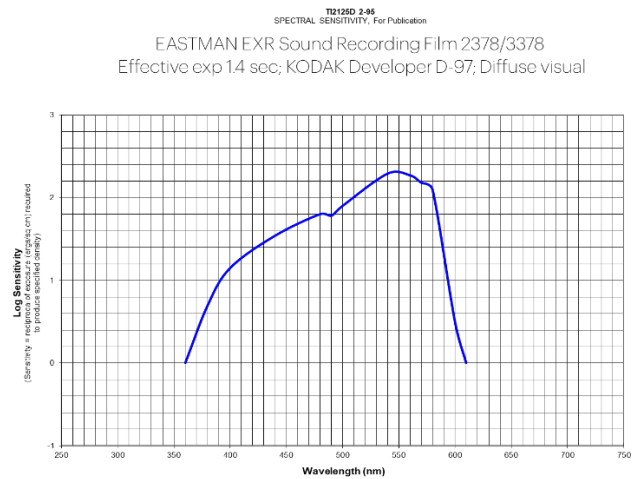
NORMAL EXPOSURE



SIMULATED FOR GREEN LED EXPOSURE



SPECTRAL SENSITIVITY



NOTICE: The sensitometric curves and data in this publication represent product tested under the conditions of exposure and processing specified. They are representative of production coatings, and therefore do not apply directly to a particular box or roll of photographic material. They do not represent standards or specifications that must be met by Eastman Kodak Company. The company reserves the right to change and improve product characteristics at any time.

Available Roll Lengths and Formats

See Kodak Motion Picture Products Catalog at www.kodak.com/go/mpcatalog

To order film in the United States and Canada, call 1- 800-356-3259, prompt 3.

Worldwide customers can find the nearest sales office at www.kodak.com/go/salesoffices



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