Cinematographer's Field Guide

KODAK
MOTION
PICTURE
CAMERA
FILMS

Entertainment
Imaging

Cinematographer's Field Guide

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INTRODUCTION

This pocket-sized publication provides up-to-date and easy-to-use information about all KODAK Motion Picture Camera Films and several important related subjects. We designed the book to help you choose and order the right films for your needs, and to help you use the films most effectively. The guide is divided into five major sections for easy reference:

Motion Picture Camera Films

Filter Information

Tips and Techniques

Formats and Packaging

Ordering Raw Stock

Brief but comprehensive descriptions of each black-and-white and color camera film appear in the section "KODAK Motion Picture Camera Films." The section "Filter Information" contains charts for color conversion, neutral density, color balancing, filter factors, and color temperature. The section "Tips and Techniques" covers film storage and care, shooting for television, must items for your on-location ditty bag, survival tools, flashing techniques, force processing, a filmmaker's flowchart, and more. The section "Formats and Packaging" clears up any questions you might have concerning "spec" numbers, "iden" numbers, film can label terms and numbers, and packaging information. The last section, "Ordering Raw Stock," tells you how to order film and lists names, addresses, and telephone numbers of Kodak people worldwide who can answer all of your questions about film and film orders.

This edition includes the new KODAK VISION Color Negative Films, the highest quality camera films available from Kodak. KODAK VISION Films, which offer superior technology for image capture, intercut seamlessly with EASTMAN EXR Color Negative Films, which are also available. These films are based on emulsion chemistry that uses KODAK T-GRAIN® Emulsions and advanced dye-coupler technology. This gives the films increased

underexposure latitude, wider speed ranges, and improvements in grain structure, sharpness, continuous-tone reproduction, and color saturation.

An edge-numbering system for all KODAK Motion Picture Camera Films features both electronic- and operator-read characters. The digital numbers, called EASTMAN KEYKODE Numbers, are in the form of a machine-readable barcode. This feature opens up the potential for automated film handling. All KODAKMotion Picture Color Negative Camera Films as well as most Black-and-White Camera Films have KEYKODENumbers.

Note: The Kodak filter materials, as well as other brand name products we describe in this publication, are available from dealers in photographic supplies. You can use equivalent materials, if desired.

Need Another H-2?

You can purchase extra copies of Publication No. H-2 from the nearest Kodak company or distributor in your country. U.S. residents can order directly from Eastman Kodak Company, Department 412L, 343 State Street, Rochester, NY 14650-0532. Be sure to include the title *Cinematographer's Field Guide* and the code number H-2 in your order.

You can also find information on KODAK Motion Picture Films on the Web. Visit our website at: **www.kodak.com/go/motion**.

KODAK MOTION PICTURE CAMERA FILMS

Introduction

This section provides pertinent information about all currently available KODAK Motion Picture Camera Films. For information on future film updates, see page 40.

A quick reference chart of all the films is on page MPF-4. Page references for the individual film-information sheets as they appear in this guide are included at the right of the chart. The detailed descriptions for each film begin on page MPF-6 and include the following information:

- Film code number and film name
- Exposure indexes and filters
- Uses and general properties
- Trial exposure settings
- Illumination table and light-contrast suggestions
- Filter factors
- Reciprocity characteristics
- Handling
- Availability

Caution: Load and unload all camera spools in total darkness to prevent edge fog on the film.

H-1 Data Sheets Available

You can get detailed data sheets for all KODAK Motion Picture Camera Films. To obtain a single free copy of any data sheet, write to Eastman Kodak Company, Dept. 412L, Rochester, NY 14650-0532. In countries outside the U.S., contact one of the facilities listed in the back of this book. Be sure to include the name and code number for each film data sheet you request. (For example: EASTMAN EXR 50D Color Negative Film 5245™ [35 mm] and 7245™ [16 mm], KODAK Publication No. H-1-5245.)

You can also find data sheets on the Kodak Entertainment Imaging website at: **www.kodak.com/go/motion**.

Technical Information

For technical information in the United States, call the Kodak Information Center (KIC), 9:00 a.m. to 7:00 p.m. (Eastern time), Monday through Friday, at 1 (800) 242-2424. In Canada, call 1 (800) 465-6325, Monday through Friday, from 8:30 a.m. to 5:00 p.m. (Eastern time). Outside the United States and Canada, contact Kodak or a distributor in your country.

A Note on T-Stops and F-Stops

When discussing lens aperture size, cinematographers traditionally refer to *t*-stops while still photographers refer to *f*-stops. A *t*-stop is a measure of actual light transmission by the lens. An *f*-stop is the theoretical ratio of the lens' focal length to the diameter of its entrance pupil (approximately the aperture diaphragm size in a symmetrical lens). What relates the two is the lens' efficiency in transmitting light; if the lens could transmit all the light entering it, its *t*-stop and *f*-stop would be the same (ANSI PH 22.90-1987, *Aperture Calibration of Motion Picture Lenses, Method for Determining,* gives full details).

Color Temperature

The color quality of some light sources can be stated in terms of *color temperature,* and is a measure that defines the color of a light source relative to the visual appearance and expressed in degrees Kelvin (K). There are at least two important points to keep in mind when using color temperature values. *First,* color temperature refers only to the *visual appearance* of a light source and does not necessarily describe its photographic effect. *Second,* color temperature does not take into account the spectral distribution of a light source. Unless the light source has a continuous spectral distribution, its effective color temperature alone may not be reliable as a means of selecting a suitable correction filter. For example, fluorescent lamps do not have the continuous smooth spectral-distribution curve that is characteristic of a tungsten-filament source.

It is possible for two or more light sources to be described as having the same color temperature, but the photographic results obtained with each may be quite different. Only a

wavelength-by-wavelength comparison of film sensitivity and spectral output of the lamp can determine the exact filters required to balance the light to the film response. KODAK Motion Picture Films have a photographic latitude that makes it unnecessary to use unusual filtration, except for special visual effects. Filter recommendations in this publication, for most normal photography, are capable of producing excellent-quality pictures with the products described.

All light sources, whether daylight, tungsten, or fluorescent, emit energy at a precise color temperature at a given moment and may not remain consistent at all times. Some factors that will affect color temperature are sun angle, conditions of sky (clouds, dust, haze), age of lamps, voltage, reflectors, etc. Deviations from the expected light source color temperature will cause an overall color shift in the finished product. While this difference may be color corrected in printing, there could be some unforeseen mired shifts. The light source color temperature should be monitored with a color temperature meter and corrected as necessary, at the source, camera, or both.

Only recommended conversion filters (e.g. daylight to artificial light) that are placed on the camera are listed in this publication. Since they may not be consistent with previous recommendations, use the current recommendations for exposures and testing. Light source filters (filters on lamps, arcs, etc.) are not listed because of the many varieties and color temperatures of the sources.

The manufacturers of these light sources should be contacted for filter recommendations. It is suggested that all filter recommendations be tested before actual shooting.

KODAK Motion Picture Camera Films

Film Name	Code No.			
	35 mm	16 mm	super 8	
EASTMAN EXR 50D	5245	7245	—	
EASTMAN EXR 100T	5248	7248	—	
KODAK VISION 200T	5274	7274	—	
EASTMAN EXR 200T	5293	7293	—	
KODAK SFX 200T	—	—	—	
KODAK VISION 250D	5246	7246	—	
KODAK VISION 320T	5277	7277	—	
KODAK VISION 500T	5279	7279	—	
EASTMAN EXR 500T	5298	—	—	
KODAK VISION 800T	5289	—	—	
KODAK EKTACHROME 100D	5285	—	—	
EASTMAN EKTACHROME	—	7240	7240	
EASTMAN EKTACHROME	—	7239	—	
EASTMAN EKTACHROME High Speed	—	7250	—	
EASTMAN EKTACHROME High Speed Daylight	—	7251	—	
EASTMAN PLUS-X Negative	5231	7231	—	
EASTMAN DOUBLE-X Negative	5222	7222	—	
EASTMAN PLUS-X Reversal	—	7276	7276	
EASTMAN TRI-X Reversal	—	7278	7278	

Type	Exposure Index (DIN)		See Page
	Daylight	Tungsten (3200 K)	
Color Negative	50 (18)	12 (12) with KODAK WRATTEN Gelatin Filter No. 80A	MPF-6
Color Negative	64 (19) with KODAK WRATTEN Gelatin Filter No. 85	100 (21)	MPF-8
Color Negative	125 (22) with KODAK WRATTEN Gelatin Filter No. 85	200 (24)	MPF-10
Color Negative	125 (22) with KODAK WRATTEN Gelatin Filter No. 85	200 (24)	MPF-12
Color Negative	125 with KODAK WRATTEN Gelatin Filter No. 85	200 (24)	MPF-14
Color Negative	250 (25)	64 (19) with KODAK WRATTEN Gelatin Filter No. 80A	MPF-16
Color Negative	200 (24) with KODAK WRATTEN Gelatin Filter No. 85	320 (26)	MPF-18
Color Negative	320 (26) with KODAK WRATTEN Gelatin Filter No. 85	500 (28)	MPF-20
Color Negative	320 (26) with KODAK WRATTEN Gelatin Filter No. 85	500 (28)	MPF-22
Color Negative	500 (28) with KODAK WRATTEN Gelatin Filter No. 85	800 (30)	MPF-24
Color Reversal	100 (21)	25 (15) with KODAK WRATTEN Gelatin Filter No. 80A	MPF-26
Color Reversal	80 (20) with KODAK WRATTEN Gelatin Filter No. 85B	125 (22)	MPF-28
Color Reversal	160 (23)	40 (17) with KODAK WRATTEN Gelatin Filter No. 85B	MPF-30
Color Reversal	250 (25) with KODAK WRATTEN Gelatin Filter No. 85B	400 (27)	MPF-32
Color Reversal	400 (27)	100 (21) with KODAK WRATTEN Gelatin Filter No. 80A	MPF-34
B&W Negative	80 (20)	64 (19)	MPF-36
B&W Negative	250 (25)	200 (24)	MPF-38
B&W Reversal	50 (18)	40 (17)	MPF-40
B&W Reversal	200 (24)	160 (23)	MPF-42

Kodak Eastman
COLOR NEGATIVE FILM
EXR 50D

5245™/7245™ (35 mm, 65 mm/16 mm) EASTMAN EXR 50D Film *Daylight EI 50 (18)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 80A	12 (12)
Tungsten 3200 K	WRATTENGelatin No. 80A	12 (12)
Tungsten Photoflood 3400 K	WRATTEN Gelatin No. 80A	12 (12)
Daylight 5500 K	None	50 (18)
Metal Halide H.M.I.	None	50 (18)
Yellow-Flame Arcs	WRATTEN Gelatin No. 80C	20 (14)
White-Flame Arcs	WRATTEN Gelatin/ Color Compensating 20Y + 10C	32 (16)
Optima 32	WRATTEN Gelatin No. 80A	12 (12)
Vitalite	None	50 (18)
Fluorescent* Cool White	WRATTEN Gelatin/ Color Compensating 20M + 10B	32 (16)
Fluorescent* Deluxe Cool White	WRATTEN Gelatin/ Color Compensating 30B + 10C	20 (14)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC20M filter with an index exposure of 20 (14) for a trial exposure.

Process: ECN-2

Use: EASTMAN EXR 50D Film 5245/7245 is a camera film intended for general motion picture production. The wide exposure latitude of this negative film makes it especially suitable for outdoor photography under normal daylight conditions.

General Properties: EASTMAN EXR 50D Film 5245/7245 is balanced for daylight. The emulsion contains a colored-coupler mask to achieve excellent color reproduction in prints from EASTMAN Color Release Print Film. This film is characterized by very high sharpness, micro-fine grain, excellent color rendition, and underexposure latitude.

Illumination (Incident Light) Table for Daylight
(24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	50	100	200	400	800	1600	3200	6400

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1 or 3:1.

Reciprocity Characteristics EI 50 (18): No exposure or filter compensation is required for exposure times from 1/1000 second to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak Eastman
COLOR NEGATIVE FILM
EXR 100T

5248™/7248™ (35 mm, 65 mm/16 mm) EASTMAN EXR 100T Film *Tungsten EI 100 (21)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	64 (19)
Tungsten 3200 K	None	100 (21)
Tungsten Photoflood 3400 K	None	100 (21)
Daylight 5500 K	WRATTENGelatin No. 85	64 (19)
Metal Halide H.M.I.	WRATTENGelatin No. 85	64 (19)
Yellow-Flame Arcs	WRATTENGelatin No. 81C	80 (20)
White-Flame Arcs	WRATTEN Gelatin/ Color Compensating 20R + 50Y	40 (17)
Optima 32	None	100 (21)
Vitalite	WRATTENGelatin No. 85	64 (19)
Fluorescent* Cool White	WRATTENGelatin No. 81B + 40R	40 (17)
Fluorescent* Deluxe Cool White	WRATTEN Gelatin/ Color Compensating 20R	64 (19)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an exposure index of 50 (18) for a trial exposure.

Process: ECN-2

Use: EASTMAN EXR 100T Film 5248/7248 is intended for general motion picture production. The wide exposure latitude of this negative film makes it especially suitable for indoor and outdoor photography under a wide variety of conditions.

General Properties: EASTMAN EXR 100T Film 5248/7248 is a medium-speed film balanced for tungsten light and for daylight with appropriate filters. The emulsion contains a colored-coupler mask to achieve superior color reproduction in prints from EASTMAN Color Release Print Film. This film is characterized by very high sharpness, micro-fine grain, high resolving power and underexposure latitude.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	25	50	100	200	400	800	1600	3200

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1 or 3:1.

Reciprocity Characteristics EI 100 (21): You do not need to make any exposure or filter adjustments for exposure times from 1/1000 to 1/10 second. At an exposure time of 1 second, increase exposure by ⅓ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak
COLOR NEGATIVE FILM

VISION 200T

5274™/7274™ (35 mm, 65 mm/16 mm) KODAK VISION 200T Color Negative Film *Tungsten EI 200 (24)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	125 (22)
Tungsten 3200 K	None	200 (24)
Tungsten Photoflood 3400 K	None	200 (24)
Daylight 5500 K	WRATTENGelatin No. 85	125 (22)
Metal Halide H.M.I.	WRATTENGelatin No. 85	125 (22)
White-Flame Arcs	WRATTENGelatin No. 85B	125 (22)
Optima 32	None	200 (24)
Vitalite	WRATTENGelatin No. 85	125 (22)
Fluorescent* Cool White	WRATTENGelatin No. 85 + 10M	80 (20)
Fluorescent* Deluxe Cool White	WRATTENGelatin No. 85C + 10R	125 (22)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an index exposure of 250 (25) for a trial exposure.

Process: ECN-2

Use: KODAK VISION 200T Color Negative Film 5274/7274 features very high sharpness, fine grain, accurate flesh-to-neutral reproduction, and wide under- and over-exposure latitude for indoor or outdoor photography. Enhanced shadow detail provides crisp, rich blacks.

General Properties: KODAK VISION 200T Color Negative Film 5274/7274 is a medium-speed film balanced for tungsten light. It cuts seamlessly with other Kodak color negative motion picture films. VISION Film sets new standards for consistency—emulsion to emulsion, roll to roll, batch to batch.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	12.5	25	50	100	200	400	800	1600

Use this table for average subjects. When a subject includes only pastels, use at least ½ stop less exposure; dark colors require ½ stop more exposure.

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1, 3:1, or 4:1. At a 4:1 ratio, this film takes on a "special look."

Reciprocity Characteristics EI 200 (24): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1 second. If your exposure is in the 10-second range, increase your exposure ⅔ stop and use a KODAK Color Compensating Filter CC10Y.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog,* or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak Eastman
COLOR NEGATIVE FILM
EXR 200T

5293™/7293™ (35 mm, 65 mm/16 mm) EASTMAN EXR 200T Film *Tungsten EI 200 (24)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	125 (22)
Tungsten 3200 K	None	200 (24)
Tungsten Photoflood 3400 K	None	200 (24)
Daylight 5500 K	WRATTENGelatin No. 85	125 (22)
Metal Halide H.M.I.	WRATTENGelatin No. 85	125 (22)
Yellow-Flame Arcs	WRATTENGelatin No. 81D	125 (22)
White-Flame Arcs	WRATTENGelatin No. 85C + CC50Y	100 (21)
Optima 32	None	200 (24)
Vitalite	WRATTENGelatin No. 85	125 (22)
Fluorescent* Cool White	WRATTENGelatin CC40R	64 (19)
Fluorescent* Deluxe Cool White	WRATTENGelatin No. 85C	125 (22)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an exposure index of 100 (21) for a trial exposure.

5293/7293

Use: EASTMAN EXR 200T Color Negative Film 5293/7293 is intended for general motion picture production. The wide exposure latitude of this negative film makes it especially suitable for indoor and outdoor photography under a wide variety of conditions.

General Properties: EASTMAN EXR 200T Color Negative Film 5293/7293 is a medium-speed film balanced for tungsten light and for daylight with appropriate filters. The emulsion contains a colored-coupler mask to achieve superior color reproduction in prints from EASTMAN Color Release Print Film. This film is characterized by very high sharpness, micro-fine grain, high resolving power and underexposure latitude.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	12.5	25	50	100	200	400	800	1600

Reciprocity Characteristics EI 200 (24): You do not need to make any filter adjustments for exposure times from 1/1000 to 1/10 second. At an exposure time of 1 second, increase exposure by ⅓ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak
COLOR NEGATIVE FILM

SFX 200T

(35 mm)
KODAK SFX 200T Color Negative Film
Tungsten EI 200 (24)

Exposure Indexes and Filters

Light Source	KODAKCamera Filters*	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	125 (22)
Tungsten 3200 K	None	200 (24)
Tungsten Photoflood 3400 K	None	200 (24)
Daylight 5500 K	WRATTENGelatin No. 85	125 (22)
Metal Halide H.M.I.	WRATTENGelatin No. 85	125 (22)
Yellow-Flame Arcs	WRATTEN Gelatin No. 81D	125 (22)
White-Flame Arcs	WRATTEN Gelatin No. 85C + 50Y	100 (21)
Optima 32	None	200 (24)
Vitalite	WRATTEN Gelatin No. 85	125 (22)
Fluorescent, Cool White	WRATTEN Gelatin CC40R	64 (19)
Fluorescent, Deluxe Cool White	WRATTENGelatin No. 85C	125 (22)

***IMPORTANT:** These are approximate filter requirements. Make final corrections during printing. When you don't know the kind of lamp, use a CC40R filter with an index exposure of 100 (21) for a trial exposure.

Process: ECN-2

Use: KODAK SFX 200T Color Negative Film is optimized for traveling matte shots, so foreground action photographed against a blue or green screen can be separated more cleanly from the background when it's scanned into the digital format. In complex composite shots, this film can save time in postproduction.

General Properties: KODAK SFX 200T Color Negative Film is a medium speed film balanced for tungsten light. It intercuts seamlessly with other KODAK Color Negative Films used to record live action footage. This film features microfine grain, unprecedented sharpness, high resolving power, wide exposure latitude and accurate tone reproduction for the most difficult compositing applications.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	12.5	25	50	100	200	400	800	1600

Use this table for average subjects. When a subject includes only pastels, use at least ½ stop less exposure; dark colors require ½ stop more exposure.

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill-light is 2:1, 3:1, or 4:1. At a 4:1 ratio, this film takes on a "special look."

Reciprocity Characteristics EI 200 (24): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1/10 second.

Handling: Total darkness.

Available Roll Lengths: SFX 200T Film is a special order product from Kodak. For information on film roll lengths, contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak
COLOR NEGATIVE FILM

VISION 250D

5246™/7246™ (35 mm, 65 mm/16 mm) KODAK VISION 250D Color Negative Film *Daylight EI 250 (25)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 80A	64 (19)
Tungsten 3200 K	No. 80A	64 (19)
Tungsten Photoflood 3400 K	No. 80A	64 (19)
Daylight 5500 K	None	250 (25)
Metal Halide H.M.I.	None	250 (25)
White-Flame Arcs	WRATTEN Gelatin/ Color Compensating 20Y + 10C	160 (23)
Optima 32	WRATTENGelatin No. 80A	64 (19)
Vitalite	None	250 (25)
Fluorescent* Cool White	WRATTEN Gelatin/ Color Compensating 20M	200 (24)
Fluorescent* Deluxe Cool White	WRATTENGelatin No. 82C	200 (24)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an index exposure of 250 (25) for a trial exposure.

Process: ECN-2

Use: KODAK VISION 250D Color Negative Film 5246/7246 features very high sharpness, fine grain, accurate flesh-to-neutral reproduction, and wide under- and over-exposure latitude for daylight or mixed light photography. Enhanced shadow detail provides crisp, rich blacks.

General Properties: KODAK VISION 250D Color Negative Film 5246/7246 is a medium-speed film balanced for daylight. It cuts seamlessly with other Kodak color negative motion picture films. VISION Film sets new standards for consistency—emulsion to emulsion, roll to roll, batch to batch.

Illumination (Incident Light) Table for Daylight
(24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	10	20	40	80	160	320	640	1250

Use this table for average subjects. When a subject includes only pastels, use at least ½ stop less exposure; dark colors require ½ stop more exposure.

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1, 3:1, or 4:1. At a 4:1 ratio, this film takes on a "special look."

Reciprocity Characteristics EI 250 (25): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1 second. If your exposure is in the 10-second range, increase your exposure ⅔ stop and use a KODAK WRATTEN Filter/Color Compensating 10Y.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog,* or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak
COLOR NEGATIVE FILM

VISION 320T

5277™/7277™ (35 mm, 65 mm/16 mm) KODAK VISION 320T Color Negative Film *Tungsten EI 320 (26)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	200 (24)
Tungsten 3200 K	None	320 (26)
Tungsten Photoflood 3400 K	None	320 (26)
Daylight 5500 K	WRATTENGelatin No. 85	200 (24)
Metal Halide H.M.I.	WRATTENGelatin No. 85	200 (24)
White-Flame Arcs	WRATTENGelatin No. 85B	125 (22)
Optima 32	None	320 (26)
Vitalite	WRATTENGelatin No. 85	200 (24)
Fluorescent* Cool White	WRATTENGelatin No. 85 + 10M	125 (22)
Fluorescent* Deluxe Cool White	WRATTENGelatin No. 85C + 10R	200 (24)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an index exposure of 100 (21) for a trial exposure.

Process: ECN-2

Use: KODAK VISION 320T Color Negative Film 5277/7277 lets you create a very different look—softer, more pastel. This film has very wide exposure latitude that allows you to pick up the detail in the shadows without losing the highlights. Overexpose it a bit and maintain the shadow detail, but the blacks get blacker. Underexpose it, and the shadows open up. This film features fine grain, high sharpness, and wide color reproduction.

General Properties: KODAK VISION 320T Color Negative Film 5277/7277 is a 320-speed film balanced for tungsten light. You'll get clean, white highlights, accurate flesh-tone reproduction, but with softer colors. It cuts seamlessly with other Kodak color negative motion picture films. VISION Film sets new standards for consistency—emulsion to emulsion, roll to roll, batch to batch.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	8	16	32	64	125	250	500	1000

Use this table for average subjects. When a subject includes only pastels, use at least ½ stop less exposure; dark colors require ½ stop more exposure.

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1, 3:1, or 4:1.

Reciprocity Characteristics EI 320 (26): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1 second. If your exposure is in the 10-second range, increase your exposure ⅔ stop and use a KODAK WRATTEN Filter / Color Compensating 10Y.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog,* or contact a Kodak sales representative.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak
COLOR NEGATIVE FILM

VISION 500T

5279™/7279™ (35 mm, 65 mm/16 mm) KODAK VISION 500T Color Negative Film *Tungsten EI 500 (28)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	320 (26)
Tungsten 3200 K	None	500 (28)
Tungsten Photoflood 3400 K	None	500 (28)
Daylight 5500 K	WRATTENGelatin No. 85	320 (26)
Metal Halide H.M.I.	WRATTENGelatin No. 85	320 (26)
White-Flame Arcs	WRATTENGelatin No. 85B	200 (24)
Yellow-Flame Arcs	WRATTEN Gelatin/ Color Compensating 20Y	320 (26)
Optima 32	None	500 (28)
Vitalite	WRATTEN Gelatin No. 85	320 (26)
Fluorescent* Cool White	WRATTEN Gelatin No. 85 + 10M	200 (24)
Fluorescent* Deluxe Cool White	WRATTENGelatin No. 85C + 10R	320 (26)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an index exposure of 250 (25) for a trial exposure.

Process: ECN-2

Use: KODAK VISION 500T Color Negative Film 5279/7279 features very high sharpness, fine grain, accurate flesh-to-neutral reproduction, and wide under- and over-exposure latitude for indoor or outdoor photography. Enhanced shadow detail provides crisp, rich blacks.

General Properties: KODAK VISION 500T Color Negative Film 5279/7279 is a high-speed film balanced for tungsten light. It cuts seamlessly with other Kodak color negative motion picture films. VISION Film sets new standards for consistency—emulsion to emulsion, roll to roll, batch to batch.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	5	10	20	40	80	160	320	640

Use this table for average subjects. When a subject includes only pastels, use at least ½ stop less exposure; dark colors require ½ stop more exposure.

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1, 3:1, or 4:1. At a 4:1 ratio, this film takes on a "special look."

Reciprocity Characteristics EI 500 (28): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1 second. If your exposure is in the 10-second range, increase your exposure ⅔ stop and use a KODAK WRATTEN Filter/Color Compensating 10Y.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog,* or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak Eastman
COLOR NEGATIVE FILM
EXR 500T

5298™ (35 mm, 65 mm)
EASTMAN EXR 500T Film
Tungsten EI 500 (28)

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	320 (26)
Tungsten 3200 K	None	500 (28)
Tungsten Photoflood 3400 K	None	500 (28)
Daylight 5500 K	WRATTENGelatin No. 85	320 (26)
Metal Halide H.M.I.	WRATTENGelatin No. 85	320 (26)
Yellow-Flame Arcs	WRATTEN Gelatin/ Color Compensating 20Y	320 (26)
White-Flame Arcs	WRATTENGelatin No. 85B	200 (24)
Optima 32	None	500 (28)
Vitalite	WRATTENGelatin No. 85	320 (26)
Fluorescent* Cool White	WRATTENGelatin No. 85 + 10M	200 (24)
Fluorescent* Deluxe Cool White	WRATTENGelatin No. 85C + 10R	320 (26)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an exposure index of 250 (25) for a trial exposure.

Process: ECN-2

Use: EASTMAN EXR 500T Film 5298 is a camera film intended for general motion picture production. The wide exposure latitude of this film makes it especially suitable for indoor and outdoor photography under low-level illumination. The film offers the highest quality telecine transfers and is an excellent choice for blue-screen special effects.

General Properties: EASTMAN EXR 500T Film 5298 is a high-speed film balanced for tungsten light. Enhanced shadow detail provides crisp, rich blacks and clean, white highlights. The emulsion contains a colored-coupler mask to achieve superior color reproduction when printed onto EASTMAN Color Release Print Film. This film is characterized by micro-fine grain, very high sharpness, high resolving power, and wide under- and over-exposure latitude.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	5	10	20	40	80	160	320	640

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1 or 3:1.

Reciprocity Characteristics EI 500 (28): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog,* or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak
COLOR NEGATIVE FILM

VISION 800T

5289™/7289™ (35 mm/16 mm)
KODAK VISION 800T Color Negative Film
Tungsten EI 800 (30)

Exposure Indexes and Filters

Light Source	KODAKCamera Filters*	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	500 (28)
Tungsten 3200 K	None	800 (30)
Tungsten Photoflood 3400 K	None	800 (30)
Daylight 5500 K	WRATTENGelatin No. 85	500 (28)
Metal Halide H.M.I.	WRATTENGelatin No. 85	500 (28)
Yellow-Flame Arcs	WRATTEN Gelatin/ Color Compensating 20Y	500 (28)
White-Flame Arcs	WRATTENGelatin No. 85B	320 (26)
Optima 32	None	800 (30)
Vitalite	WRATTENGelatin No. 85	500 (28)
Fluorescent,* Cool White	WRATTENGelatin No. 85 + 10M	320 (26)
Fluorescent,* Deluxe Cool White	WRATTENGelatin No. 85C + 10R	500 (28)

***IMPORTANT:** These are approximate corrections only. Make final corrections during printing. When you don't know the kind of lamp, use a CC40R filter with an index exposure of 400 (27) for a trial exposure.

Process: ECN-2

Use: KODAK VISION 800T Color Negative Film / 5289/7289 offers excellent image quality and the highest capture speed available in motion picture films. It delivers the speed and latitude you need in low light, fast action, and other filming conditions where film speed is vitally important.

General Properties: KODAK VISION 800T Color Negative Film / 5289/7289 is a very high-speed film balanced for tungsten light. This film features a wide under- and overexposure latitude, and accurate color and flesh-to-neutral balance. It intercuts with other Kodak color negative motion picture films. KODAK VISION Film sets new standards for consistency—emulsion to emulsion, roll to roll, batch to batch.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16
Footcandles	3	6	12.5	25	50	100	200	400

Use this table for average subjects. When a subject includes only pastels, use at least ½ stop less exposure; dark colors require ½ stop more exposure.

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill-light is 2:1 or 3:1.

Reciprocity Characteristics El 800 (30): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1 second. If your exposure is in the 10-second range, increase exposure by ⅔ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog,* or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak
COLOR REVERSAL FILM

EKTACHROME 100D

5285™ (35 mm)
KODAK EKTACHROME 100D Color Reversal Film
Daylight EI 100 (21)

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Daylight 5500 K	None	100 (21)
Metal Halide H.M.I.	None	100 (21)
Tungsten 3000 K	WRATTENGelatin No. 80A	25 (15)
Tungsten 3200 K	No. 80A	25 (15)
Tungsten Photoflood 3400 K	No. 80A	25 (15)
White-Flame Arcs	WRATTEN Gelatin/ Color Compensating 20Y + 10C	64 (19)
Optima 32	WRATTENGelatin No. 80A	25 (15)
Vitalite	None	100 (21)
Fluorescent* Cool White	WRATTEN Gelatin/ Color Compensating 20M	80 (20)
Fluorescent* Deluxe Cool White	WRATTENGelatin No. 85C	80 (20)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an index exposure of 100 (21) for a trial exposure.

MPF-26 9/00

Process: E-6, cine machine

Use: KODAK EKTACHROME 100D Color Reversal Film / 5285 is a 100-speed, high-color reversal motion picture camera film intended for photography under daylight illumination (5500 K).

General Properties: KODAK EKTACHROME 100D Color Reversal Film / 5285 offers strikingly saturated color performance while maintaining a neutral gray scale and accurate flesh reproduction. It has exceptional sharpness that is unsurpassed by any other 100-speed reversal technology, and its grain performance is excellent.

Illumination (Incident Light) Table for Daylight (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11
Footcandles	25	50	100	200	400	800	1600

Reciprocity Characteristics EI 100 (21): You do not need to make any filter corrections or exposure adjustments for exposure times from 1/1000 to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog,* or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak Eastman
EKTACHROME FILM

7240™ (16 mm, Super 8) EASTMAN EKTACHROME Film *Tungsten EI 125* (22)*

Exposure Indexes and Filters

Light Source	KODAK Camera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTEN Gelatin No. 82B	80 (20)
Tungsten 3200 K	None	125 (22)
Tungsten Photoflood 3400 K	WRATTEN Gelatin No. 81A	100 (21)
Daylight 5500 K	WRATTEN Gelatin No. 85B	80 (20)
Metal Halide H.M.I.	WRATTEN Gelatin No. 85B	80 (20)
Yellow-Flame Arcs	None	125 (22)
White-Flame Arcs	WRATTEN Gelatin No. 85B	80 (20)
Optima 32	None	125 (22)
Vitalite	WRATTEN Gelatin No. 85B	80 (20)
Fluorescent** Cool White	WRATTEN Gelatin/ Color Compensating 60R + 10Y	32 (16)
Fluorescent** Deluxe Cool White	WRATTEN Gelatin/ Color Compensating 20R + 20Y	64 (19)

***When exposed in Super 8 cameras through KODAK WRATTEN Filter No. 85, the effective speed is reduced to 80 for Daylight. In automatic cameras, due to the cartridge speed and filter notching system, the film will be exposed as follows:

Daylight (with filter)	80
Tungsten (without filter)	125

****IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an exposure index of 64 (19) for a trial exposure.

Process: VNF-1 or RVNP. Force processing: 1 stop with some loss in quality; up to 2 stops with noticeable quality loss.

Use: EASTMAN EKTACHROME Film 7240 is a high-speed, color reversal camera film balanced for tungsten light and for daylight with an appropriate filter. You can use it for color news photography, nighttime sporting events, industrial photography with existing light, and for high-speed photography. The processed original film is balanced for projection at 5400 K.

The processed camera original is meant for direct projection; however, you can make color duplicates on EASTMAN EKTACHROME VN Print Film 7399 (Process VNF-1). Use shortened first developer time.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11
Footcandles	16	32	64	128	256	512	1024

Lighting Contrast: The suggested ratio of key-light-plus fill-light to fill light is 2:1 or 3:1.

Reciprocity Characteristics EI 125 (22): For exposure times ranging from 1 to 1/10,000 second, no compensation is needed for either exposure level or color balance.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a film emulsion letter code.

Kodak Eastman
EKTACHROME FILM

7239™ (35 mm/16 mm) EASTMAN EKTACHROME Film *Daylight EI 160 (23)*

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 80A	40 (17)
Tungsten 3200 K	WRATTENGelatin No. 80A	40 (17)
Tungsten Photoflood 3400 K	WRATTENGelatin No. 80B	50 (18)
Daylight 5500 K	None	160 (23)
Metal Halide H.M.I.	None	160 (23)
Yellow-Flame Arcs	WRATTENGelatin No. 80A	40 (17)
White-Flame Arcs	None	160 (23)
Optima 32	WRATTENGelatin No. 80A	40 (17)
Vitalite	None No. 85B	160 (23)
Fluorescent* Cool White	WRATTEN Gelatin/ Color Compensating 30M	100 (21)
Fluorescent* Deluxe Cool White	WRATTEN Gelatin/ Color Compensating 20B	100 (21)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC20M filter with an exposure index of 100 (21) for a trial exposure.

Process: VNF-1 or RVNP.
Force processing: 1 stop with some loss in quality; up to 2 stops with noticeable quality loss.

Use: This high-speed color reversal camera film is intended for photography under low-level daylight illumination. It can be used for news photography, sporting events, and high speed photography. It is a companion film to EASTMAN EKTACHROME Film 7251. The processed original camera film is balanced for projection at 5400 K.

The processed camera original of EASTMAN EKTACHROME High Speed Film 7239 is meant for direct projection; however, color duplicates can be made on EASTMAN EKTACHROME VN Print Film 7399 (Process VNF-1). Use recommended shortened first developer time.

NOTE: Operation at a lens opening larger than *f*/32 is possible by making the exposure through a neutral density filter, such as a KODAK WRATTEN Neutral Density Filter No. 96. For example, when a filter with a density of 0.9 is used, the lens can be opened 3 full stops.

Illumination (Incident Light) Table for Daylight
(24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11
Footcandles	16	32	64	128	256	512	1024

Lighting Contrast: The suggested ratio of key-light-plus fill-light to fill light is 2:1 or 3:1.

Reciprocity Characteristics EI 160 (23): For exposure times ranging from 1 to 1/10,000 second, no compensation is needed for either exposure level or color balance.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a film emulsion letter code.

Kodak Eastman
EKTACHROME FILM

7250™ (16 mm)
EASTMAN EKTACHROME High Speed Film
Tungsten EI 400 (27)

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 82B	250 (25)
Tungsten 3200 K	None	400 (27)
Tungsten Photoflood 3400 K	WRATTENGelatin No. 81A	320 (26)
Daylight 5500 K	WRATTENGelatin No. 85B	250 (25)
Metal Halide H.M.I.	WRATTENGelatin No. 85B	250 (25)
Yellow-Flame Arcs	None	400 (27)
White-Flame Arcs	WRATTENGelatin No. 85B	250 (25)
Optima 32	None	400 (27)
Vitalite	WRATTENGelatin No. 85B	250 (25)
Fluorescent* Cool White	WRATTEN Gelatin/ Color Compensating 60R + 10Y	100 (21)
Fluorescent* Deluxe Cool White	WRATTEN Gelatin/ Color Compensating 20R + 20Y	200 (24)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC40R filter with an exposure index of 200 (24) for a trial exposure.

Note: Filters judged acceptable for use with EASTMAN EKTACHROME Film 7240 (Tungsten) should provide equal compensation when you use them with this film.

Process: VNF-1 or RVNP.

Force processing: 1 stop with some loss in quality; up to 2 stops with noticeable quality loss.

Use: The very high speed of this color reversal camera film makes photography possible with very low-light illumination. It can be used for color news photography, nighttime sporting events, and high-speed photography by both daylight and artificial light. The processed original film is balanced for projection at 5400 K.

The processed camera original of High Speed Film 7250 is meant for direct projection; however, you can make color duplicates on EASTMAN EKTACHROME VN Print Film 7399 (Process VNF-1). Use recommended shortened first developer time.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16	*f*/22
Footcandles	6.3	12.5	25	50	100	200	400	800	1600

Lighting Contrast: The suggested ratio of key-light-plus-fill-light to fill light is 2:1 or 3:1.

Reciprocity Characteristics EI 400 (27): For exposure times ranging from 1/1000 to 1/10 second, no compensation is needed for either exposure level or color balance. At 1/10,000 second, increase exposure by ⅓ stop. At 1 second, increase exposure by ½ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a film emulsion letter code.

Eastman
EKTACHROME FILM

7251™ (16 mm)
EASTMAN EKTACHROME High Speed Film
Daylight EI 400 (27)

Exposure Indexes and Filters

Light Source	KODAKCamera Filters	Exposure Index (DIN)
Tungsten 3000 K	WRATTENGelatin No. 80A	100 (21)
Tungsten 3200 K	WRATTENGelatin No. 80A	100 (21)
Tungsten Photoflood 3400 K	WRATTENGelatin No. 80B	125 (22)
Daylight 5500 K	None	400 (27)
Metal Halide H.M.I.	None	400 (27)
Yellow-Flame Arcs	WRATTENGelatin No. 80A	100 (21)
White-Flame Arcs	None	400 (27)
Optima 32	WRATTENGelatin No. 80A	100 (21)
Vitalite	None	400 (27)
Fluorescent* Cool White	WRATTEN Gelatin/ Color Compensating 30M	250 (25)
Fluorescent* Deluxe Cool White	WRATTEN Gelatin/ Color Compensating 20B	250 (25)

***IMPORTANT:** These are approximate filter requirements. When you don't know the kind of lamp, use a CC20M filter with an exposure index of 250 (25) for a trial exposure.

Note: Filters judged acceptable for use with EASTMAN EKTACHROME Film 7239 should provide equal compensation when used with this film.

Process: VNF-1 or RVNP.
Force processing: 1 stop with some loss in quality; up to 2 stops with noticeable quality loss.

Use: EASTMAN EKTACHROME High Speed Film is a very high-speed color reversal camera film that makes photography possible in very low-light illumination. You can use it for industrial photography, instrumentation studies, sporting events, and high-speed photography by both daylight and artificial light with filters. The processed original camera film is balanced for projection at 5400 K. The processed camera original of EASTMAN EKTACHROME High Speed Film 7251 is meant for direct projection; however, color duplicates can be made on EASTMAN EKTACHROME VN Print Film 7399 (Process VNF-1) using recommended shortened first developer time.

Illumination (Incident Light) Table for Daylight
(24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11	*f*/16	*f*/22
Footcandles	6.3	12.5	25	50	100	200	400	800	1600

Lighting Contrast: The suggested ratio of key-light-plus fill-light to fill light is 2:1 or 3:1.

Reciprocity Characteristics EI 400 (27): You do not need to make any exposure or filter adjustment for exposure times from 1/1000 to 1/10 second. At an exposure time of 1/10,000 second, increase exposure by ⅓ stop. At an exposure time of 1 second, increase exposure by ½ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a film emulsion letter code.

Eastman PLUS-X NEGATIVE FILM

5231™/7231™ (35 mm/16 mm) EASTMAN PLUS-X Negative Film

Exposure Indexes: (For development to gamma of 0.65)

Daylight–**80 (20)** *Tungsten*–**64 (19)**

Process: Black and white with KODAK Developer D-96. Force Processing: 1 stop (or more) with some loss in quality–check with your processing laboratory.

Use: The speed and grain characteristics of EASTMAN PLUS-X Negative Film make it well suited for general motion picture production. These film characteristics provide an excellent balance between the maximum desirable speed for general production work and the fine grain.

General Properties: The medium speed of EASTMAN PLUS-X Negative Film 5231 and 7231 permits the use of relatively small apertures in daylight (thus allowing good depth of field). The film is widely used for making composite projection background scenes.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11
Footcandles	40	80	160	320	640	1280	2560

KODAK WRATTEN Filter No.	3	8	12	15	21	23A	8N5	25	29	96*
Filter Factors										
Daylight Filter Factor	1.5	2	2.5	3	3.5	5	5	8	25	8

*For use in bright sunlight to reduce the exposure without modifying color rendering or depth of field. This neutral-density filter in a density of 0.90 provides a reduction equivalent to 3 full stops.

MPF-36 9/98

Reciprocity Characteristics: You do not need to make any exposure or filter adjustment for exposure times from 1/10,000 to 1/10 second. At an exposure time of 1 second, increase exposure by ½ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Eastman DOUBLE-X NEGATIVE FILM

5222™/7222™ (35 mm/16 mm) EASTMAN DOUBLE-X Negative Film

Exposure Indexes: (For development to gamma of 0.65)

Daylight–**250 (25)** *Tungsten*–**200 (24)**

Process: Black and white with KODAK Developer D-96. Force Processing: 1 stop (or more) with some loss in quality–check with your processing laboratory.

Use: EASTMAN DOUBLE-X Negative Film is suitable for general photography and for photography under adverse lighting conditions. It is useful in situations where great depth of field is desired without an increase in illumination.

General Properties: EASTMAN DOUBLE-X Negative Film 5222/7222 is a high-speed, panchromatic film that has good image-structure characteristics and excellent sharpness.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11
Footcandles	13	25	50	100	200	400	800

Filter Factors

KODAK WRATTEN Filter No.	3	8	12	15	21	23A	25	29	96*
Daylight Filter Factor	1.5	1.5	2.0	3.0	3.0	5	8	20	8

*For use in bright sunlight to reduce the exposure without modifying color rendering or depth of field. This neutral-density filter in a density of 0.90 provides a reduction equivalent to 3 full stops.

MPF-38 9/98

Reciprocity Characteristics: No exposure or filter compensation is required for exposure times from 1/10,000 to 1 second.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a product-code number and an internal product-code symbol.

Kodak Eastman
PLUS-X REVERSAL FILM

7276™ (16 mm, Super 8)
EASTMAN PLUS-X Reversal Film

Exposure Indexes*: (For recommended reversal processing)

Daylight—**50 (18)** *Tungsten*—**40 (17)**

For negative processing in a typical negative motion picture film developer, use the following exposure indexes:

Daylight—**25 (15)** *Tungsten*—**20 (14)**

Process: KODAK Liquid Reversal Chemicals or from bulk. Force Processing: 1 stop (or more) with some loss in quality—check with your processing laboratory.

Use: EASTMAN PLUS-X Reversal Film 7276 is used widely for general exterior photography and for indoor photography where there is ample illumination.

General Properties: EASTMAN PLUS-X Reversal Film 7276 is a medium-speed, panchromatic, reversal motion picture film. It is characterized by a high degree of sharpness, good contrast, high resolving power, and excellent tonal gradation.

When processed as a reversal film, the resulting positive can be used for projection or for duplication. Processed as a negative material by conventional methods, the film will yield satisfactory results, although a print will be necessary.

*When exposed in Super 8 cameras through a KODAK WRATTEN Gelatin Filter No. 85, the effective speed is reduced to 32 for daylight. In automatic cameras, due to the cartridge speed and filter notching system, the film will be exposed as follows:

Daylight (no filter)	50
Daylight (with filter)	25
Tungsten (without filter)	40

MPF-40 9/98

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8
Footcandles	63	125	250	500	1000	2000

Lighting Contrast Ratios: The suggested ratio of key light-plus-fill-light to fill light is 2:1 or 3:1 for normal use.

KODAK WRATTEN Filter No.	Filter Factors								
	3	8	12	15	21	23A	25	29	96*
Daylight Filter Factor	1.5	2	2	2.5	3	5	10	40	8

*For use in bright sunlight to reduce the exposure without modifying color rendering or depth of field. This neutral-density filter in a density of 0.90 provides a reduction equivalent to 3 full stops.

Reciprocity Characteristics: You do not need to make any exposure or filter adjustment for exposure times from 1/1000 to 1 second. At an exposure time of 1/10,000 second, increase exposure by ½ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a film emulsion letter code.

Kodak Eastman
TRI-X REVERSAL FILM

7278™ (16 mm, super 8)
EASTMAN TRI-X Reversal Film

Exposure Indexes: (For recommended reversal processing)

Daylight—**200* (24)** *Tungsten*—**160 (23)**

For negative processing in a typical motion picture negative developer, use the following exposure indexes:

Daylight—**100 (21)** *Tungsten*—**80 (20)**

Process: KODAK Liquid Reversal Chemicals or from bulk. Force Processing: 1 stop (or more) with some loss in quality—check with your processing laboratory.

Use: The high speed of EASTMAN TRI-X Reversal Film 7278 makes it suitable for general interior photography with artificial light. You can use it in daylight also, and it is particularly useful for sports events taken at regular speed or slow motion in weak light (overcast sky or sports events at night).

General Properties: EASTMAN TRI-X Reversal Film 7278 has high speed, excellent tonal gradation, and high resolving power. An antihalation layer is incorporated in the film structure.

When processed as a reversal film, you can use the resulting positive for projection or for duplication. Processed as a negative material by conventional methods, the film yields satisfactory results, although a print will be necessary.

*****Super 8 automatic cameras will expose the film at ASA 160 due to the ANSI standard cartridge notching system.

Illumination (Incident Light) Table for Tungsten Light (24 frames per second, 170° shutter opening)

Lens Aperture	*f*/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8
Footcandles	16	32	64	128	256	512

KODAK WRATTEN Filter No.	Filter Factors								
	3	8	12	15	21	23A	25	29	96*
Daylight Filter Factor	1.5	2	2	2.5	3	5	10	40	8

*For use in bright sunlight to reduce the exposure without modifying color rendering or depth of field. This neutral-density filter in a density of 0.90 provides a reduction equivalent to 3 full stops.

Reciprocity Characteristics: You do not need to make any exposure or filter adjustment for exposure times from 1/10,000 to 1/10 second. At an exposure time of 1 second, increase exposure by ½ stop.

Handling: Total darkness

Available Roll Lengths: For information on film roll lengths, check Kodak's *Professional Motion Imaging Price Catalog*, or contact a Kodak sales representative in your country.

All rolls are identified with a film emulsion letter code.

Incident-Light Illumination (in footcandles)

(Frame rate: 24 frames/sec–approx1/50 sec)

NOTE: Data applies to both color and black-and-white films.

Exp Index (Daylight or Tungsten)	Lens Opening						
	f/1.4	*f*/2	*f*/2.8	*f*/4	*f*/5.6	*f*/8	*f*/11
12	200	400	800	1600	3200	6400	13000
16	160	320	640	1250	2500	5000	10000
20	125	250	500	1000	2000	4000	8000
25	100	200	400	800	1600	3200	6400
32	80	160	320	640	1250	2500	5000
40	64	125	250	500	1000	2000	4000
50	50	100	200	400	800	1600	3200
64	40	80	160	320	640	1250	2500
80	32	64	125	250	500	1000	2000
100	25	50	100	200	400	800	1600
125	20	40	80	160	320	640	1250
160	15	32	64	125	250	500	1000
200	12	25	50	100	200	400	800
250	10	20	40	80	160	320	640
320	8	15	32	64	125	250	500
400	6	12	25	50	100	200	400
500	5	10	20	40	80	160	320
640	4	8	15	32	64	125	250
800	3	6	12	25	50	100	200
1000	*	5	10	20	40	80	160
1250	*	4	8	15	32	64	125
1600	*	3	6	12	25	50	100
2000	*	*	5	10	20	40	80

*Less than 3 footcandles

FILTER INFORMATION

Introduction

Use the filter and color temperature charts in this section as a quick reference and general guide. The values are approximate. They offer good starting points for trial exposures in critical work. For less demanding work, the recommendations may be adequate, but it is always best to run tests before shooting final footage. For photography with fluorescent lights, see the individual film's filter information in the section"KODAK Motion Picture Camera Films."

Types of Filters

Optical filters may be solid, liquid, or gaseous; only solid filters are discussed in this book. These consist mainly of colorants dissolved in a gelatin or in cellulose acetate. Each Kodak filter, gelatin or acetate, is standardized for spectral transmittance and total transmittance by special instruments which apply an optical form of limit gauge to these characteristics.

The dyes are obtained from a number of sources, and many have been synthesized. Like other dyes, the dyes used in filters may, in time, change under certain conditions of heat and light. In this publication, we will be addressing only *filters* for black-and-white films, color compensating, conversion, light balancing, and neutral density (No. 96).

Filters for Black-and-White Films

You can use a wide range of KODAK WRATTEN Filters with black-and-white negative films for many purposes. They vary the contrast and tonal rendering of the subject in a photograph, either to correct to the normal visual appearance or to accentuate special features. The total photographic effect obtained with a particular filter depends on four main factors: its spectral absorption characteristics, the spectral sensitivity of the sensitized material, the color of the subject to be photographed, and the spectral quality of the illuminant.

	Filter Factors* for KODAK Motion Picture Films			
	Negative Films		Reversal Films	
Filter	PLUS-X	DOUBLE-X	PLUS-X	TRI-X
No. 3	1.5	1.5	1.5	1.5
No. 8 (K2)	2.0	1.5	2.0	2.0
No. 12 (Minus Blue)	2.5	2.0	2.0	2.0
No. 15 (G)	3.0	3.0	2.5	2.5
No. 21	3.5	3.0	3.0	3.0
No. 23A	5	5	5	5
No. 8N5	5	5	6	6
No. 25	8	8	10	10
No. 29	25	20	40	40
No. 96	8	8	8	8

*All filters absorb part of the incident radiation, so their use usually requires some increase in exposure over that required when no filter is used. The number of times by which an exposure must be increased for a given filter with a given material is called the *filter factor*, or multiplying factor.

Filter factors published for Kodak products by Kodak are intended only as approximate guides. Published filter factors apply strictly to the particular lighting conditions used in the laboratory where the factors were determined. For scientific applications, especially, the quality of light can vary widely so that it may be desirable to determine the filter factor for actual working conditions.

To determine a filter factor, choose a subject having a neutral-gray area, or place an 18-percent gray card or a photographic gray scale in the scene to be photographed. Make one exposure without a filter. Then, with the filter where it will be for the exposure, and beginning with the unfiltered exposure setting, make a series of exposures. Increase each in ½-stop increments through a 2- to 4-stop greater exposure (very dense filters may need more). After processing the negative, match densities of the unfiltered exposure with the filter series either visually or with a densitometer. Choose the filtered exposure that is closest to the unfiltered. Some additional exposure adjustments may be necessary.

Below is a conversion table of filter factors to exposure increase in stops.

Filter Factor	+ Stops	Filter Factor	+ Stops	Filter Factor	+ Stops
1.25	1/2	4	2	12	3 2/3
1.5	2/3	5	2 1/3	40	5 1/3
2	1	6	2 2/3	100	6 2/3
2.5	1 1/2	8	3	1000	10
3	1 2/3	10	3 1/3	–	–

Each time a filter factor is doubled, the exposure needs to be increased by 1 stop. As an example, a filter factor of 2 requires a 1-stop exposure increase. A filter factor of 4 requires a 2-stop exposure increase. Use this example for filter factors not listed in the above table.

Color Compensating Filters

Color compensating filters control light by attenuating principally the red, green, or blue part of the spectrum. While controlling one color, the filter transmits one or both of the other two colors. Thus, color compensating filters can make changes to the color balance of pictures recorded on color films, or compensate for deficiencies in the spectral quality of a light source. For optimum results, use the single recommended color compensating filter rather than combining filters (for example, CC20Y + CC20M = 20R, so using 20R only is preferable). KODAK WRATTEN Gelatin Filters / Color Compensating Filters have excellent optical quality and are suitable for image forming optical systems—over-the-camera lens, for example. For less critical work, you may use KODAK Color Printing Filters (acetate).

Conversion Filters for Color Films

These filters are intended for use whenever *significant* changes in the color temperature of the illumination are required (for example, daylight to artificial light). The filter may be positioned between the light source and other elements of the system or over the camera lens in conventional photographic recording.

Filter Color	Filter Number	Exposure Increase In Stops*	Conversion in Degrees K
Blue	80A	2	3200 to 5500
	80B	1 2/3	3400 to 5500
	80C	1	3800 to 5500
	80D	1/3	4200 to 5500
Amber	85C	1/3	5500 to 3800
	85	2/3	5500 to 3400
	85N3	1 2/3	5500 to 3400
	85N6	2 2/3	5500 to 3400
	85N9	3 2/3	5500 to 3400
	85B	2/3	5500 to 3200
	85BN3	1 2/3	5500 to 3200
	85BN6	2 2/3	5500 to 3200

*These values are approximate. For critical work, check by accurate tests, especially if you use more than one filter.

KODAK Light Balancing Filters

Light-balancing filters enable the photographer to make *minor* adjustments in the color quality of illumination to obtain cooler (bluer) or warmer (yellower) color rendering. One of the principle uses for KODAK Light Balancing Filters is where light sources frequently exhibit color temperatures different than that for which a color film is balanced. When using a color temperature meter to determine the color temperature of prevailing light, you can use the table below, which converts the prevailing temperature to either 3200 K or 3400 K.

Filter Color	Filter Number	Exposure Increase in Stops*	To Obtain 3200 K from:	To Obtain 3400 K from:
Bluish	82C + 82C	1 1/3	2490 K	2610 K
	82C + 82B	1 1/3	2570 K	2700 K
	82C = 82A	1	2650 K	2780 K
	82C + 82	1	2720 K	2870 K
	82C	2/3	2800 K	2950 K
	82B	2/3	2900 K	3060 K
	82A	1/3	3000 K	3180 K
	82	1/3	3100 K	3290 K
Yellowish	81	1/3	3300 K	3510 K
	81A	1/3	3400 K	3630 K
	81B	1/3	3500 K	3740 K
	81C	1/3	3600 K	3850 K
	81D	2/3	3700 K	3970 K
	81EF	2/3	3850 K	4140 K

*These values are approximate. For critical work, check by accurate tests, especially if you use more than one filter.

Neutral Density Filters

In black-and-white and color photography, filters such as the KODAK WRATTEN Neutral Density Filters No. 96 reduce the intensity of light reaching the film without affecting the tonal rendition in the original scene. In motion-picture work or other photography, neutral density filters allow use of a large aperture to obtain differential focusing. You can use them when filming in bright sunlight or with very fast films. These filters control exposure when the smallest aperture is still too large. Also available are KODAK WRATTEN Gelatin Filters with combinations of neutral density and color conversion filters (for example, No. 85N3). These filters combine the light-conversion characteristics of KODAK WRATTEN Gelatin Filter No. 85 with neutral densities.

KODAK WRATTEN Neutral Density Filters No. 96

Neutral Density	Percent Transmittance	Filter Factor	Exposure Increase in Stops*
0.1	80	$1\frac{1}{4}$	$\frac{1}{3}$
0.2	63	$1\frac{1}{2}$	$\frac{2}{3}$
0.3	50	2	1
0.4	40	$2\frac{1}{2}$	$1\frac{1}{3}$
0.5	32	3	$1\frac{2}{3}$
0.6	25	4	2
0.7	20	5	$2\frac{2}{3}$
0.8	16	6	$2\frac{2}{3}$
0.9	13	8	3
1.0	10	10	$3\frac{1}{3}$
2.0	1	100	$6\frac{2}{3}$
3.0	0.1	1000	10
4.0	0.01	10,000	$13\frac{2}{3}$

*These values are approximate. For critical work, check by accurate tests, especially if you use more than one filter.

Approximate Correlated Color Temperature for Various Light Sources

Source	Degrees Kelvin
Artificial Light	
Match Flame	1700
Candle Flame	1850
40-Watt Incandescent Tungsten Lamp	2650
75-Watt Incandescent Tungsten Lamp	2820
100-Watt Incandescent Tungsten Lamp	2865
500-Watt Incandescent Tungsten Lamp	2960
200-Watt Incandescent Tungsten Lamp	2980
1000-Watt Incandescent Tungsten Lamp	2990
3200-Degree Kelvin Tungsten Lamp	3200
Molarc "Brute" with Yellow Flame Carbons & YF-101 Filter (approx.)	3350
"C.P." (Color Photography) Studio Tungsten Lamp	3350
Photoflood and Reflector Flood Lamp	3400
Daylight Blue Photoflood Lamp	4800
White Flame Carbon Arc Lamp	5000
High-Intensity Sun Arc Lamp	5500
Xenon Arc Lamp	6420
Daylight	
Sunlight: Sunrise or Sunset	2000
Sunlight: One Hour After Sunrise	3500
Sunlight: Early Morning	4300
Sunlight: Late Afternoon	4300
Average Summer Sunlight at Noon (Washington, D.C.)	5400
Direct Mid-Summer Sunlight	5800
Overcast Sky	6000
Average Summer Sunlight (plus blue skylight)	6500
Light Summer Shade	7100
Average Summer Shade	8000
Summer Skylight Will Vary from	9500 to 30,000

NOTE: Sunlight is the light of the sun only. Daylight is a combination of sunlight plus skylight. The values given are approximate because many factors affect color temperature. OUTDOORS: the sun angle, and the conditions of the sky–clouds, haze, dust particles–raise or lower the color temperature. INDOORS: lamp age (and blackening), voltage, type of reflectors and diffusers affect tungsten bulbs–all of these can influence the actual color temperature of the light. Usually a change of 1 volt equals 10 degrees Kelvin. But this is true only within a limited voltage range and does not always apply to "booster voltage" operation, since certain bulbs will not exceed a certain color temperature regardless of the increase in voltage.

TIPS AND TECHNIQUES

Introduction

This collection of ideas is provided by Kodak people and others who work in the professional motion picture industry. The section covers topics from force processing, flashing, and shooting for television to what you need in the well-stocked ditty bag, and tools to survive. Also in this section (on the double foldout pages), is a filmmaker's flow chart that can help you through the tasks of production scheduling.

If you have further questions about our films or their applications, please refer to the last few pages in this guide for the names, addresses, and phone numbers of Kodak people worldwide who can help.

Aspect Ratios

The aspect ratio is the relationship between the width and height of an image. While the image dimensions may vary in size according to projection requirements, the aspect ratio should comply with the cinematographic intent.

The industry standard for 35 mm theatrical motion pictures remained a constant 1.37:1 between the introduction of sound and the introduction of Cinemascope in 1953, when "wide-screen" presentations arrived. The non-anamorphic or "flat" wide-screen presentations had aspect ratios of 1.66:1, 1.75:1 and 1.85:1. Today 1.85:1 is the wide-screen (flat) presentation format of choice in the USA, while in Europe 1.66:1 is used.

In the early 1950's, television's demand for feature films increased. The typical television display provides a fixed aspect ratio of 1.33:1 (4 x 3) and many of the films shown on television, to fill the picture height, lost a substantial part of the image when this was "matted off" at the edges. To rectify this incompatibility, the "Academy aperture" was introduced for flat (non-anamorphic) presentations. The Academy aperture produced an image of greater height so that it would fill a television screen without compromising the width. The usual procedure when filming productions for both theatrical release and conventional television transmission is called "shoot and protect." The camera viewfinder is "matted" to indicate 1.85:1 for

theatrical presentation and to keep all pertinent action within this area. The cinematographer must make certain no scene rigging, microphone booms, cables or lights are included in the expanded area which will be transmitted on television at 1.33:1. Subsequent interpositives, duplicate negatives and prints contain sufficient frame height to provide normal telecine transmission. In the theater, the projectionist must use a 1.85:1 aperture plate and exercise some judgment in adjusting the projector framing.

Super 16 is a format that employs single-perforation 16 mm film stock and has two objectives. When Super 16 was introduced in the early 1970's, it was to provide an image suitable for enlargement to a 35 mm print for wide-screen presentation. The second is for origination that will be displayed on wide-screen television (1.78:1 = 16 x 9). Super 16 and 3-perforation 35 mm are great fits for wide-screen television. The Super 16 camera aperture extends into the area used for a sound track on conventional 16 mm film providing more negative area to achieve a 1.66:1 aspect ratio, with some loss of image height when enlarged to wide-screen 35 mm film (1.85:1) and to 1.78:1 (16 x 9) for wide-screen television.

The Super 35, 4-perforation system utilizes the entire width of the film and is used primarily to extract an anamorphic print for theatrical release by optical reduction printing. This system is quite versatile: from a Super 35 negative, 70 mm blow-up prints can be produced, as well as extractions for 16 x 9 (1.78:1).

The Super 35, 3-perforation system is used for extracting 16 x 9 (1.78:1) prints and for origination for wide-screen television.

The 65 mm, 5-perforation system has a camera aperture of 2.29:1. It is used primarily for special effects, but when used in feature films, is projected on the screen using 70 mm release prints having an aspect ratio of 2.20:1. In lieu of originating on 65 mm for theatrical presentation, productions shot on 35 mm film with an anamorphic lens or in the Super 35 system are optically enlarged onto 70 mm release prints.

Other formats employing 65 mm negatives include 8-perforation (Iwerks 870), 10-perforation and the Imax 15-perforation (horizontal) format.

Ambient-Background Radiation (effects on raw stock)

Ambient gamma radiation is composed of two sources: a low-energy component which arises from the decay of radionuclides and a high-energy component which is the product of the interaction of cosmic rays with the earth's upper atmosphere. The radionuclides responsible for the low-energy photons exist in soil and rock and are carried into earth-derived building materials, such as concrete. Upon exposure to ambient-background radiation, photographic negative materials can exhibit an increase in minimum density, a loss in contrast and speed in the dark areas, and an increase in granularity. The changes in film performance are determined by several factors, such as the film speed and length of time exposed to the radiation before the film is processed. A film with an exposure index of 500 can exhibit about three times the change in performance as a film with an index of 125. While this effect on film raw stock is not immediate, it is one reason why we suggest exposing and processing film as soon as possible after purchase. We recommend a period of no more than six months from the time of film purchase before processing, provided it has been kept under specified conditions. Extended periods beyond six months may affect faster speed films as noted above, even if kept frozen. The only way to determine the specific effect of ambient-background radiation is with actual testing or measurements and placing a detector in the locations where the film was stored. The most obvious clue is the observance of increased granularity, especially in the light areas of the scene.

Protection from Physical Damage

Keep films away from heating pipes and direct sunlight, even if the room is air-conditioned. Maintain uniform room temperature throughout the storage area by means of adequate air circulation. If the building is not fireproof, install an automatic fire-extinguisher system. Design storage rooms for motion picture raw stock so that film is at least 6 in. (15 cm) off the floor.

Unprocessed Film Before and After Exposure

Exposed film, particularly color, deteriorates more rapidly than unexposed film. Process films as soon as possible after exposure.

Do not keep film in the camera or magazine longer than is necessary. If you load magazines a long time ahead of use, protect them from excessive temperature and relative humidity until you need to load the camera.

Keep loaded cameras or magazines and carrying cases out of closed spaces that can trap heat from the sun or other sources such as closed automobiles, airplanes, or the holds of ships.

Immediately after exposure, return the film to its can and retape the can to help prevent any increase in moisture content.

Processed Film Storage

The following suggestions apply to extended storage of all motion picture films. Be aware that color dyes are more prone to change than are silver images over extended periods, with heat and humidity being the chief factors. Before any extended storage (ten years or more), these minimum guidelines should be followed:

1. Make sure the film was adequately washed to remove residual chemicals, and the residual hypo level does not exceed the recommended maximum. ANSI PH 4.8-1985 describes a test method for residual hypo.
2. At present, only EASTMAN EKTACHROME Motion Picture Films require stabilization during processing for dye stability. Be sure process specifications have been strictly followed.
3. All film should be as clean as possible. Cleaning is best done professionally. If you use a liquid cleaner, provide adequate ventilation. Adhere to local municipal codes in using and disposing of any solvents.
4. Keep film out of an atmosphere containing chemical fumes, such as hydrogen sulfide, hydrogen peroxide, sulfur dioxide, hydrogen sulfide, ammonia, coal gas, and automobile engine exhaust.
5. Do not store processed film above the recommended 21°C (70°F), 20 to 50 percent RH for acetate or for polyester, if extended life expectancy is to be maintained.

6. Wind films emulsion in and store flat in untaped cans under the above conditions.

Shooting for Television

The television industry is changing. New, advanced standards for high-definition television (HDTV) will put more demands on the cinematographer. Despite all the uncertainties associated with the new standards, indications are that film remains the ideal, independent origination format. With film, you have the ability to transfer to any electronic format, without conversions problems.

Film origination format and aspect ratio are more important than ever before. Film choices for origination include 16 mm, super 16 mm, and 35 mm. When cinematographers and producers compose the image, they need to decide whether to use the current 4:3 aspect ratio or 16:9 for HDTV. Some are shooting 4:3 and protecting the edges for 16:9.

The most widely used films in the television industry are KODAK VISION Color Negative and EASTMAN EXR Films.

In all likelihood, your film will still end up on a video format for broadcasting. An important part of this process is the telecine transfer. This critical procedure must be performed with the highest quality standards because, after all, the video output of the telecine is only as good as the film transfer input.

So, no matter what format or aspect ratio you choose, the best television images start with the best practices in cinematography.

In general, photography expressly for television release should avoid high-contrast scenes and scenes with important details in dark shadows or against very bright backgrounds. The recommendations below should help you get the best possible results.

1. Always have a white reference (something brighter than a face) in every shot.
2. The white reference should not be more than 1½ stops brighter than your subject's face.
3. Keep your subjects away from windows or other high-brightness backgrounds, such as white walls or large expanses of open sky, except for a desired effect.

4. Don't photograph dark-skinned people against very bright or very dark backgrounds.
5. Try to maintain a range of 5 to 6 stops from the brightest to the darkest parts of the shot. A lighting ratio of 2:1 is a good starting point.
6. If you must shoot white or extremely bright costumes, try to maintain a good face-to-face white reference relationship. For these scenes, use soft lighting, such as that produced by an overcast day or open shade.
7. Flat lighting will give very good results for television, but may not be acceptable if the film is later released for theater use.

Getting Ready

Before you go out on a shoot, you should check over the equipment and accessories that you plan to use on location. Below are several lists of items judged necessary by several suppliers of motion picture equipment. The first list includes items that ought to be in the assistant's ditty bag. The second list shows what tools the crew should have. Next is a list of camera accessories. Last is a list of the contents of a camera operator's meter case.

Ditty Bag

- Felt marking pen
- Ear syringe
- Flashlight
- Lens tissue and lens cleaner
- Magnifying glass
- Scissors
- Masking tape
- Tweezers
- Orange sticks
- *American Cinematographer Manual*
- Assorted 85 filters (85, 85B, 85C, etc.)
- Pencils and ballpoint pens
- Screwdrivers
- Paint brush (a 1-inch size w/tapered bristles is very handy)
- Leakproof precision oil can (the kind that looks like a fountain pen)
- Rubber bands

- Black cloth
- Magazine belt clips and pick
- This copy of *Cinematographer's Field Guide,* KODAK Publication No. H-2.

Tools

- Longnose pliers
- Diagonal cutters
- Channel Lock pliers
- Screwdrivers—Standard and Phillips
- Jeweler's screwdriver set
- Allen wrenches
- Open end and box wrench sets
- Files (for metal and wood)
- Pocket knife
- "C" clamps 3-in. (7.5 cm)
- Spring clamps
- Scriber
- ¼ x 20 screws 1- and 2½-in. (2.5 and 6 cm)
- ⅜ x 16 screws 1- and 2½-in. (2.5 and 6 cm)
- Washers
- Tape measure
- Voltmeter (w/adequate range to cover voltages likely to be encountered on location assignments)
- Electrical tape
- Ground adapters (both the 3-pin plug adapter and water pipe clamp types)
- Electric drill and bits, up to ⅜-in. (0.75 cm)
- Soldering iron and solder
- Small and medium Crescent wrenches
- Expansion bit (and bit brace, if not electric)
- Flashlight

Camera Accessories

- 100-ft (30 m) camera spool*
- 200-ft (61 m) camera spool*
- Spare film cores
- Spare 85 conversion filters
- Assorted ND filters (at least 0.3, 0.6, and 0.9)
- Black camera tape
- Gaffer tape

*Load and unload all camera spools in total darkness.

- Insert slate
- Log sheets
- Dental mirror
- Magnifier
- "Dust Off" (or equivalent canned air)
- Black felt marker (Sharpie)
- Lens cleaner and lens tissue
- Lens brush
- Cotton swabs
- Syringe
- Spot remover or aerosol solvent
- Penlight
- Cube taps (2 or 3)
- Dulling spray
- Fuses
- Mag head cleaner

Camera Operator's Meter Case

- Favorite filters
- Diffusion (gauzes or discs)
- Two exposure meters
- Color meter
- Viewing filters
- Calculators
- Handbook (this one fits nicely in almost any meter case) You may also want a copy of the ASC Manual.
- Magnifying glass
- Small hand mirror
- Aspirin tablets

Some items on these lists you may not use often—the key is the word often—but even if you need an item only once and have it among your photo gear, you will be thankful that you (or an assistant) remembered to bring it along.

Of course, these lists were developed by other people. You can customize them to fit your specific needs.

Flashing Camera Films to Lower Contrast

"Flashing" means to deliberately fog film by giving it a uniform exposure before processing. The amount and type of exposure will vary with the "look" desired. This slight exposure lowers the film's contrast (to some extent), primarily in the upper scale (shadow) areas, and allows for more detail in the shadows. The results are similar whether the film is pre- or post-flashed in a laboratory or on the camera (equipment supplied by camera manufacturers).

Flashing is often done to establish a closer match between films of different contrast characteristics that will be intercut. Other reasons for flashing are to create pastels from more saturated colors—enhancing shadow details that have less fill light, etc. Effects such as changing the color of shadows can be made by selective filtering (non-neutral light source).

The amount of flash will affect the result, but flashing intensity has its limits, and too much will distort the image. Flashing is often measured in percentages by the cinematographers and laboratory personnel. There is no absolute consensus about what these percentages mean. This is usually perceived through past experience, and as with most other creative techniques, it is important to work closely with the laboratory and gain experience through contacts and testing.

Exposed Film—What Now?

A Final Thought About Laboratories

Perhaps now is a good time to draw on the experiences of a lot of professional cinematographers that may offer a few hints about dealing with the laboratories where you take your films for processing and duplicating. You need to establish a good line of communications with your lab. Doing so will help this step of your production go smoothly.

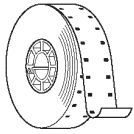
Know your needs—Know what you need from a lab and then talk about those needs with several labs before you make a choice. Consider such things as editing, dubbing, special effects, animation, etc., so the lab can help you accomplish these tasks the best way possible.

Get acquainted—Once you have made your choice of labs, get to know the people who will do your work. Tell them as much as you can about yourself, your needs and your style. The more you communicate with them about yourself and your production, the better they can serve you.

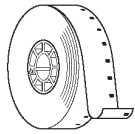
Get it In writing—Face-to-face discussions and telephone calls are necessary for efficient work flow; but when it comes to specifying what you want, when you want it, and how much it will cost, a carefully written document—the purchase order—is a must.

Winding Designations

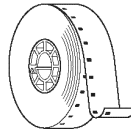
In the sketches below, the film is wound on cores and the emulsion side of the film faces the center of the roll. All 35 mm camera films and many 16 mm camera films have perforations on both edges—2R in the sketch. All one-edge perforated 16 mm camera films are Winding B.



2R



1R–WINDING B



1R–WINDING A

Perforation Types

35 mm and 65 mm End Use

1. BH-1870—35 mm Bell & Howell negative perforations with a pitch measurement of 0.1870" (4750), long pitch, (ANSI/SMPTE 93-1996)
2. BH-1866—35 mm Bell & Howell negative perforations with a pitch measurement of 0.1866" (4740), short pitch, (ANSI/SMPTE 93-1996)
3. KS-1866—35 mm and 65 mm Kodak Standard Positive perforations with a pitch measurement of 0.1866" (4740), short pitch, (ANSI/SMPTE 139-1996; ANSI/SMPTE 145-1993)
4. DH-1870—35 mm Dubray-Howell perforations with a pitch measurement of 0.1870" (4750), long pitch, (ANSI/SMPTE 237-1993)
5. KS-1870—70 mm film perforated 65 mm Kodak Standard Positive perforations with a pitch measurement of 0.1870" (4750), long pitch, (ANSI/SMPTE 119-1993)

16 mm End Use

6. 2R-2994—16 mm film perforated two edges with a perforation pitch of 0.2994" (7605), short pitch, (ANSI/SMPTE 109-1996)
7. 2R-3000—16 mm film perforated two edges with a perforation pitch of 0.3000" (7620), long pitch, (ANSI/SMPTE 109-1996)
8. 1R-2994—Same as No.6 except perforated one edge (ANSI/SMPTE 109-1996)
9. 3R-2994—35 mm film perforated 16 mm with a perforation pitch of 0.2994" (7605), short pitch, (ANSI/SMPTE 171-1996)
10. 1R-3000—Same as No.7 except perforated one edge (ANSI/SMPTE 109-1996)
11. 3R-3000—Same as No. 9 except with a perforation pitch of 0.3000" (7620), long pitch, (ANSI/SMPTE 171-1996)

Note: For other perforation types or formats, consult your Professional Motion Imaging office.

Quantities—Standard Packages

For faster service and easier handling, you should order case-lot quantities whenever possible.

Film Width	Film Type	Roll Length	Case Quantity	Approx. Case Weight
35 mm	Camera Films (Color/B&W)	100 ft (30 m)	50	35 lb (16 kg)
		200 ft (61 m)	20	28 lb (13 kg)
		400 ft (122 m)	10	25 lb (11 kg)
		1000 ft (305 m)	5	30 lb (14 kg)
16 mm	Camera Films (Color/B&W)	100 ft (30 m)	50	22 lb (10 kg)
		200 ft (61 m)	30	30 lb (14 kg)
		400 ft (122 m)	30	30 lb (14 kg)
		800 ft (244 m)	12	37 lb (17 kg)
		1200 ft (366 m)	15	57 lb (25 kg)

ORDERING RAW STOCK

Introduction

All of the information presented in this field guide is intended to help you determine—

- the right film (performance characteristics), in
- the right quantities (shooting time/ratio), and
- the right format (width, perforations, winding, packaging, etc.).

How to Order

In this section, we briefly explain how to write (or phone) an order so you can get the film you need to begin or continue production on *schedule*. After you place an order with a Kodak company or distributor in your country, they'll arrange for all the other particulars of your order, such as product availability, terms of payment, applicable taxes, transportation, and returns.

The Catalog Number (CAT No.)

This number is perhaps the most important piece of information to know when you want to buy film from Kodak. In brief, the CAT No. describes a particular kind of film, the size, length, perforation, pitch, and other format information to our Customer Relations Representatives. For example, the CAT No. for 100 ft (30 m) of EASTMAN EXR 100T Film 5248 (35 mm), BH-1886 (4740) perforation type, with a film identification number of EXM417, on a spool is 170 0434. That seven-digit CAT No. describes only one film package.

To get your order as quickly as possible, give us the correct CAT No. listed in your Kodak price catalog. That simple seven-digit number is the key to your film order—all additional related numbers and descriptions verify the CAT No. and rule out the possibility that the number was recorded incorrectly. Once the CAT No. is written in our order sheet, we know the exact film you need, the length of one roll, the specific core or spool, the perforation pitch, the price, and a multitude of other important details.

To illustrate our point, let's look at one example:

If you order a 400-ft (122 m) roll of 35 mm KODAK VISION 200T Color Negative Film 5274, the CAT No. is 171 6984. That number tells us exactly what you need.

To verify that number you should include:

- the name of the film (5274)
- Iden No. (VXM718)
- roll length (400 ft [122 m]) on core
- perforation pitch (BH-1866 [4740]).

Product and Technical Information

Throughout the world, Eastman Kodak Company provides the motion picture industry with a full range of quality products, supported by worldwide technical services and distribution. The goal is simple: to provide customers with products and services to achieve the best screen image possible.

The vast majority of filmmakers choose KODAK Motion Picture Films to generate quality images. Cinematographers and laboratory professionals know they can count on Eastman Kodak Company for fast, experienced technical assistance and a film-distribution network that reaches just about every corner of the globe. Our involvement extends to theaters where we assist exhibitors in providing first-class viewing environments.

A worldwide network is available to supply you with KODAK Motion Picture Products and to answer any technical questions. For information, call Kodak in your area of operations listed on pages 31 through 39. For technical information in the United States, call the **Kodak Information Center** at **1-800-242-2424, Ext. 16,** 9 a.m. to 7 p.m. (Eastern time), Monday through Friday. To place an order in the United States, call 1-800-621-FILM. Countries outside the U.S., contact Kodak in your country or the nearest distributor.

Visit the Entertainment Imaging website at www.kodak.com/go/motion for complete technical data sheets on KODAK Motion Picture Films, or call the Kodak Information Center (see phone information above).

Two internationally recognized sources of technical information for motion picture procedures and standards are the **Society of Motion Picture and Television Engineers (SMPTE),** located at 595 West Hartsdale Avenue, White Plains, New York 10607, 914-761-1100, and the **American National Standards Institute (ANSI),** 550 Mamaroneck Ave., Harrison, New York 10528, 212-642-4900.

The ***American Cinematographer Film Manual,*** from the American Society of Cinematographers, covers virtually every phase of motion picture photography. The seventh edition is available from A.S.C. Press, P. O. Box 2230, Hollywood, California 90078.

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You can also find updated addresses and phone/fax numbers on the Professional Motion Imaging website: **www.kodak.com/go/motion**.

Limitations of Liability on Sensitized Goods

The sale, use, processing and handling of Kodak sensitized goods are subject to the applicable limitation of liability listed below:

Film

Kodak films will be replaced if defective in manufacture, labeling or packaging, or if damaged or lost by us or any subsidiary company. Except for such replacement, the sale, or other handling of these films is without warrant or liability, even though defect, damage, or loss is caused by negligence or other fault. Since color dyes may in time change, color films will not be replaced for, or otherwise warranted against, any change in color.

Motion Picture Film Updates

Eastman Kodak Company offers updates of the film section of the *Cinematographer's Field Guide* as new films are introduced. The updates are free to owners of the *Cinematographer's Field Guide*.

To obtain film updates, please fill in and return this form to:

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