

KODAK PROFESSIONAL ULTRA COLOR Films / 100UC and 400UC

Kodak

TECHNICAL DATA / COLOR NEGATIVE FILM

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This family of color negative films delivers an extra punch of color. KODAK PROFESSIONAL ULTRA COLOR Films / 100UC and 400UC feature deep, saturated color to bring subjects to life, without sacrificing skin tones. Both film offer extremely fine grain for smooth enlargements through both optical prints and digital film scans, as well as outstanding sharpness for capturing fine detail.

Use KODAK PROFESSIONAL ULTRA COLOR Films / 100UC and 400UC for fashion, landscape, nature, wildlife, and lifestyle photography. KODAK PROFESSIONAL ULTRA COLOR Film / 400UC provides extra speed for low light and action situations.

FEATURES	BENEFITS
<ul style="list-style-type: none"> Color Precision Technology 	<ul style="list-style-type: none"> Vibrant color Improved color saturation without sacrificing skin reproduction
<ul style="list-style-type: none"> Advanced T-GRAIN Emulsions with Kodak's proprietary ADA's (Advanced Developer Accelerators) 	<ul style="list-style-type: none"> Extremely fine grain Remarkably detailed scans Enlargements with very little grain
<ul style="list-style-type: none"> High performance dye couplers 	<ul style="list-style-type: none"> Unsurpassed sharpness Able to record fine detail and distinct edges
<ul style="list-style-type: none"> Human-eye spectral sensitivity 	<ul style="list-style-type: none"> Unsurpassed color accuracy—film sees color much like the human eye Renders difficult colors
<ul style="list-style-type: none"> Unified Film Emulsion Technology 	<ul style="list-style-type: none"> Consistent look with 100UC and 400UC Films Exceptional flexibility to capture a wide variety of scenes and situations

STORAGE AND HANDLING

Store unexposed film at 21°C (70°F) or lower in the original sealed package. For extended periods, store film at 13°C (55°F) to preserve consistency.

To avoid moisture condensation on film that has been refrigerated, allow the film to warm up to room temperature before opening the package. Typical warm-up times are given in the table below.

Size	Warm-Up Times (Hours) to Reach Room Temperature of 21°C (70°F) From a Storage Temperature of:		
	-18°C (0°F)	2°C (35°F)	13°C (55°F)
135 magazine	1½	1¼	1

Load and unload roll-film cameras in subdued light.

Process film as soon as possible after exposure. Protect negatives from strong light, and store them in a cool, dry place. For long-term storage, keep negatives at a temperature between 2°C (35°F) and 13°C (55°F) and at a relative humidity between 30 and 35 percent.

DARKROOM RECOMMENDATIONS

Do not use a safelight. Handle unprocessed film in total darkness.

EXPOSURE

Film Speed

Use the speed numbers in the tables below with cameras or meters marked for ISO, ASA, or DIN speeds or exposure indexes (EIs). Do not change the film-speed setting when metering through a filter. Metering through filters may affect light meter accuracy; see your meter or camera manual for specific information. For critical work, make a series of test exposures.

Light Source	KODAK WRATTEN Gelatin Filter*	ISO Speed	
		100UC Film	400UC Film
Daylight or Electronic Flash	None	100	400
Photolamp (3400 K)	No. 80B	32	125
Tungsten (3200 K)	No. 80A	25	100

* For best results without special printing.

Adjustments for Long and Short Exposures

No filter correction or exposure compensation is required using 100UC and 400UC Film for exposures from 1/10,000 second to 10 seconds. For critical applications with longer exposure times, make tests under your conditions.

Daylight

Use the exposures in the table below for average frontlit subjects from 2 hours after sunrise to 2 hours before sunset.

Lighting Conditions	Shutter Speed (Second) and Lens Opening	
	100UC Film	400UC Film
Bright or Hazy Sun on Light Sand or Snow	1/125 f/16	1/500 f/16
Bright or Hazy Sun (Distinct Shadows)	1/125 f/11*	1/500 f/11*
Weak, Hazy Sun (Soft Shadows)	1/125 f/8	1/500 f/8
Cloudy Bright (No Shadows)	1/125 f/5.6	1/500 f/5.6
Heavy Overcast or Open Shade‡	1/125 f/4	1/500 f/4

* Use f/5.6 for backlit close-up subjects.

‡ Subject shaded from the sun but lighted by a large area of sky.

Electronic Flash

Use the appropriate guide number in the table below as starting-point recommendations for your equipment. Select the unit output closest to the number given by your flash manufacturer. Then find the guide number for feet or metres. To determine the lens opening, divide the guide number by the flash-to-subject distance. If negatives are consistently too dense (overexposed), use a higher guide number; if they are too thin (underexposed), use a lower number.

Unit Output (BCPS)*	Guide Number Distances in Feet/Metres	
	100UC Film	400UC Film
350	40/12	85/26
500	50/15	100/30
700	60/18	120/36
1000	70/21	140/42
1400	85/26	170/50
2000	100/30	200/60
2800	120/36	240/70
4000	140/42	280/85
5600	170/50	340/100
8000	200/60	400/120

* BCPS = beam candlepower seconds

Fluorescent and High-Intensity Discharge Lamps

Use the color-compensating filters and exposure adjustments in the tables below as starting points to expose these films under fluorescent or high-intensity discharge lamps. For critical applications, make a series of test exposures under your actual conditions.

To avoid the brightness and color variations that occur during a single alternating-current cycle, use exposure times of 1/60 second or longer with fluorescent lamps; with high-intensity discharge lamps, use exposure times of 1/25 second or longer.

Type of Fluorescent Lamp	KODAK Color Compensating Filter(s)	Exposure Adjustment
	100UC Film	
Daylight	20R + 5M	+ 1 stop
White	30B + 20C	+ 1 2/3 stops
Warm White	40B + 50C	+ 2 stops
Warm White Deluxe	90C + 30M	+ 2 stops
Cool White	20B	+ 1 stop
Cool White Deluxe	10B + 30C	+ 1 stop
T8 741 (CCT = 4100 K)*	40B + 30C	+ 1 2/3 stops
T8 830 (CCT = 3000 K)*	50B + 70C	+ 2 1/3 stops
T8 835 (CCT = 3500 K)*	40B + 50C	+ 1 2/3 stops
T8 841 (CCT = 4100 K)*	30B + 30C	+ 1 1/3 stops

* CCT = Correlated Color Temperature. Phosphor emission emulates the color temperature of a continuous spectrum lamp, such as tungsten.

Type of Fluorescent Lamp	KODAK Color Compensating Filter(s)	Exposure Adjustment
	400UC Film	
Daylight	20R + 5M	+ 1 stop
White	50C + 30M	+ 1 2/3 stops
Warm White	40B + 50C	+ 2 stops
Warm White Deluxe	90C + 30M	+ 2 stops
Cool White	30B	+ 1 stop
Cool White Deluxe	40C + 10M	+ 1 stop
T8 741 (CCT = 4100 K)*	40B + 20C	+ 1 2/3 stops
T8 830 (CCT = 3000 K)*	50B + 60C	+ 2 1/3 stops
T8 835 (CCT = 3500 K)*	40B + 40C	+ 1 2/3 stops
T8 841 (CCT = 4100 K)*	50C + 20M	+ 1 1/3 stops

* CCT = Correlated Color Temperature. Phosphor emission emulates the color temperature of a continuous spectrum lamp, such as tungsten.

High-Intensity Discharge Lamp (CCT)*	KODAK Color Compensating Filter(s)	Exposure Adjustment
	100UC Film	
High-Pressure Sodium Vapor (2700 K)	50B + 80C	+ 2 ² / ₃ stops
High-Pressure Sodium Vapor (2200 K)	50B + 90C	+ 3 stops
High-Pressure Sodium Vapor (2100 K)	30B + 170C	+ 4 stops
Metal Halide (4300 K)	10B	+ ² / ₃ stop
Metal Halide (3200 K)	80C + 5M	+ 1 ² / ₃ stops
Mercury Vapor (3700 K)	20B + 20C	+ 1 stop

* CCT = Correlated Color Temperature. Phosphor emission emulates the color temperature of a continuous spectrum lamp, such as tungsten.

High-Intensity Discharge Lamp (CCT)*	KODAK Color Compensating Filter(s)	Exposure Adjustment
	400UC Film	
High-Pressure Sodium Vapor (2700 K)	50B + 70C	+ 2 ² / ₃ stops
High-Pressure Sodium Vapor (2200 K)	50B + 90C	+ 3 stops
High-Pressure Sodium Vapor (2100 K)	20M + 200C	+ 4 stops
Metal Halide (4300 K)	10M	+ ² / ₃ stop
Metal Halide (3200 K)	80C + 10M	+ 1 ² / ₃ stops
Mercury Vapor (3700 K)	20B + 10C	+ 1 stop

* CCT = Correlated Color Temperature. Phosphor emission emulates the color temperature of a continuous spectrum lamp, such as tungsten.

PROCESSING

Process these films in KODAK FLEXICOLOR Chemicals for Process C-41 with the following replenishment and wash rates.

Replenishment and Wash Rates / 100UC Film

Film Size	KODAK FLEXICOLOR Developer Replenisher	KODAK FLEXICOLOR Developer Replenisher LORR	KODAK FLEXICOLOR Bleach III, Fixer, and Stabilizer	Wash Water*
135	1012 mL/m ² 94 mL/ft ²	506 mL/m ² 47 mL/ft ²	861 mL/m ² 80 mL/ft ²	31 L/m ² 2.9 L/ft ²
120/220	1012 mL/m ² 94 mL/ft ²	506 mL/m ² 47 mL/ft ²	1023 mL/m ² 95 mL/ft ²	31 L/m ² 2.9 L/ft ²

* Rates are for first wash and a two-stage countercurrent final wash. Double these rates for a single stage final wash.

Replenishment and Wash Rates / 400UC Film

Film Size	KODAK FLEXICOLOR Developer Replenisher	KODAK FLEXICOLOR Developer Replenisher LORR	KODAK FLEXICOLOR Bleach III, Fixer, and Stabilizer	Wash Water*
135	1400 mL/m ² 130 mL/ft ²	700 mL/m ² 65 mL/ft ²	861 mL/m ² 80 mL/ft ²	31 L/m ² 2.9 L/ft ²
120/220	1400 mL/m ² 130 mL/ft ²	700 mL/m ² 65 mL/ft ²	1023 mL/m ² 95 mL/ft ²	31 L/m ² 2.9 L/ft ²

* Rates are for first wash and a two-stage countercurrent final wash. Double these rates for a single stage final wash.

JUDGING NEGATIVE EXPOSURES

You can check the exposure level with a suitable electronic densitometer equipped with a filter such as a KODAK WRATTEN Gelatin Filter No. 92 or the red filter for Status M densitometry. Depending on the subject and the light source used for exposure, a normally exposed and processed color negative measured through the red filter should have the approximate densities listed below.

Because of the extreme range in skin color, use these red density values for a normally lit forehead only as a guide. For best results, use a *KODAK Gray Card* (gray side).

Area Measured	100UC Film Density Reading
<i>KODAK Gray Card</i> (gray side) receiving same illumination as subject	0.90 to 1.10
Lightest step (darkest in the negative) of a <i>KODAK Paper Gray Scale</i> receiving same illumination as subject	1.25 to 1.45
Highest diffuse density on normally lighted forehead —light complexion —dark complexion	1.05 to 1.35 0.85 to 1.20

Area Measured	400UC Film Density Reading	
	EI 400	EI 800 (Push 1)
<i>KODAK Gray Card</i> (gray side) receiving same illumination as subject	0.80 to 1.00	1.00 to 1.20
Lightest step (darkest in the negative) of a <i>KODAK Paper Gray Scale</i> receiving same illumination as subject	1.25 to 1.45	1.40 to 1.60
Highest diffuse density on normally lighted forehead —light complexion —dark complexion	1.00 to 1.30 0.80 to 1.15	1.20 to 1.50 0.95 to 1.30

RETOUCHING

You can retouch the sheet and 120 / 220 sizes on both the base side and the emulsion side. Retouch only the emulsion side on the 135 size.

For information on retouching equipment, supplies, and techniques, see KODAK Publication No. E-71, *Retouching Color Negatives*.

PRINTING NEGATIVES

This film is optimized for printing on KODAK PROFESSIONAL SUPRA ENDURA and ULTRA ENDURA Papers, and KODAK PROFESSIONAL ENDURA Metallic Paper.

Make color slides and transparencies by printing the negatives on KODAK PROFESSIONAL ENDURA Transparency Display Material or KODAK PROFESSIONAL ENDURA Clear Display Material.

Make black-and-white prints on any of the materials mentioned above using the recommendations in KODAK Publication CIS-274, *Printing Black-and-White Images Without KODAK Black-and-White Papers*.

To set up a color printer or negative analyzer, use the following control negatives.

KODAK PROFESSIONAL PORTRA Printer Control Negative	CAT No.
Set / Size 135*	179 8511
Normal / Size 120	846 0958
Very Under / Size 120	107 1398
Under / Size 120	841 1902
Over / Size 120	177 1302
Very Over / Size 120	144 5741

* This set includes one each: very under, under, normal, over, and very over negatives.

Digital Files

You can scan your image to a file and print digitally to —
 KODAK PROFESSIONAL SUPRA ENDURA Paper
 KODAK PROFESSIONAL ULTRA ENDURA Paper
 KODAK PROFESSIONAL ENDURA Transparency Display Material
 KODAK PROFESSIONAL ENDURA Clear Display Material
 KODAK PROFESSIONAL ENDURA Metallic Paper

SCANNING NEGATIVES

You can easily scan KODAK PROFESSIONAL Film negatives with a variety of linear-array-CCD, area-array-CCD, and PMT film scanners. You can scan negatives on desktop scanners as well as high-end drum scanners.

Because no standards exist to define the colored filter sets that film scanners use to capture the red, green, and blue information of the film image, each manufacturer's scanner has its own characteristic output. The output depends on the scanner's sensitivity to the dyes in the film. This sensitivity is determined by the spectral distribution of the colored filter sets and/or the spectral sensitivity of the charge-coupled-device (CCD). In addition to these spectral specifications, scanner output depends on the look-up tables or matrices that the scanner uses to output information for CRT monitors, transmission, etc. These tables or matrices are part of either "plug-in" programs used with specific software packages designed for image manipulation, updateable ROMs included with the equipment, or fixed algorithms for calibrating and balancing, similar to those used in photographic color printing equipment.

The generic "color negative film" channel designation available with scanner software is only a starting point. You can adjust the final color balance and the scene-dependent contrast and brightness of an image by using the scanner's controls during pre-scan, or by using an image-manipulation software program or workstation after acquisition. Some scanners allow you to use "plug-in" programs to customize scanner setups.

For more information, visit the following Web sites.

To access	Go to
Film Terms for KODAK PHOTO CD Imaging Workstations	www.kodak.com/go/pcdFilmTerms
Drivers for KODAK Film Scanners	www.kodak.com/go/scannerDrivers

IMAGE STRUCTURE

Print Grain Index

The Print Grain Index number refers to a method of defining graininess in a print made with diffuse-printing illumination. It replaces rms granularity and has a different scale which cannot be compared to rms granularity.

- The method uses a uniform perceptual scale, with a change of four units equaling a *just noticeable difference* in graininess to 90 percent of observers.
- A Print Grain Index rating of 25 on the scale represents the approximate visual threshold for graininess. A higher number indicates an increase in the amount of graininess observed.
- The standardized inspection (print-to-viewer) distance for all print sizes is 14 inches, the typical viewing distance for a 4 x 6-inch print.
- In practice, larger prints will likely be viewed from distances greater than 14 inches, which reduces apparent graininess.
- Print Grain Index numbers may not represent graininess observed from more specular printing illuminants, such as condenser enlargers.

Negative Size: 24 x 36 mm (Size 135)

Print Size in inches	4x6	8x10	16x20
Magnification	4.4X	8.8X	17.8X
Print Grain Index for—			
100UC Film	31	53	83
400UC Film	40	62	92

Negative Size: 6 x 6 cm (Size 120/220)

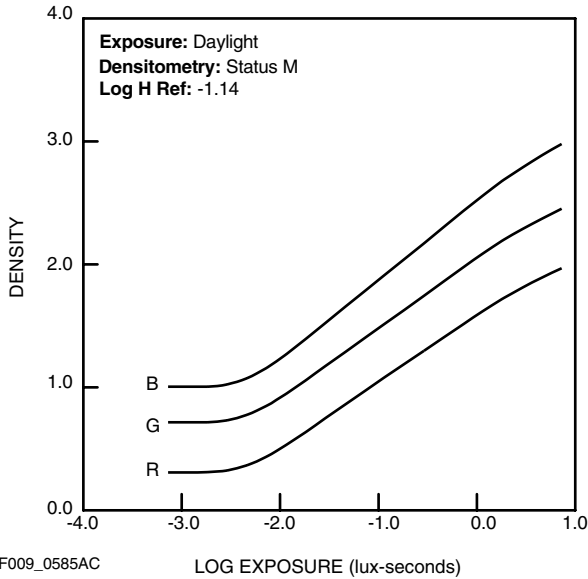
Print Size in inches	4x6	8x10	16x20
Magnification	2.6X	4.4X	8.8X
Print Grain Index for—			
100UC Film	less than 25	31	53
400UC Film	28	40	62

For more information, see KODAK Publication No. E-58, *Print Grain Index—An Assessment of Print Graininess from Color Negative Films*.

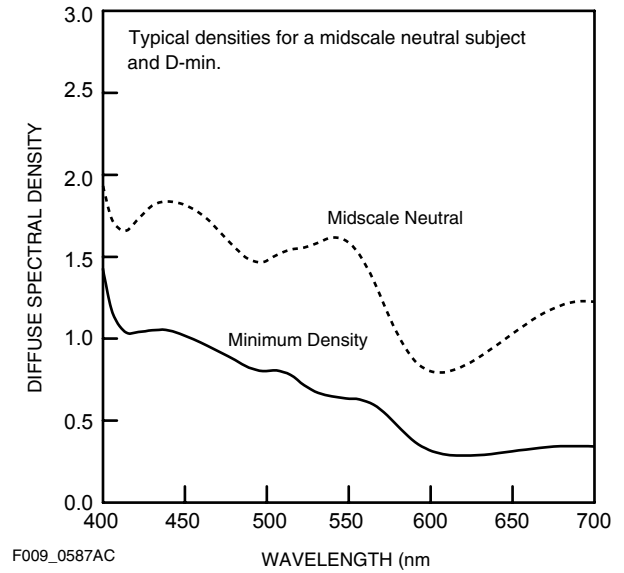
CURVES

KODAK PROFESSIONAL ULTRA COLOR Film / 100UC

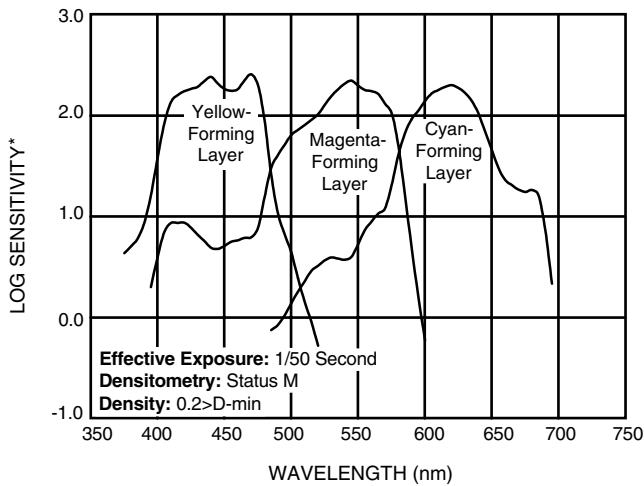
Characteristic Curves



Spectral-Dye-Density Curves

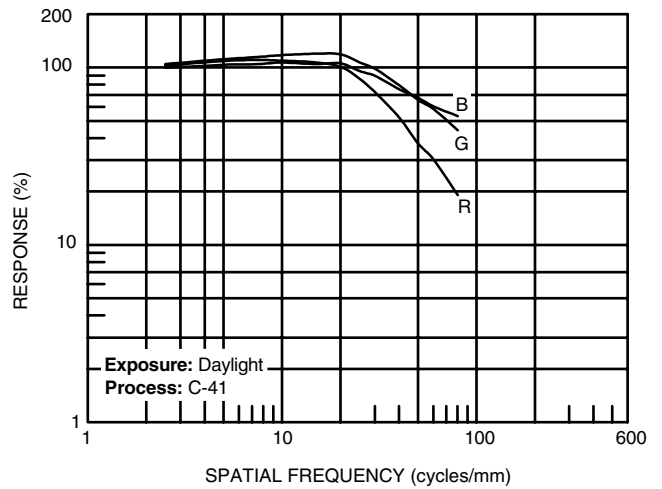


Spectral-Sensitivity Curves



*Sensitivity = reciprocal of exposure (erg/cm^2) required to produce specified density

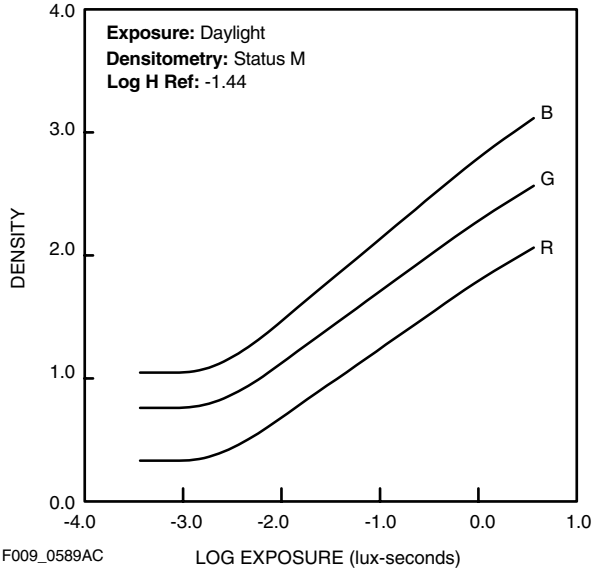
Modulation Transfer Function



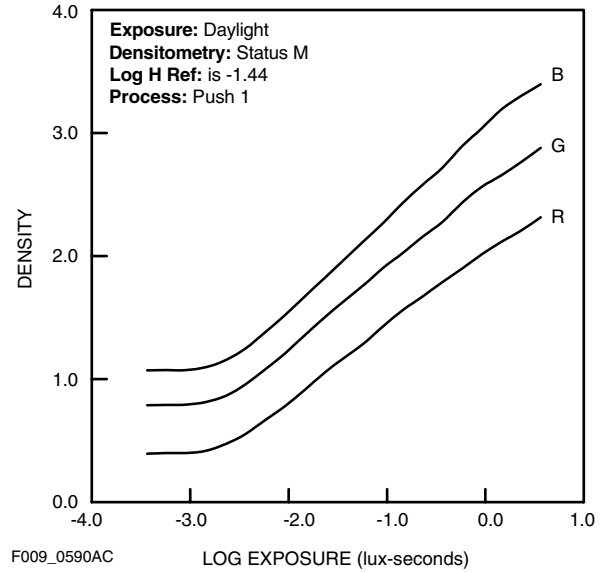
NOTICE: The sensitometric curves and data in this publication represent product tested under the conditions of exposure and processing specified. They are representative of production coatings, and therefore do not apply directly to a particular box or roll of photographic material. They do not represent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

KODAK PROFESSIONAL ULTRA COLOR
Film / 400UC

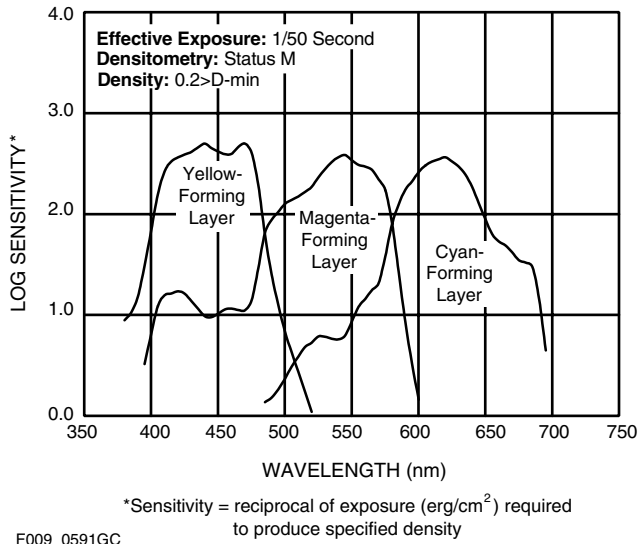
Characteristic Curves, EI 400



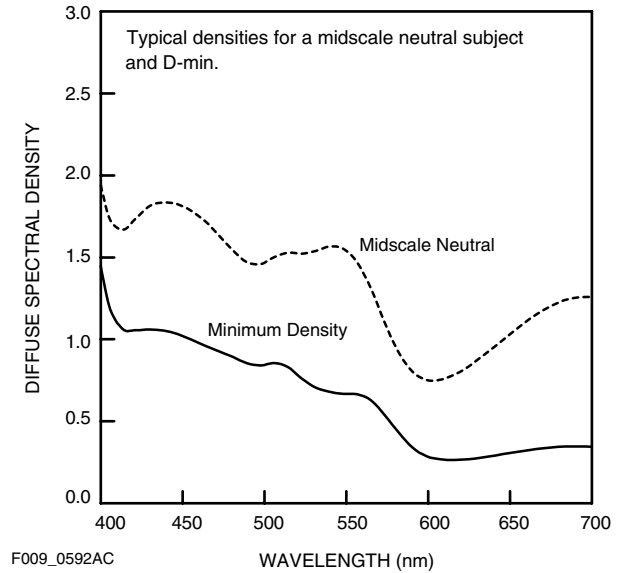
Characteristic Curves, EI 800 (Push 1)



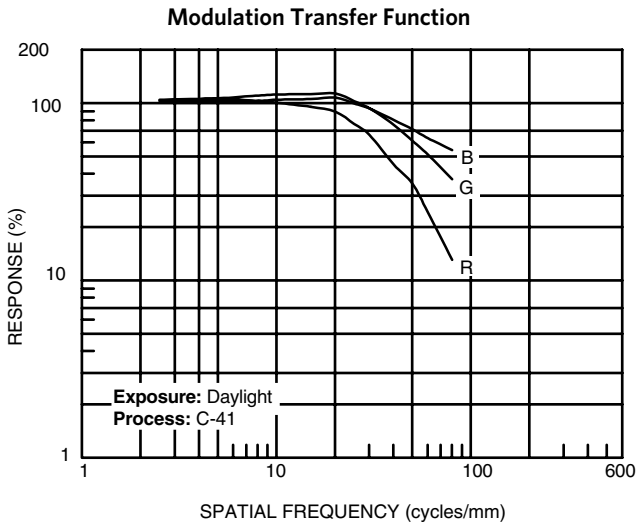
Spectral-Sensitivity Curves



Spectral-Dye-Density Curves



KODAK PROFESSIONAL ULTRA COLOR Films / 100UC and 400UC



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MORE INFORMATION

Kodak has many publications to assist you with information on Kodak products, equipment, and materials.

The following publications are available from Kodak Customer Service, from dealers who sell Kodak products, or you can contact Kodak in your country for more information.

E-30	<i>Storage and Care of KODAK Photographic Materials—Before and After Processing</i>
E-58	<i>Print Grain Index</i>
E-71	<i>Retouching Color Negatives</i>
E-4021	<i>KODAK PROFESSIONAL PORTRA and SUPRA ENDURA Papers</i>
E-4020	<i>KODAK PROFESSIONAL ULTRA ENDURA Paper</i>
E-4031	<i>KODAK PROFESSIONAL ENDURA Transparency and Clear Display Materials</i>
E-4028	<i>KODAK PROFESSIONAL ENDURA Metallic Paper</i>
J-38	<i>Using KODAK FLEXICOLOR Chemicals in Sink-Line, Bath, and Rotary-Tube Processors</i>
Z-131	<i>Using KODAK FLEXICOLOR Chemicals</i>

For the latest version of technical support publications for KODAK PROFESSIONAL Products, visit Kodak on-line at: http://www.kodak.com/go/professional
If you have questions about KODAK PROFESSIONAL Products, call Kodak. In the U.S.A.: 1-800-242-2424, Ext. 19, Monday-Friday 9 a.m.-7 p.m. (Eastern time) In Canada: 1-800-465-6325, Monday-Friday 8 a.m.-5 p.m. (Eastern time)

Note: The Kodak materials described in this publication for use with KODAK PROFESSIONAL Films are available from dealers who supply KODAK PROFESSIONAL Products. You can use other materials, but you may not obtain similar results.

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