

KODAK PROFESSIONAL PORTRA 160NC, 160VC, 400NC, 400VC, 400UC, and 800 Films



KODAK PROFESSIONAL PORTRA Films offer photographers both variety and consistency. You have your choice of speed, color saturation, and format for virtually any shooting situation. PORTRA Films deliver beautifully matched final prints across speeds and formats: 35 mm, 120, 220, and sheet formats; NC (natural color), VC (vivid color), and UC (ultra color); 100T, 160, 400 and 800 speeds. The PORTRA Film family yields consistently rich and detailed negatives with a neutrally balanced tone scale from shadows to highlights. An emulsion overcoat and scanner friendly design make PORTRA Films the perfect choice for photographers and labs who scan negatives.

KODAK PROFESSIONAL PORTRA 160NC Film features natural colors and medium speed. Use 160NC Film for smooth, natural flesh tones in controlled lighting situations.

KODAK PROFESSIONAL PORTRA 160VC Film features vivid colors and medium speed. Use 160VC Film for rich, enhanced colors in controlled lighting situations.

KODAK PROFESSIONAL PORTRA 400NC Film features natural colors and high speed. Use 400NC Film for smooth, natural flesh tones in low light or on-camera flash situations.

KODAK PROFESSIONAL PORTRA 400VC Film features vivid colors and high speed. Use 400VC Film for enhanced colors in low light or on-camera flash situations.

KODAK PROFESSIONAL PORTRA 400UC Film features very vivid ("ultra") colors and high speed. Use 400UC Film for the highest color saturation in low light or on-camera flash situations.

KODAK PROFESSIONAL PORTRA 800 Film features the highest film speed with neutral flesh-tone reproduction, tight grain, and medium color saturation. Use PORTRA 800 Film when using long lenses, shooting action, or shooting in low light.

KODAK PROFESSIONAL PORTRA 100T Film delivers color accuracy under tungsten illumination (3200K) and allows long exposure times with minimum effect on color balance and contrast.

Try This KODAK PROFESSIONAL Film	For
<i>Daylight Balanced</i>	
PORTRA 160NC	<ul style="list-style-type: none"> • Smooth, natural flesh tones • Controlled lighting situations
PORTRA 160VC	<ul style="list-style-type: none"> • Vivid colors • Controlled lighting situations
PORTRA 400NC	<ul style="list-style-type: none"> • Smooth, natural flesh tones • Location photography • On-camera flash
PORTRA 400VC	<ul style="list-style-type: none"> • Vivid colors • Location photography • On-camera flash
PORTRA 400UC	<ul style="list-style-type: none"> • Very vivid colors • Location photography • On-camera flash
PORTRA 800	<ul style="list-style-type: none"> • Smooth, natural flesh tones • Low-light photography • Action photography • Location photography
<i>Tungsten balanced</i>	
PORTRA 100T*	<ul style="list-style-type: none"> • Tungsten-balanced lights • Controlled lighting situations

* For more information about this PORTRA Film, see KODAK Publication No. E-2468.

KODAK PROFESSIONAL PORTRA Films offer the following features.

FEATURES	BENEFITS
<ul style="list-style-type: none"> Single Channel Printing technology 	<ul style="list-style-type: none"> Beautifully matched prints across speeds and formats Convenient analyzing and printing for the lab Uses the same scanner setup for all PORTRA Films
<ul style="list-style-type: none"> True-to-speed shooting at 160, 400, and 800 	<ul style="list-style-type: none"> Shoot at box speed in all lighting conditions No second-guessing film exposure
<ul style="list-style-type: none"> Wider exposure latitude 	<ul style="list-style-type: none"> Better highlight and shadow detail Forgiveness for up to two stops for underexposure or overexposure
<ul style="list-style-type: none"> High-Efficiency T-GRAIN Emulsions 	<ul style="list-style-type: none"> Captures the fine details of your subject
<ul style="list-style-type: none"> Excellent scanning performance 	<ul style="list-style-type: none"> High-quality prints from digital output systems
<ul style="list-style-type: none"> Outstanding performance in mixed daylight and fluorescent lighting 	<ul style="list-style-type: none"> Shoot under mixed lighting situations and still get neutral prints
<ul style="list-style-type: none"> Excellent flesh tones 	<ul style="list-style-type: none"> Kodak's legendary reproduction of the world's flesh tones
<ul style="list-style-type: none"> Exacting color reproduction 	<ul style="list-style-type: none"> No surprises with hard-to-reproduce colors


Suggested applications for KODAK PROFESSIONAL PORTRA Films are given below.

Application	KODAK PROFESSIONAL PORTRA Film					
	160NC	160VC	400NC	400VC	400UC	800
Advertising/ Illustration	✓	✓	✓	✓	✓	✓
Architecture	✓	✓	✓	✓	✓	
Corporate/ Industrial	✓	✓	✓	✓	✓	✓
Fashion/ Glamour	✓	✓	✓	✓	✓	
Museum/Art/ Copy	✓	✓				
Portraiture— Low Light			✓	✓	✓	✓
Portraiture— Daylight and Electronic Flash	✓	✓	✓	✓	✓	
Wedding— Low Light			✓	✓	✓	✓
Wedding— Daylight and Electronic Flash	✓	✓	✓	✓	✓	
Digital Film Recorders	✓	✓				


SIZES AVAILABLE

Availability may differ from country to country. See your dealer who supplies KODAK PROFESSIONAL Products.


KODAK PROFESSIONAL PORTRA 160NC Film

Size/Format	Code	Base
135	160NC	0.13 mm (0.005 inch) acetate
120	160NC	0.10 mm (0.004 inch) acetate
220	160NC	0.10 mm (0.004 inch) acetate
Long Rolls	160NC	0.13 mm (0.005 inch) acetate, 0.10 mm (0.004 inch) ESTAR Thick
Sheets		0.19 mm (0.007 inch) ESTAR Thick

KODAK PROFESSIONAL PORTRA 160VC Film

Size/Format	Code	Base
135	160VC	0.13 mm (0.005 inch) acetate
120	160VC	0.10 mm (0.004 inch) acetate
220	160VC	0.10 mm (0.004 inch) acetate
Long Rolls	160VC	0.13 mm (0.005 inch) acetate, 0.10 mm (0.004 inch) ESTAR Thick
Sheets		0.19 mm (0.007 inch) ESTAR Thick
READYLOAD Single-Sheet Packets		

KODAK PROFESSIONAL PORTRA 400NC Film

Size/Format	Code	Base
135	400NC	0.13 mm (0.005 inch) acetate
120	400NC	0.10 mm (0.004 inch) acetate
220	400NC	0.10 mm (0.004 inch) acetate
Long Rolls	400NC	0.13 mm (0.005 inch) acetate, 0.10 mm (0.004 inch) ESTAR Thick
Sheets		0.19 mm (0.007 inch) ESTAR Thick

KODAK PROFESSIONAL PORTRA 400VC Film

Size/Format	Code	Base
135	400VC	0.13 mm (0.005 inch) acetate
120	400VC	0.10 mm (0.004 inch) acetate
220	400VC	0.10 mm (0.004 inch) acetate
Long Rolls	400VC	0.13 mm (0.005 inch) acetate, 0.10 mm (0.004 inch) ESTAR Thick

KODAK PROFESSIONAL PORTRA 400UC Film

Size/Format	Code	Base
135	400UC	0.13 mm (0.005 inch) acetate
120	400UC	0.10 mm (0.004 inch) acetate
220	400UC	0.10 mm (0.004 inch) acetate
Long Rolls	400UC	0.13 mm (0.005 inch) acetate

KODAK PROFESSIONAL PORTRA 800 Film

Size/Format	Code	Base
135	800	0.13 mm (0.005 inch) acetate
120	800	0.10 mm (0.004 inch) acetate
220	800	0.10 mm (0.004 inch) acetate

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)
120/220	1	¾	½
135 magazine	1½	1¼	1
35 mm long roll	5	3	2
70 mm long roll	10	5	3
10-sheet box	1½	1	1
50-sheet box	3	2	2

Load and unload roll-film cameras in subdued light. Total darkness is required when you load and unload sheet film holders.

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.

Note: High speed films, such as PORTRA 800 Film, are sensitive to environmental radiation. Expose and process this film promptly. As exposure to radiation is cumulative, you may want to request *visual* inspection of PORTRA 800 film at airport and other security x-ray inspection stations.

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		
		160NC and 160VC Films	400NC, 400VC, and 400UC Films	800 Film
Daylight or Electronic Flash	None	160	400	800
Photolamp (3400 K)	No. 80B	50	125	250
Tungsten (3200 K)	No. 80A	40	100	200

* For best results without special printing.

Note: The latitude of PORTRA 160NC and 160VC Films allows you to use 100-speed proofing products for test exposures.

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		
	160NC and 160VC Films	400NC, 400VC, and 400UC Films	800 Film
Bright or Hazy Sun on Light Sand or Snow	1/125 f/16	1/500 f/16	1/1000 f/16
Bright or Hazy Sun (Distinct Shadows)	1/125 f/11*	1/500 f/11*	1/500 f/16†
Weak, Hazy Sun (Soft Shadows)	1/125 f/8	1/500 f/8	1/500 f/11
Cloudy Bright (No Shadows)	1/125 f/5.6	1/500 f/5.6	1/250 f/11
Heavy Overcast or Open Shade‡	1/125 f/4	1/500 f/4	1/125 f/11

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

† Use f/8 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		
	160NC and 160VC Films	400NC, 400VC, and 400UC Films	800 Film
350	55/17	85/26	120/36
500	65/20	100/30	140/42
700	75/22	120/36	170/50
1000	90/27	140/42	200/60
1400	110/33	170/50	240/70
2000	130/40	200/60	280/85
2800	150/46	240/70	340/100
4000	180/55	280/85	400/120
5600	210/65	340/100	470/140
8000	250/75	400/120	560/170

* 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 PORTRA 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 1/125 second or longer.

Type of Fluorescent Lamp	KODAK Color Compensating Filter(s)	Exposure Adjustment	KODAK Color Compensating Filter(s)	Exposure Adjustment	KODAK Color Compensating Filter(s)	Exposure Adjustment
	160NC/VC and 400NC/VC Films		400UC Film		800 Film	
Daylight	20R + 5M	+ 1 stop	20R + 5M	+ 1 stop	40R	+ 1 1/3 stop
White	40B + 5C	+ 1 2/3 stop	50C + 30M	+ 1 2/3 stops	30C + 40M	+ 1 2/3 stop
Warm White	40B + 40C	+ 2 stops	40B + 50C	+ 2 stops	50B + 5C	+ 2 stops
Warm White Deluxe	40B + 50C	+ 2 stops	90C + 30M	+ 2 stops	40B + 40C	+ 2 stops
Cool White	30B	+ 1 stop	30B	+ 1 stop	30M	+ 1 stop
Cool White Deluxe	40C + 10M	+ 1 stop	40C + 10M	+ 1 stop	20B + 20C	+ 1 stop
T8 741 (CCT = 4100 K)*	40B + 20C	+ 1 2/3 stop	40B + 20C	+ 1 2/3 stops	20B + 20M	+ 1 2/3 stop
T8 830 (CCT = 3000 K)*	50B + 60C	+ 2 1/3 stops	50B + 60C	+ 2 1/3 stops	55B + 20C	+ 2 1/3 stops
T8 835 (CCT = 3500 K)*	40B + 40C	+ 1 2/3 stop	40B + 40C	+ 1 2/3 stops	40B	+ 1 2/3 stop
T8 841 (CCT = 4100 K)*	50C + 20M	+ 1 1/3 stop	50C + 20M	+ 1 1/3 stops	20B + 10C	+ 1 1/3 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	KODAK Color Compensating Filter(s)	Exposure Adjustment	KODAK Color Compensating Filter(s)	Exposure Adjustment
	160NC/VC and 400NC/VC Films		400UC Film		800 Film	
High-Pressure Sodium Vapor (2700 K)	50B + 70C	+ 2 2/3 stops	50B + 70C	+ 2 2/3 stops	60B + 50C	+ 2 2/3 stops
High-Pressure Sodium Vapor (2200 K)	50B + 90C	+ 3 stops	50B + 90C	+ 3 stops	120C + 50M	+ 3 1/3 stops
High-Pressure Sodium Vapor (2100 K)	200C + 20M	+ 4 stops	20M + 200C	+ 4 stops	55B + 100C	+ 4 stops
Metal Halide (4300 K)	5C + 10M	+ 2/3 stop	10M	+ 2/3 stop	5R + 20M	+ 1 stop
Metal Halide (3200 K)	80C + 10M	+ 1 2/3 stop	80C + 10M	+ 1 2/3 stops	20B + 30C	+ 1 2/3 stop
Mercury Vapor (3700 K)	30B + 5C	+ 1 stop	20B + 10C	+ 1 stop	30M	+ 1 stop

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

Adjustments for Long and Short Exposures

No filter correction or exposure compensation is required for PORTRA 160NC, 160VC, 400NC, PORTRA 400VC, or PORTRA 400UC Films for exposures from 1/10,000 second to 10 seconds. For PORTRA 800 Film, no adjustments are required for exposures from 1/10,000 second to 1 second. For critical applications with longer exposure times, make tests under your conditions.

PROCESSING

Process PROFESSIONAL PORTRA Films in KODAK FLEXICOLOR Chemicals for Process C-41 with the following replenishment and wash rates.

Replenishment and Wash Rates / PORTRA 160NC and 160VC Films

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
4 x 5 inch	1245 mL/m ² 116 mL/ft ²	622 mL/m ² 58 mL/ft ²	1152 mL/m ² 107 mL/ft ²	59 L/m ² 5.5 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 / PORTRA 400NC, 400VC and 400UC Films

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
4 x 5 inch	1722 mL/m ² 160 mL/ft ²	861 mL/m ² 80 mL/ft ²	1152 mL/m ² 107 mL/ft ²	59 L/m ² 5.5 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 / PORTRA 800 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	Density Reading	
	160NC and 400NC Films	160VC and 400VC Films
<i>KODAK Gray Card</i> (gray side) receiving same illumination as subject	0.77 to 0.87	0.81 to 0.93
Lightest step (darkest in the negative) of a <i>KODAK Paper Gray Scale</i> receiving same illumination as subject	1.13 to 1.23	1.22 to 1.34
Highest diffuse density on normally lighted forehead —light complexion —dark complexion	1.08 to 1.18 0.93 to 1.03	1.16 to 1.28 0.98 to 1.10

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

Area Measured	800 Film Density Reading		
	EI 800	EI 1600 (Push 1)	EI 3200 (Push 2)
<i>KODAK Gray Card</i> (gray side) receiving same illumination as subject	0.80 to 1.00	0.75 to 0.95	0.70 to 0.90
Lightest step (darkest in the negative) of a <i>KODAK Paper Gray Scale</i> receiving same illumination as subject	1.15 to 1.35	1.15 to 1.35	1.15 to 1.35
Highest diffuse density on normally lighted forehead —light complexion —dark complexion	1.08 to 1.18 0.93 to 1.03	0.85 to 1.20 0.60 to 0.95	0.80 to 1.15 0.55 to 0.90

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 PORTRA ENDURA, SUPRA ENDURA and ULTRA ENDURA Papers, KODAK PROFESSIONAL DURAFLEX Plus Digital Display Material, and on KODAK PROFESSIONAL ENDURA Metallic Paper.

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

Make black-and-white prints on KODAK PANALURE SELECT RC Paper for conventional black-and-white processing, or KODAK PROFESSIONAL PORTRA Black & White Paper for Process RA-4.

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 PORTRA ENDURA Paper
 KODAK PROFESSIONAL SUPRA ENDURA Paper
 KODAK PROFESSIONAL ULTRA ENDURA Paper
 KODAK PROFESSIONAL ENDURA Transparency Digital Display Material
 KODAK PROFESSIONAL ENDURA Clear Digital Display Material
 KODAK PROFESSIONAL DURAFLEX Plus Digital Display Material
 KODAK PROFESSIONAL Day/Night Digital Display Material
 KODAK PROFESSIONAL ENDURA Metallic Paper

SCANNING NEGATIVES

You can easily scan PROFESSIONAL PORTRA 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—			
160NC Film	36	58	87
160VC Film	40	62	91
400NC Film	44	66	96
400VC Film	48	70	99
400UC Film	40	62	92
800 Film	50	72	101

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—			
160NC Film	Less than 25	36	58
160VC Film	28	40	62
400NC Film	32	44	66
400VC Film	36	48	70
400UC Film	28	40	62
800 Film	38	50	72

Negative Size: 4 x 5 Inches (Sheets)

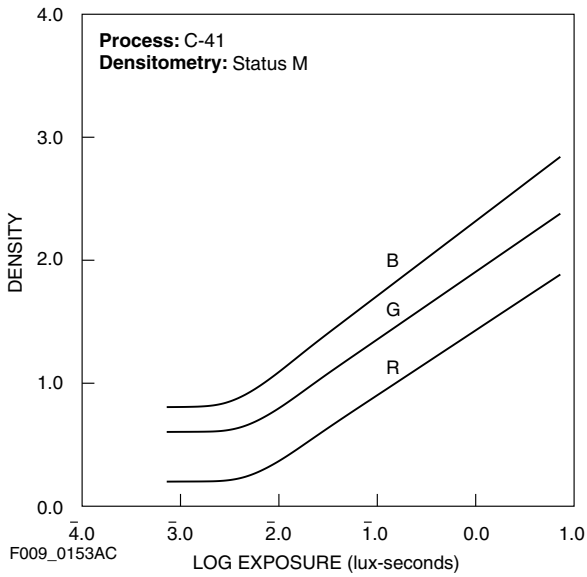
Print Size in inches	4x6	8x10	16x20
Magnification	1.2X	2.1X	4.2X
Print Grain Index for—			
160NC Film	Less than 25	Less than 25	35
160VC Film	Less than 25	Less than 25	39
400NC Film	Less than 25	28	43

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

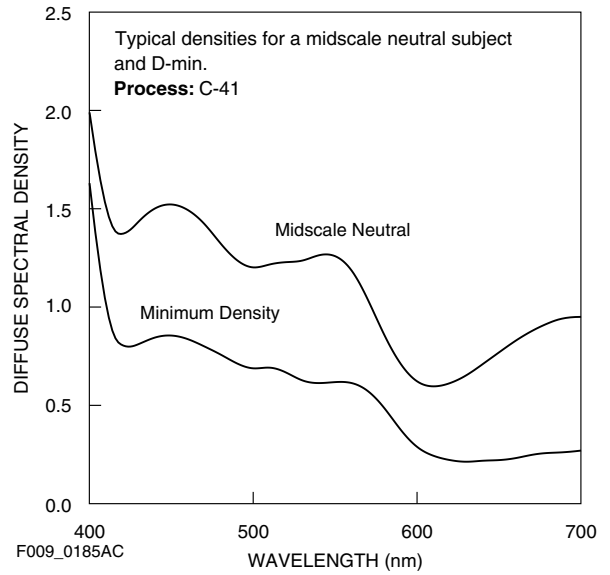
CURVES

KODAK PROFESSIONAL PORTRA 160NC Film

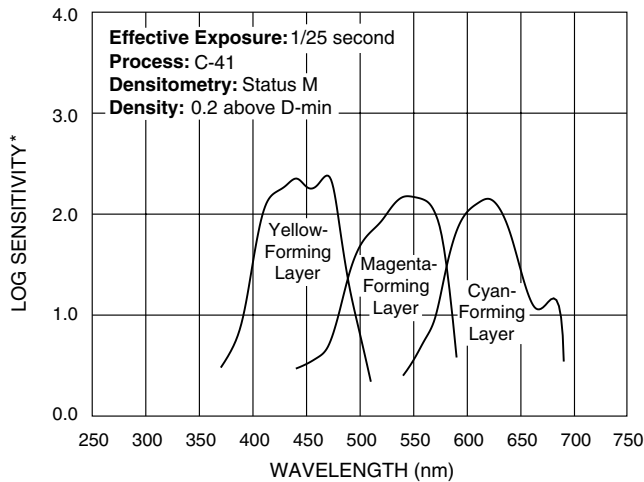
Characteristic Curves



Spectral-Dye-Density Curves



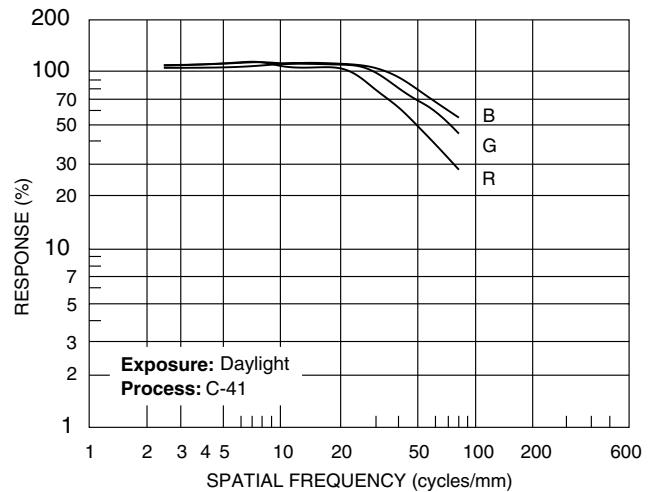
Spectral-Sensitivity Curves



*Sensitivity = reciprocal of exposure (ergs/cm²) required to produce specified density

F009_0180AC

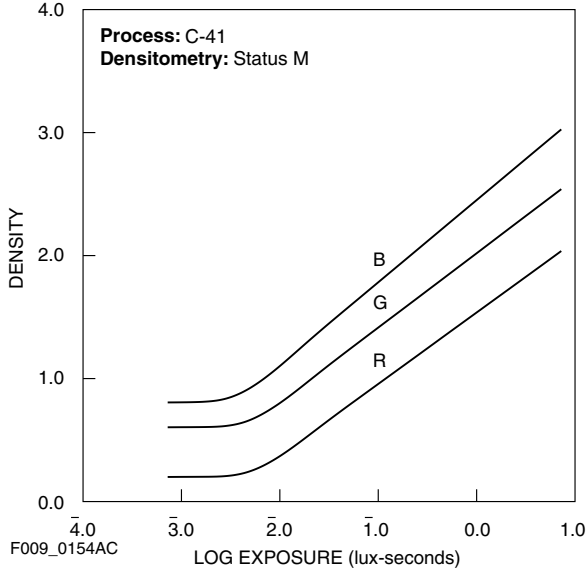
Modulation Transfer Function



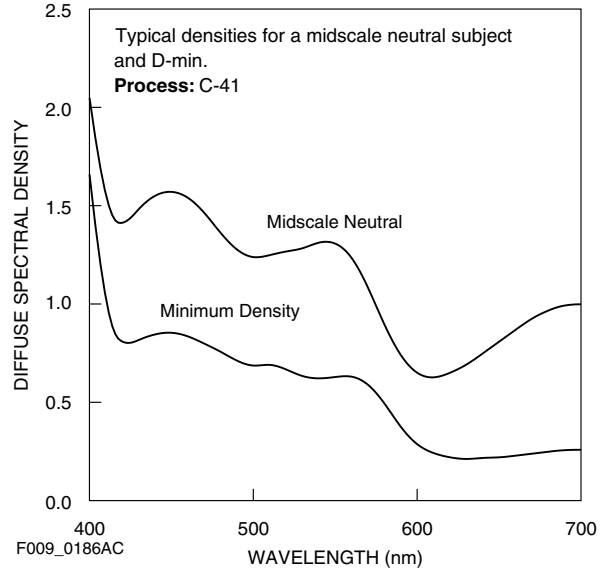
NOTICE: The sensitometric curves and data in this publication represent product tested under the conditions of exposure and processing specified. They are representative of production coatings, and therefore do not apply directly to a particular box or roll of photographic material. They do not represent 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 PORTRA 160VC Film

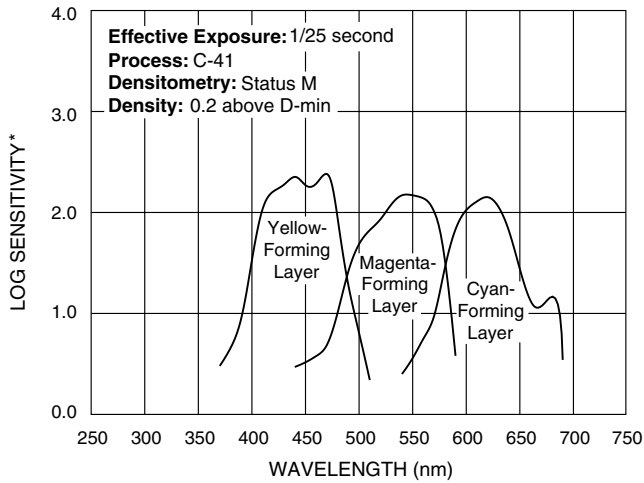
Characteristic Curves



Spectral-Dye-Density Curves



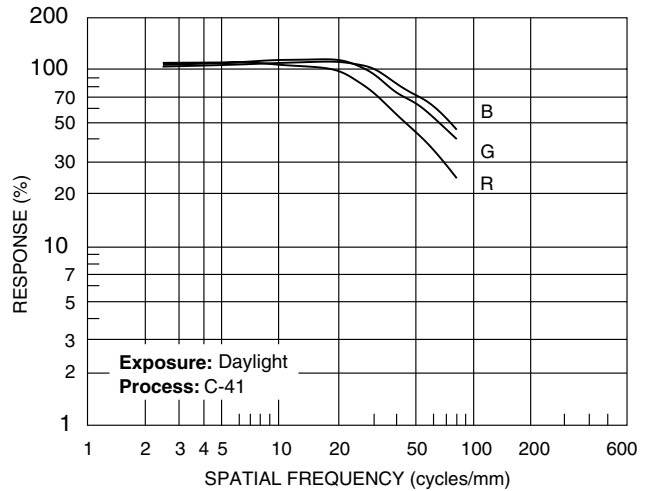
Spectral-Sensitivity Curves



*Sensitivity = reciprocal of exposure (ergs/cm²) required to produce specified density

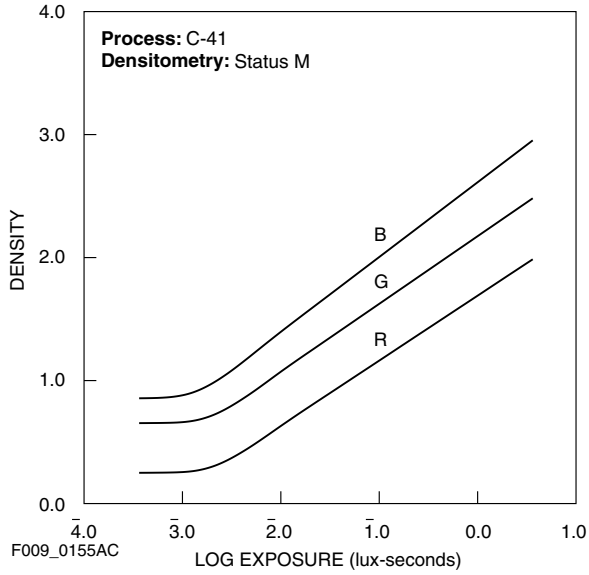
F009_0180AC

Modulation Transfer Function

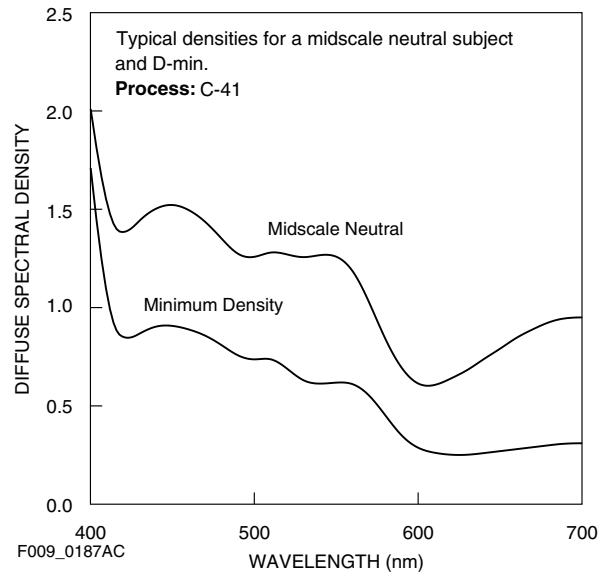


KODAK PROFESSIONAL PORTRA 400NC Film

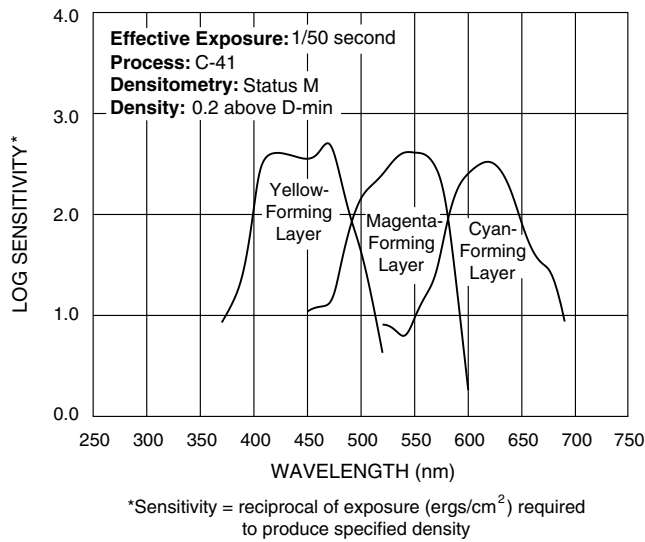
Characteristic Curves



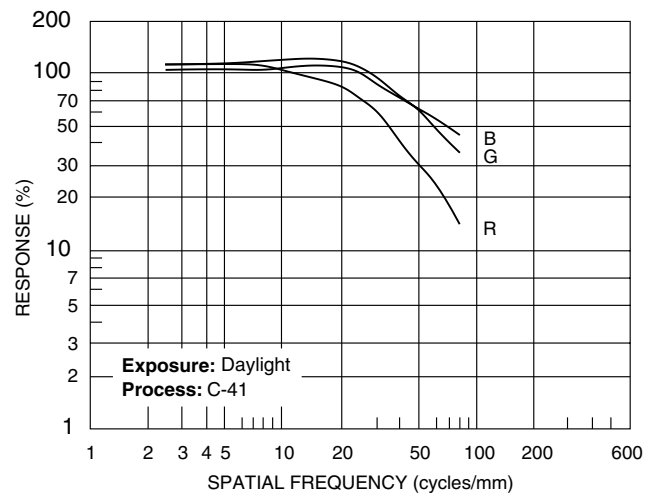
Spectral-Dye-Density Curves



Spectral-Sensitivity Curves

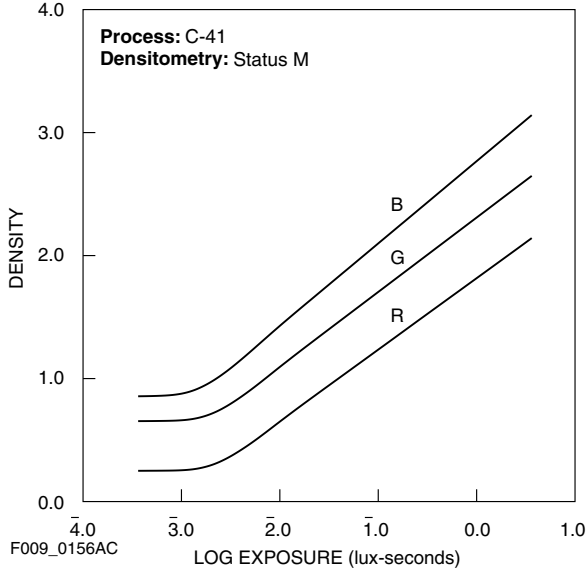


Modulation Transfer Function

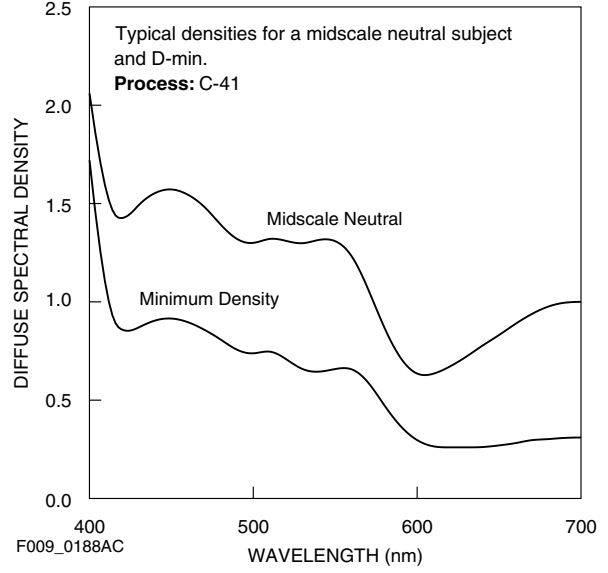


KODAK PROFESSIONAL PORTRA 400VC Film

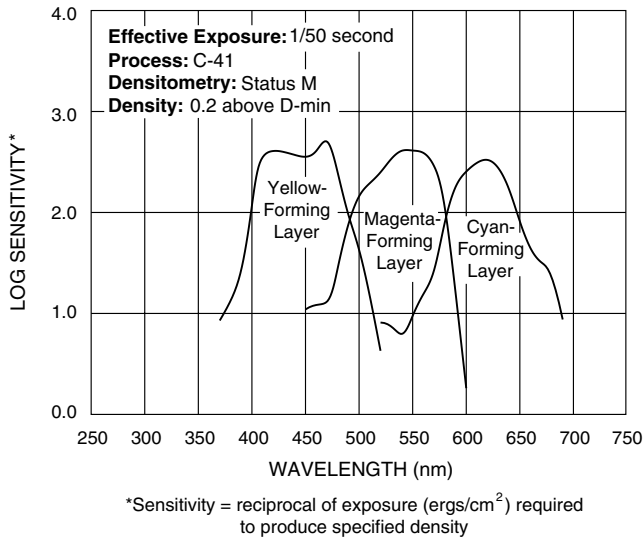
Characteristic Curves



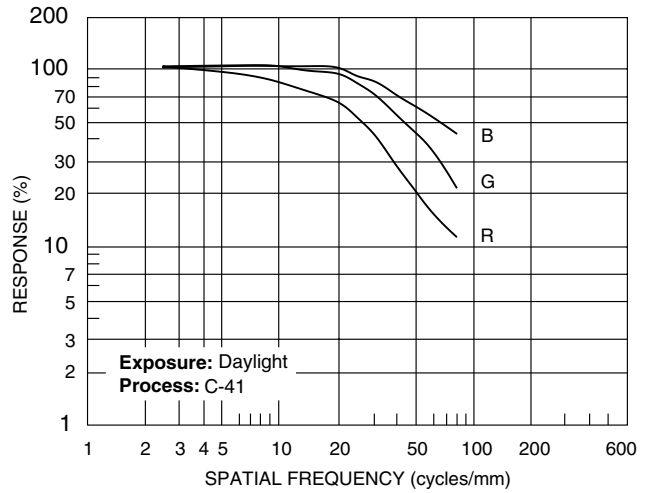
Spectral-Dye-Density Curves



Spectral-Sensitivity Curves

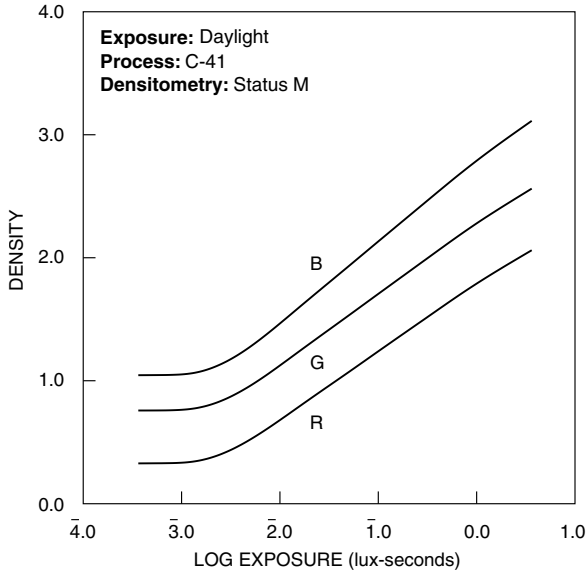


Modulation Transfer Function

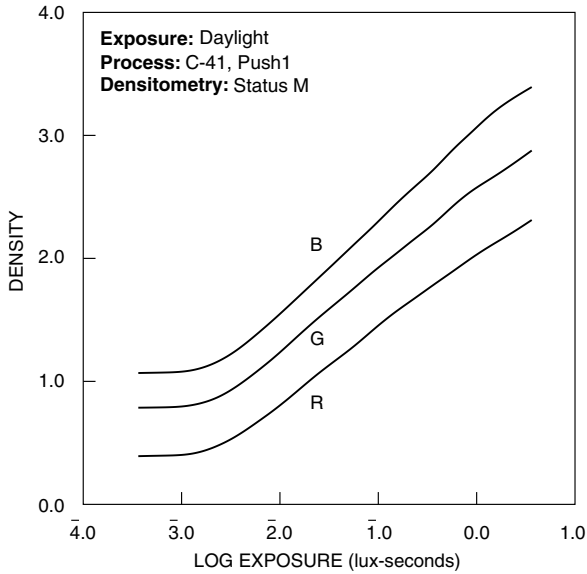


KODAK PROFESSIONAL PORTRA 400UC Film

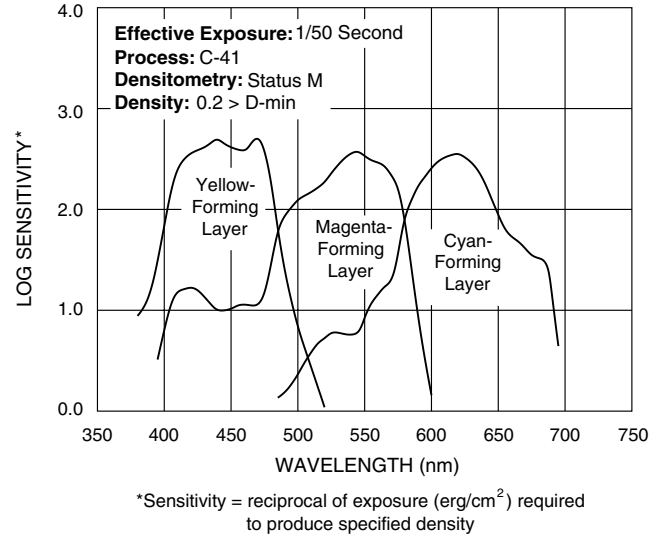
Characteristic Curves, EI 400



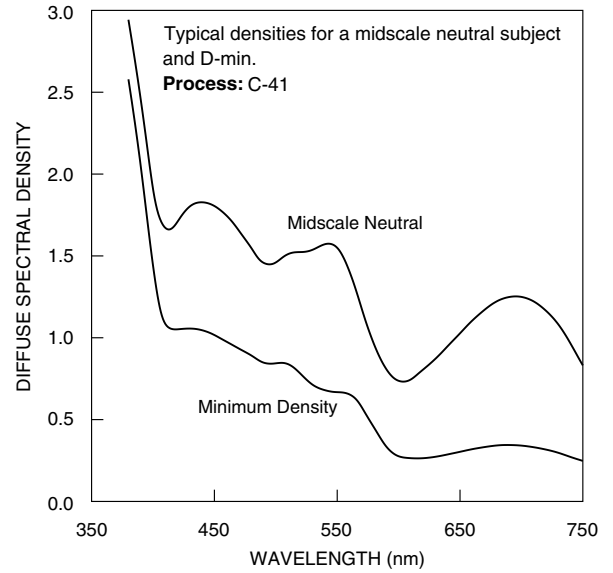
Characteristic Curves, EI 800 (Push 1)



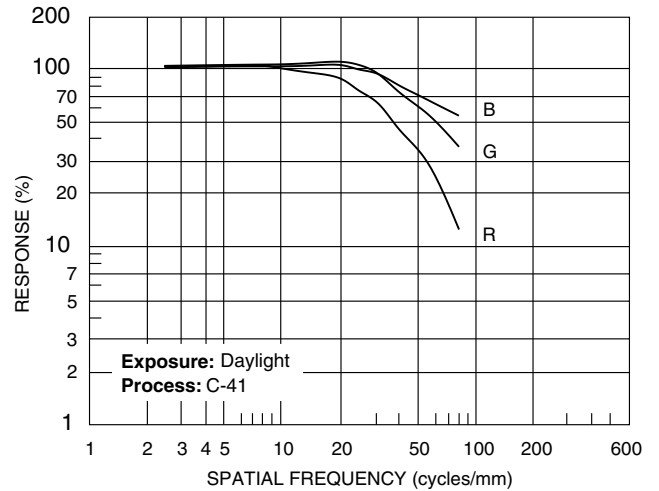
Spectral-Sensitivity Curves



Spectral-Dye-Density Curves

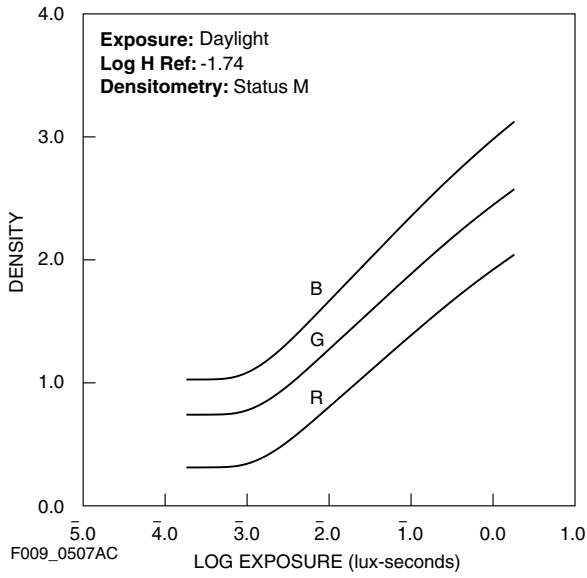


Modulation Transfer Function

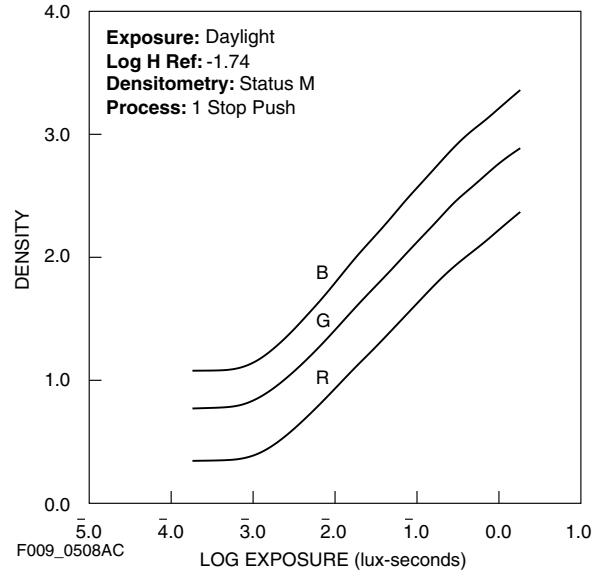


KODAK PROFESSIONAL PORTRA 800 Film

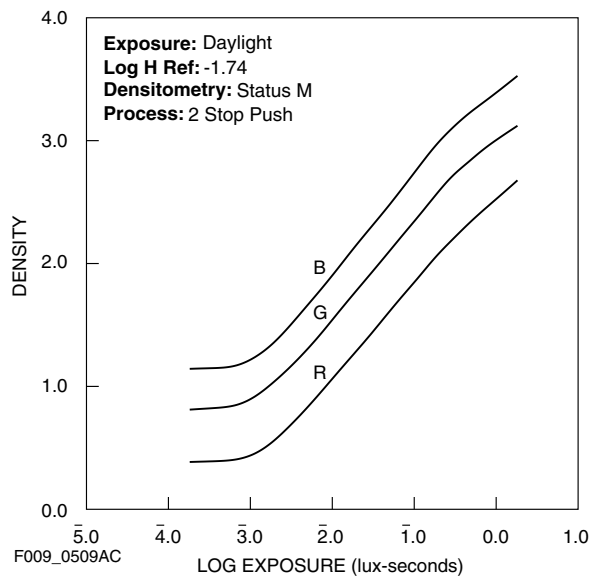
Characteristic Curves, EI 800



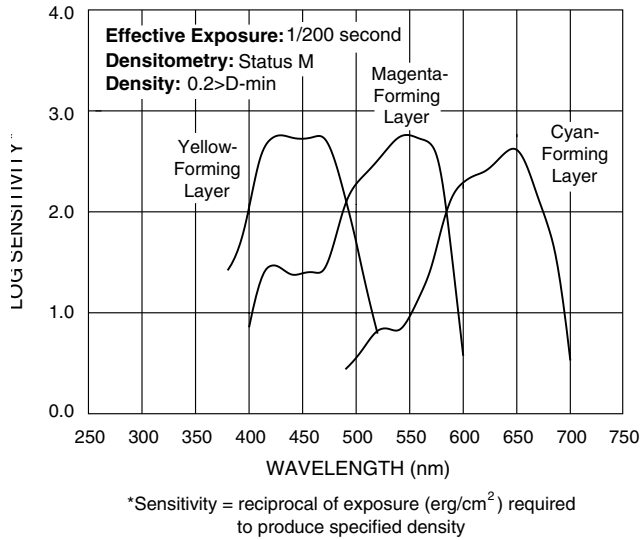
Characteristic Curves, EI 1600 (Push 1)



Characteristic Curves, EI 3200 (Push 2)

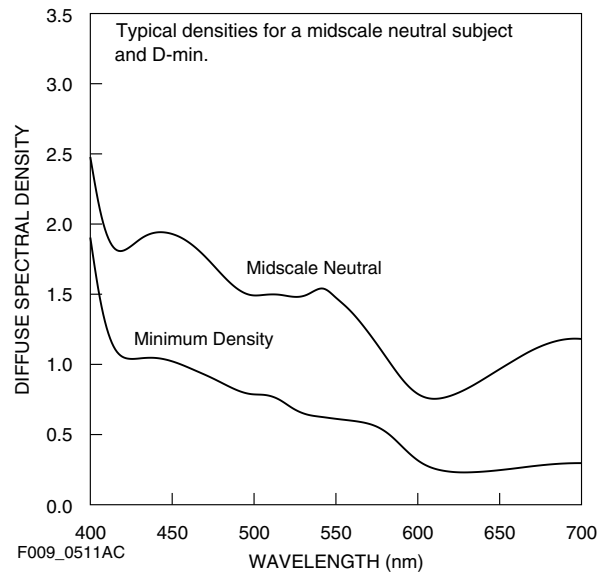


Spectral-Sensitivity Curves



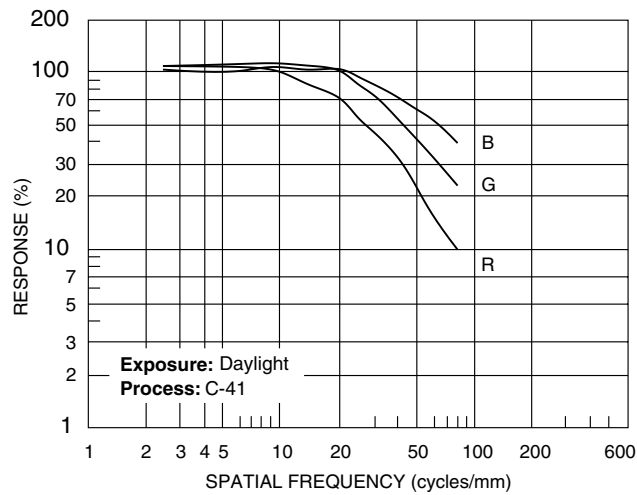
F009_0510AC

Spectral-Dye-Density Curves



F009_0511AC

Modulation Transfer Function



KODAK PROFESSIONAL PORTRA 160NC, 160VC, 400NC, 400VC, 400UC, and 800 Films

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-4030	<i>KODAK PROFESSIONAL ENDURA Transparency and Clear Optical Display Materials</i>
E-4031	<i>KODAK PROFESSIONAL ENDURA Transparency and Clear Digital Display Materials</i>
E-4028	<i>KODAK PROFESSIONAL ENDURA Metallic Paper</i>
E-2468	<i>KODAK PROFESSIONAL PORTRA 100T Film</i>
G-4006	<i>KODAK PROFESSIONAL PORTRA Black-and-White Paper</i>
G-4019	<i>KODAK PROFESSIONAL PORTRA Sepia Black-and-White Paper</i>
G-27	<i>KODAK PROFESSIONAL PANALURE SELECT RC 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 PORTRA 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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