KODAK PROFESSIONAL PORTRA Films

— New —
KODAK PROFESSIONAL PORTRA 160NC, 160VC, 400NC, and 400VC Films

Never before have films been able to give you such confidence in delivering the results you expect. Introducing a new family of color negative films that shares emulsion technology to offer you two levels of color saturation in two film speeds. KODAK PROFESSIONAL PORTRA Films allow matched prints across speeds and formats, and provide the finest results—even with hard-to-reproduce colors.

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, vivid colors in controlled lighting situations.

KODAK PROFESSIONAL PORTRA 400NC Film features natural colors and high speed. Use 400NC Film for smooth, natural flesh tones on location.

KODAK PROFESSIONAL PORTRA 400VC Film features high speed and vivid colors. Use 400VC Film for vivid colors on location.

Choose with confidence in a variety of situations...from studio to location.

If you use this KODAK PROFESSIONAL Film	Try this KODAK PROFESSIONAL Film	For
VERICOLOR III or 160 (VPS) EKTACOLOR PRO GOLD 160 (GPX)	PORTRA 160NC	• smooth, natural flesh tones • controlled lighting situations
Pro 100 (PRN) EKTACOLOR PRO GOLD 100 HC (GPH)	PORTRA 160VC	• rich, vivid colors • controlled lighting situations
Pro 400 MC (PMC) EKTACOLOR PRO GOLD 400 MC (GPM)	PORTRA 400NC	• smooth, natural flesh tones • on-camera flash
Pro 400 (PPF) EKTACOLOR PRO GOLD 400 (GPY)	PORTRA 400VC	• vivid colors • location photography

The family of KODAK PROFESSIONAL PORTRA Films offers the following features.

FEATURES	BENEFITS
• Unified Film Emulsion technology – Two levels of color saturation – Two film speeds	• Matched prints across speeds and formats • Convenient analyzing and printing for your lab
• True-to-speed shooting at 160 and 400	• Shoot at box speed in all lighting conditions • No second-guessing exposure
• Wider exposure latitude	• Better highlight and shadow detail • Safety net for underexposures
• New packaging	• No mistaking speed, format, or color saturation • Easy to tell unexposed from exposed
• New wraps and pasters—120/220 formats	• Easy-open foil wrap; easy-to-remove paster
• Translucent film cans and writable magazines—135 format	• No mistaking film type • Area on magazine for exposure notes
• Improved scanning performance	• Higher-quality prints from digital output systems
• Improved performance under mixed daylight and fluorescent lighting	• Fewer concerns in mixed lighting situations
• Excellent flesh tones	• Kodak's legendary reproduction of the world's flesh tones
• Improved color reproduction	• No surprises with hard-to-reproduce colors

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Suggested applications for KODAK PROFESSIONAL PORTRA Films are given in the table below.

Application	KODAK PROFESSIONAL PORTRA Film			
	160NC	160VC	400NC	400VC
Advertising/ Illustration	✔	✔	✔	✔
Architecture	✔	✔		
Corporate/ Industrial	✔	✔	✔	✔
Fashion/ Glamour	✔	✔	✔	✔
Medical/ Scientific	✔	✔	✔	✔
Museum/Art/ Copy	✔	✔		
Portraiture—Available Light			✔	✔
Portraiture—Electronic Flash	✔		✔	✔
Wedding—Daylight and Electronic Flash	✔		✔	✔
Digital Film Recorders		✔		

STORAGE AND HANDLING

Store unexposed film at 70°F (21°C) or lower in the original sealed package. For extended periods, store film at 55°F (13°C) 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 Time (Hours) to Reach Room Temperature of 70°F (21°C) From a Storage Temperature of		
	0°F (–18°C)	35°F (2°C)	55°F (13°C)
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.

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
Sheets		0.19 mm (0.007 inch) ESTAR

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
Sheets		0.19 mm (0.007 inch) ESTAR

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
Sheets		0.19 mm (0.007 inch) ESTAR

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

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 and 400VC Films
Daylight or Electronic Flash	None	160	400
Photolamp (3400 K)	No. 80B	50	125
Tungsten (3200 K)	No. 80A	40	100

* 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 and 400VC Films
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.
† Subjects shaded from the sun but lighted by a large area of clear sky.

Electronic Flash

Use the appropriate guide number in the following table as a starting point 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 and 400VC Films
350	55/17	85/26
500	65/20	100/30
700	75/22	120/36
1000	90/27	140/42
1400	110/33	170/50
2000	130/40	200/60
2800	150/46	240/70
4000	180/55	280/85
5600	210/65	340/100
8000	250/75	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 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
Daylight	20R + 5M	+1 stop
White	40B + 5C	+1 ⅔ stops
Warm White	40B + 40C	+2 stops
Warm White Deluxe	40B + 50C	+2 stops
Cool White	30B	+1 stop
Cool White Deluxe	40C + 10M	+1 stop
T8 741	40B + 20C	+1 ⅔ stops
T8 830	50B + 60C	+2 ⅓ stops
T8 835	40B + 40C	+1 ⅔ stops
T8 841	50C + 20M	+1 ⅓ stops

Note: When you don't know the type of fluorescent lamps, try a 40B + 40C filter combination and increase exposure by 1⅔ stops; color rendition may be less than optimum.

High-Intensity Discharge Lamp (CCT*)	KODAK Color Compensating Filters	Exposure Adjustment
High-Pressure Sodium Vapor (2700 K)	50B + 70C	+2 ⅔ stops
High-Pressure Sodium Vapor (2200 K)	50B + 90C	+3 stops
High-Pressure Sodium Vapor (2100 K)	200C + 20M	+4 stops
Metal Halide (4300 K)	5C + 10M	+⅔ stop
Metal Halide (3200 K)	80C + 10M	+1 ⅔ stops
Mercury Vapor (3700 K)	30B + 5C	+1 stop

* Correlated color temperature; phosphor emission emulates the color temperature of a continuous-spectrum lamp (e.g., tungsten).

Adjustments for Long and Short Exposures

No filter correction or exposure compensation is required for exposures from 1/10,000 second to 10 seconds.

PROCESSING

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

Replenishment and Wash Rates / PROFESSIONAL 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/m² (94 mL/ft²)	506 mL/m² (47 mL/ft²)	861 mL/m² (80 mL/ft²)	31 L/m² (2.9 L/ft²)
120/220	1012 mL/m² (94 mL/ft²)	506 mL/m² (47 mL/ft²)	1023 mL/m² (95 mL/ft²)	31 L/m² (2.9 L/ft²)
4 x 5 inch	1245 mL/m² (116 mL/ft²)	622 mL/m² (58 mL/ft²)	1152 mL/m² (107 mL/ft²)	59 L/m² (5.5 L/ft²)

* 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 / PROFESSIONAL PORTRA 400NC and 400VC Films

Film Size	KODAK FLEXICOLOR Developer Replenisher	KODAK FLEXICOLOR Developer Replenisher LORR	KODAK FLEXICOLOR Bleach III, Fixer, and Stabilizer	Wash Water*
135	1400 mL/m² (130 mL/ft²)	700 mL/m² (65 mL/ft²)	861 mL/m² (80 mL/ft²)	31 L/m² (2.9 L/ft²)
120/220	1400 mL/m² (130 mL/ft²)	700 mL/m² (65 mL/ft²)	1023 mL/m² (95 mL/ft²)	31 L/m² (2.9 L/ft²)
4 x 5 inch	1722 mL/m² (160 mL/ft²)	861 mL/m² (80 mL/ft²)	1152 mL/m² (107 mL/ft²)	59 L/m² (5.5 L/ft²)

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

JUDGING NEGATIVE EXPOSURE

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 Film	160VC Film	400NC Film	400VC Film
KODAK Gray Card (gray side) receiving same illumination as subject	0.70 to 0.90	0.74 to 0.94	0.75 to 0.95	0.79 to 0.99
Lightest step (darkest in negative) of *KODAK Paper Gray Scale* receiving same illumination as subject	1.07 to 1.27	1.15 to 1.35	1.12 to 1.32	1.20 to 1.40
Highest diffuse density on normally lighted forehead —light complexion —dark complexion	0.97 to 1.27 0.76 to 1.16	1.04 to 1.34 0.82 to 1.22	1.02 to 1.32 0.81 to 1.21	1.09 to 1.39 0.87 to 1.27

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; apply KODAK Retouching Fluid before using KODAK Retouching Pencils.

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

PRINTING NEGATIVES

You can make color prints by contact printing or enlarging on KODAK PORTRA, SUPRA, and ULTRA Papers, or KODAK DURAFLEX® RA Print Material.

Make color transparencies or slides by exposing negatives directly onto KODAK VERICOLOR Print Film, KODAK VERICOLOR Slide Film, or KODAK DURATRANS® RA or DURACLEAR™ RA Display Material.

Make black-and-white prints on KODAK PANALURE SELECT RC Paper for conventional black-and-white processing, or KODAK EKTAMAX RA Professional 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.

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 desk-top 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.

Note: For more information, visit the following web sites.

To access	**Go to**
Film Terms for KODAK PHOTO CD Imaging Workstations	**www.kodak.com/global/en/service/software/filmTerms/pcdFilmTerms.shtml**
Drivers for KODAK PROFESSIONAL RFS 2035 Film Scanner	**www.kodak.com/global/en/service/software/rfs2035Drivers.shtml**
KODAK Driver for KODAK PROFESSIONAL RFS 3570 Film Scanner	**www.kodak.com/global/en/service/software/rfs3570Drivers.shtml**

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 (inches)	4 x 6	8 x 10	16 x 20
Magnification	4.4X	8.8X	17.8X
Print Grain Index for—			
160NC Film	30	52	81
160VC Film	33	55	84
400NC Film	41	62	92
400VC Film	43	64	94

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

Print Size (inches)	4 x 6	8 x 10	16 x 20
Magnification	2.6X	4.4X	8.8X
Print Grain Index for—			
160NC Film	Less than 25	30	52
160VC FIlm	Less than 25	33	55
400NC Film	29	41	62
400VC Film	31	43	64

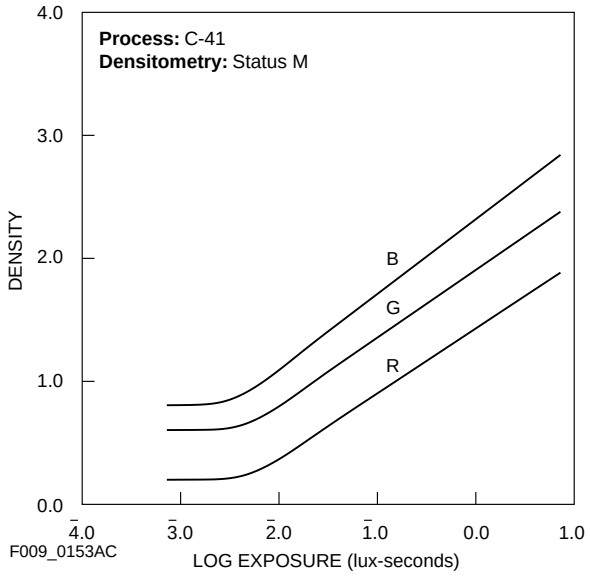
Negative Size: 4 x 5 Inches (Sheets)

Print Size (inches)	4 x 6	8 x 10	16 x 20
Magnification	1.2X	2.1X	4.2X
Print Grain Index for—			
160NC Film	Less than 25	Less than 25	29
160VC Film	Less than 25	Less than 25	31
400NC Film	Less than 25	26	39

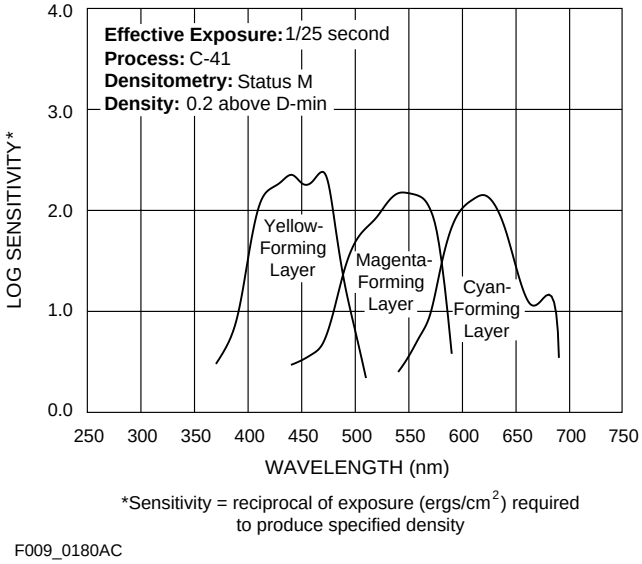
For more information, see KODAK Publication No. E-58, *Print Grain Index—An Assessment of Print Graininess from Color Negative Films.*

KODAK PROFESSIONAL PORTRA 160NC Film

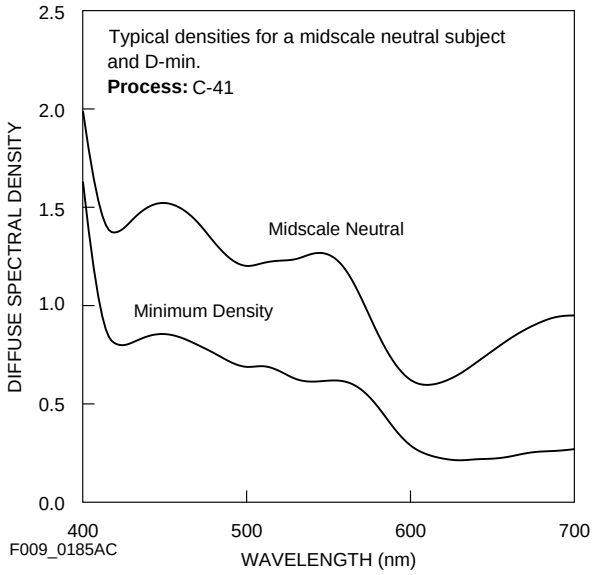
Characteristic Curves



Spectral-Sensitivity Curves



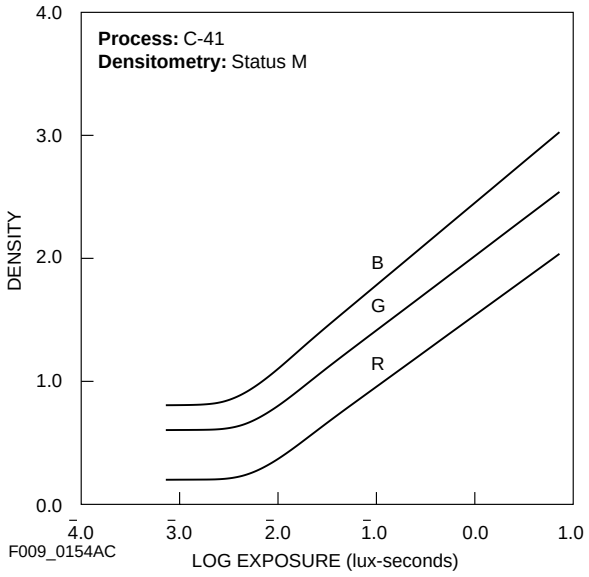
Spectral-Dye-Density Curves



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



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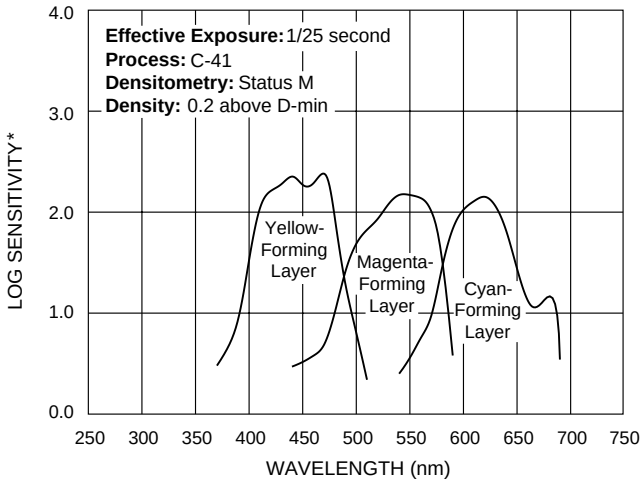
Spectral-Sensitivity Curves



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

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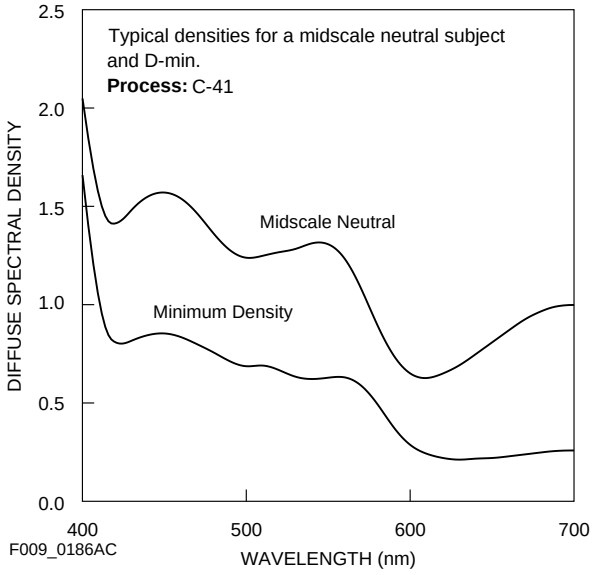
Spectral-Dye-Density Curves



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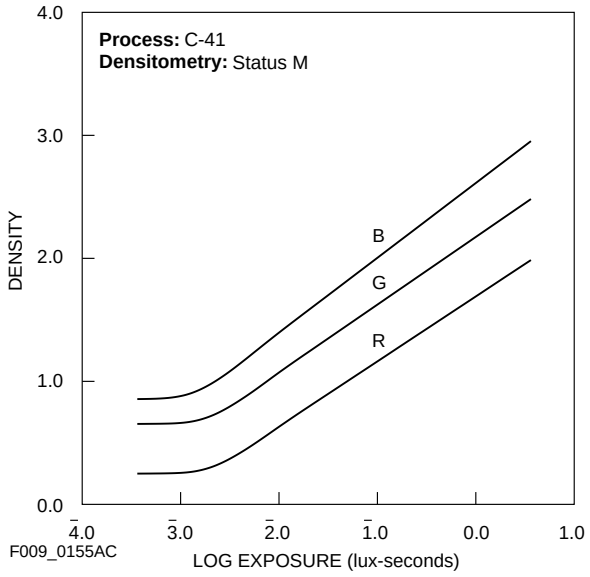
KODAK PROFESSIONAL PORTRA 400NC Film

Characteristic Curves



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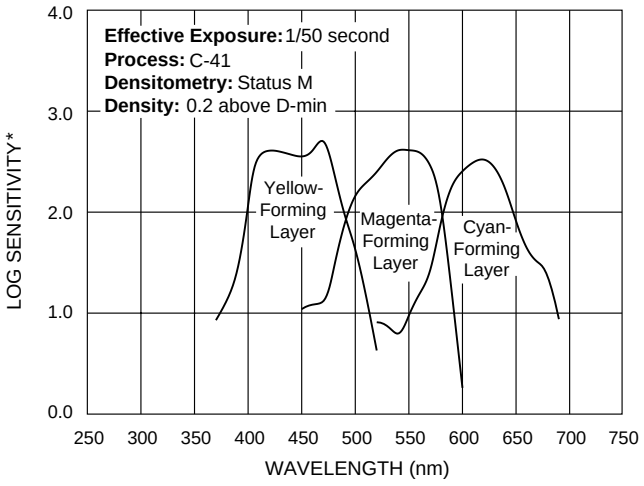
Spectral-Sensitivity Curves



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

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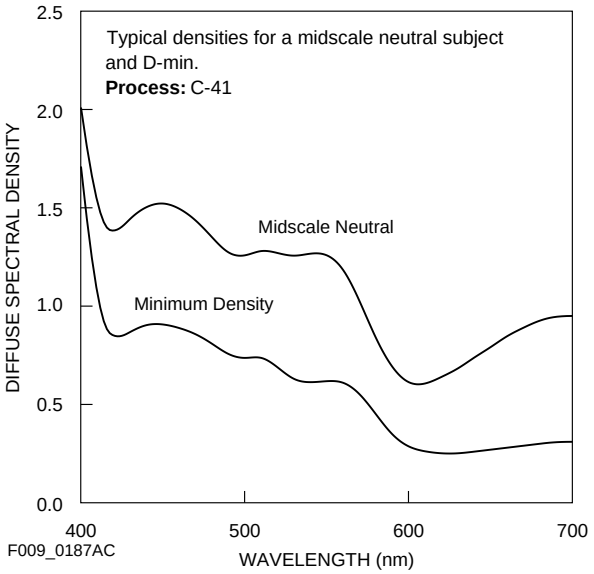
Spectral-Dye-Density Curves



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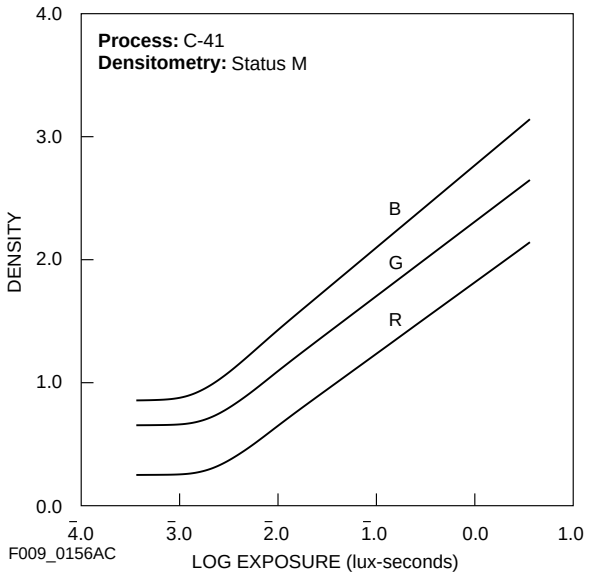
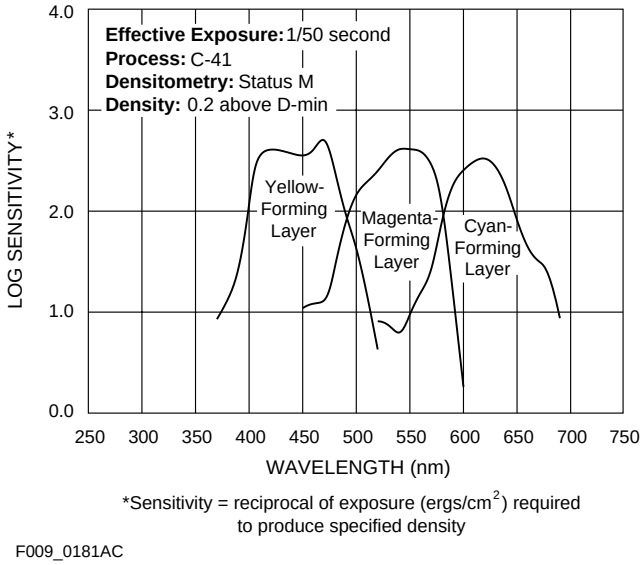
KODAK PROFESSIONAL PORTRA 400VC Film

Characteristic Curves

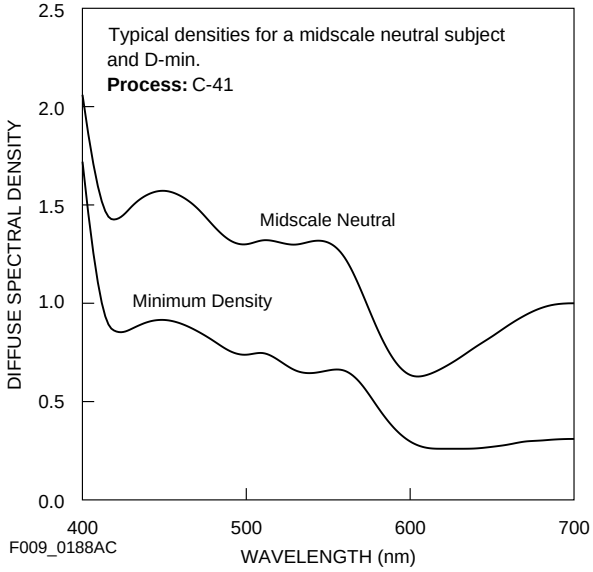


Spectral-Sensitivity Curves



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

Spectral-Dye-Density Curves



MORE INFORMATION

Kodak Information Center's Faxback System

—Available 24 hours a day, 7 days a week—

Many technical support publications for Kodak products can be sent to your **fax** machine from the Kodak Information Center. Call:

U.S.A. 1-800-242-2424, Ext. 33
Canada 1-800-295-5531

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)

Or contact Kodak on-line at:
http://www.kodak.com/go/portra

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.

Kodak Professional Division
EASTMAN KODAK COMPANY

Kodak Professional

KODAK PROFESSIONAL PORTRA Films
KODAK Publication No. **E-190**
CAT 154 1663

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