KODAK PROFESSIONAL PORTRA 160 Film

Kodak alaris

TECHNICAL DATA / COLOR NEGATIVE FILM

February 2016 • E-4051

KODAK PROFESSIONAL PORTRA 160 Film features a significantly finer grain structure for improved scanning and enlargement capability in today's workflow, while retaining the exceptionally smooth and natural skin tone reproduction that the PORTRA Film family is renowned for. PORTRA 160 Film is the ideal choice for portrait, fashion and commercial photography, either in the studio, or on location.

TECHNOLOGY	BENEFIT
• Incorporates Entertainment Imaging's KODAK VISION Film Technology • KODAK Advanced Cubic Emulsions • Antenna Dye Sensitization in magenta emulsion layers • KODAK proprietary Targeted Advanced Development Accelerators • Micro-Structure Optimized KODAK T-GRAIN Emulsions	• Improved grain • Ideal for scanning • Extraordinary enlargement capability from a 35mm negative
• Optimized Emulsion Spectral Sensitivity and Image Modifier Chemistry	• Beautiful, neutral skin tones and superb color reproduction
• KODAK Advanced Cubic Emulsions • KODAK Proprietary DIR Couplers	• Optimized sharpness • Distinct edges, fine detail
• Unified Emulsion Technology	• Printing compatible with other Kodak films

SIZES AVAILABLE

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

Size/Format	Code	Base
135	5059	0.13 mm (0.005 inch) acetate
120	6059	0.11 mm (0.004 inch) acetate
Sheets	4059	0.19 mm (0.007 inch) KODAK ESTAR Thick Base

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	1	3/4	1/2
135 magazine	1 1/2	1 1/4	1
10-sheet box	1 1/2	1	1

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.

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
Daylight or Electronic Flash	None	160
Photolamp (3400 K)	No. 80B	50
Tungsten (3200 K)	No. 80A	40

* For best results without special printing.

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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
Bright or Hazy Sun on Light Sand or Snow	1/125 *f*/16
Bright or Hazy Sun (Distinct Shadows)	1/125 *f*/11*
Weak, Hazy Sun (Soft Shadows)	1/125 *f*/8
Cloudy Bright (No Shadows)	1/125 *f*/5.6
Heavy Overcast or Open Shade‡	1/125 *f*/4

* Use f/5.6 for backlit close-up subjects.
‡ Subject shaded from the sun but lighted by a large area of sky.

Adjustments for Long and Short Exposures

No filter correction or exposure compensation is required for PORTRA 160 Film for exposures from 1/10,000 second to i second. For critical applications with longer exposure times, make tests under your conditions.

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
350	85/26
500	100/30
700	120/36
1000	140/42
1400	170/50
2000	200/60
2800	240/70
4000	280/85
5600	340/100
8000	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 this film 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 2/3 stop
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

High-Intensity Discharge Lamp (CCT)	KODAK Color Compensating Filter(s)	Exposure Adjustment
High-Pressure Sodium Vapor	50B + 70C	+ 2 2/3 stops
Metal Halide	5C + 10M	+ 2/3 stop
Mercury Vapor with Phosphor	30B + 5C	+ 1 stop
Mercury Vapor without Phosphor	80R	+ 1 2/3 stop

RETOUCHING

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

PROCESSING

Process PORTRA 160 Film in KODAK FLEXICOLOR Chemicals for Process C-41 using the replenishment and wash rates in the tables below. Note that the developer replenishment rates are starting-point recommendations only and may vary due to the amount of exposure to the film, scene content, and the presence/absence of sprocket holes.

Replenishment and Wash Rates

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.

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
KODAK Gray Card (gray side) receiving same illumination as subject	0.79 to 0.89
Lightest step (darkest in the negative) of a *KODAK Paper Gray Scale* receiving same illumination as subject	1.15 to 1.25
Highest diffuse density on normally lighted forehead —light complexion —dark complexion	 1.10 to 1.20 0.95 to 1.05

PRINTING NEGATIVES

This film is optimized for printing to —

KODAK PROFESSIONAL ENDURA Premier Paper

KODAK PROFESSIONAL ENDURA Premier Canvas Paper

KODAK PROFESSIONAL ENDURA Premier Metallic Paper

KODAK PROFESSIONAL ENDURA Transparency Display Material

KODAK PROFESSIONAL ENDURA Clear Display Material

SCANNING NEGATIVES

You can easily scan PORTRA 160 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.

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	28	50	79

Negative Size: 6 x 6 cm (Size 120)

Print Size in inches	4x6	8x10	16x20
Magnification	2.6X	4.4X	8.8X
Print Grain Index	<25	28	50

Negative Size: 4 x 5 Inches (Sheets)

Print Size in inches	4x6	8x10	16x20
Magnification	1.2X	2X	4X
Print Grain Index	<25	<25	26

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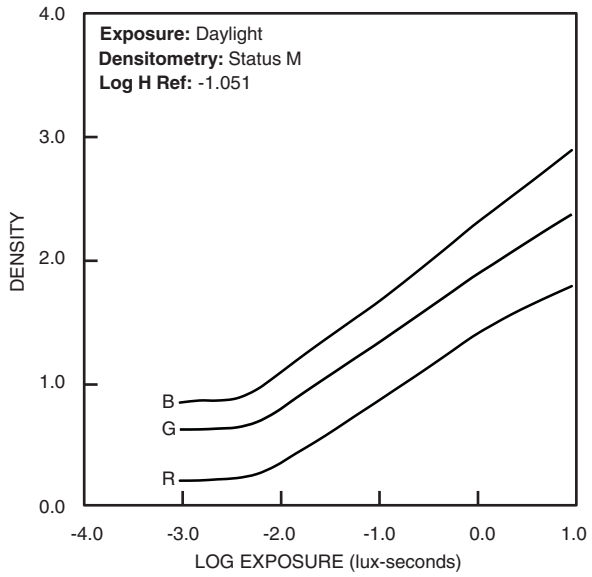
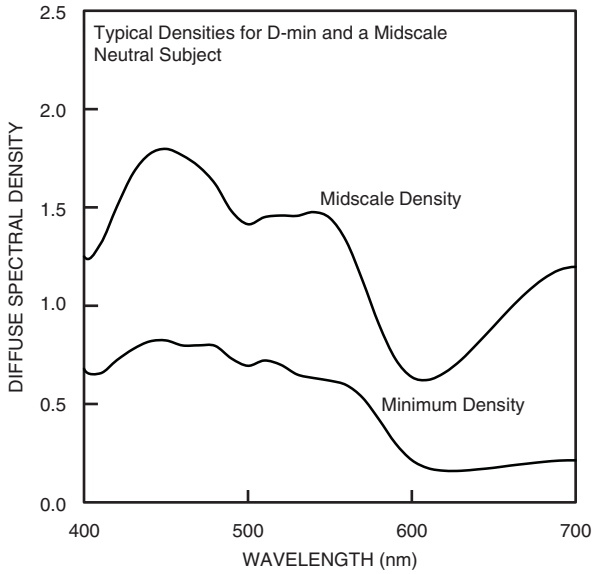
CURVES

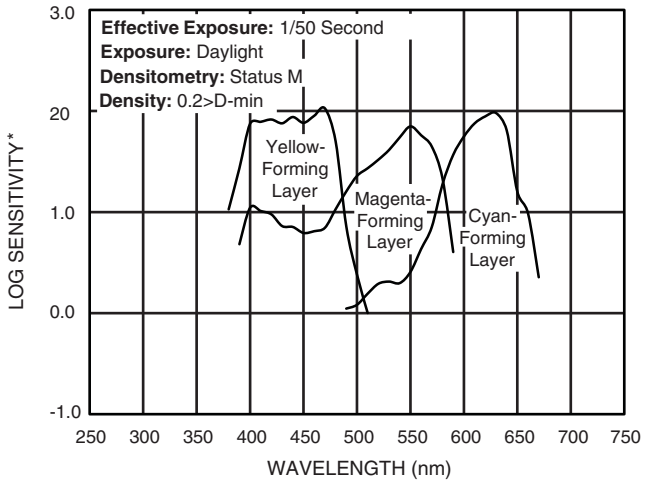
Characteristic Curves



Spectral-Dye-Density Curves

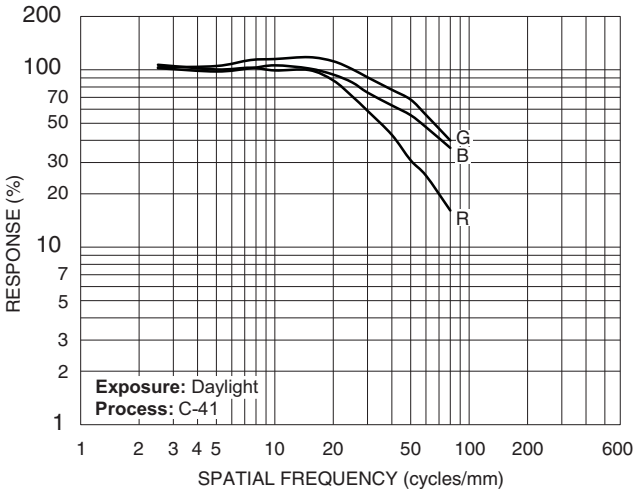


Spectral-Sensitivity Curves



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

Modulation Transfer Function



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