Kodak Professional

P O R T R A 400BW

BLACK and WHITE FILM

—NOTICE—

This film has been discontinued. As a recommended alternative, we suggest KODAK PROFESSSIONAL BW400CN Film.

KODAK PROFESSIONAL PORTRA 400BW Film is a 400-speed, multi-purpose, black-and-white film that offers the elegance of black-and-white . . . and the convenience of color. It is designed for processing in Process C-41 with color negative films and can be printed on KODAK PROFESSIONAL PORTRA ENDURA, SUPRA ENDURA, and ULTRA ENDURA Papers, as well as other color negative papers.

The film is intended for exposure with daylight, electronic flash, and artificial illumination. You can also obtain pleasing results under other light sources, i.e. illumination in stadiums, without using filters.

This film incorporates KODAK T-GRAIN® Emulsions, providing extremely fine grain and sharpness with relatively high speed.

This film is excellent for portrait and wedding applications, but can also be used for many commercial applications.

Features	Benefits
• For processing in KODAK FLEXICOLOR Chemicals, Process C-41	• Convenient and fast processing and printing often at lower cost for photographers—rapid turnaround in any lab that processes color negative film • Simplified way to make and sell high-quality black-and-white prints
• KODAK T-GRAIN® Emulsions	• Extremely fine grain and high sharpness • Neutral-toned black-and-white prints from color processes • Excellent quality and detail in enlargements • Neutral, predictable results with a variety of printing devices
• Professional film quality with professional support	• Outstanding black-and-white images for a versatile portfolio • Expansion to a wider customer base for labs • More versatility in services offered to customers for labs
• Wide exposure latitude	• High quality prints from negatives exposed at speeds from EI 50 to 1600 • High tolerance for exposure errors • Excellent tone reproduction in prints • Easier handling and printing of customers' negatives for labs
• True speed of ISO 400	• Great flexibility during shooting • More consistent results in customer's negatives for labs
• Optimized for scanning	• Ease of use in digital applications • Easier handling for labs • Higher-quality scans
• Excellent latent-image keeping properties	• Dependable results even with delays between exposure and processing • More consistent results for labs • More satisfied customers
• Intermixes with color negative film in Process C-41	• Consistent negatives from virtually any facility running Process C-41
• Stable, long-term film keeping after processing	• Keeping characteristics similar to Kodak color negative films

Available Sizes

Available in 135 magazines, 120- and 220-size rolls, and 70 mm rolls. Catalog numbers and packaging may vary from country to country. See your dealer who supplies KODAK PROFESSIONAL Products.

Size	Base	Code	CAT No. (US & Canada)	CAT No. (except US & C)
135-36	0.13 mm (0.005 in) acetate	PORTRA 400BW	113 7348	132 9952
120	0.10 mm (0.0039 in) acetate	PORTRA 400BW	806 6235	134 9935
220	0.10 mm (0.0039 in) acetate	PORTRA 400BW	132 0522	N/A

STORAGE AND HANDLING

Before Exposure

Load and unload your camera in subdued light.

High temperatures or high humidity may produce unwanted quality changes. Store unexposed film at 21°C (70°F) or lower in the original package. Always store film (exposed or unexposed) in a cool, dry place. Though this film has excellent latent image keeping characteristics (after exposure, but before processing), for best results, process film as soon as possible after exposure.

Darkroom Handling

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

✳ Important

This film cannot be processed in conventional black-and-white chemicals. It must be processed in KODAK FLEXICOLOR Chemicals, Process C-41, or compatible chemicals. See PROCESSING.

After Processing

Protect processed film from strong light, and store it in a cool, dry place. For more information on storing negatives, see KODAK Publication No. E-30, *Storage and Care of Photographic Materials-Before and After Processing*.

EXPOSURE

Speed:

Use these speed numbers with meters and cameras marked for ISO, ASA, or DIN speeds or exposure indexes. For critical work, make a series of test exposures.

ISO Speed

Arithmetic	Logarithmic
400	27°

Daylight Exposure:

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

Lighting Conditions	Shutter Speed (seconds)	Lens Opening
Bright/Hazy Sun on Light Sand or Snow	1/500	f/22
Bright or Hazy Sun, Distinct Shadows	1/500	f/16*
Weak, Hazy Sun, Soft Shadows	1/500	f/11
Cloudy Bright, No Shadows	1/500	f/8
Heavy Overcast, Open Shade†	1/500	f/5.6

* Use f/8 for backlighted close-up subjects.
† Subject shaded from the sun but lighted by a large area of sky.

Existing Light

Subject and Lighting Conditions	Shutter Speed (second)	Lens Opening
Home Interiors at Night —Average Light —Bright Light	1/30 1/30	f/2 f/2.8
Fireworks —Aerial Displays* —Displays on Ground	"Bulb" or "Time"† 1/60	f/16 f/4
Interiors with Bright Fluorescent Light	1/60‡	f/4
Brightly Lit Street Scenes at Night	1/60	f/2.8
Neon and Other Lighted Signs	1/125	f/4
Floodlighted Buildings, Fountains, Monuments	1/15*	f/2
Night Football, Soccer, Baseball, Racetracks	1/125	f/2.8
Basketball, Hockey, Bowling	1/125	f/2
Stage Shows —Average Light —Bright Light	1/60 1/125	f/2.8
Circuses and Ice Shows —Floodlighted Acts —Spotlighted Acts	1/125 1/250	f/2.8
School—State and Auditorium	1/30	f/2

*Leave shutter open for several bursts.
†Use a tripod or other firm camera support for exposure times longer than 1/30 second.
‡Use shutter speeds of 1/60 second or longer with fluorescent light.

Electronic Flash:

Use the guide numbers 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	
	For Distances in Feet	For Distances in 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	105
8000	400	120

*BCPS = beam candlepower seconds

Exposure Adjustments for Long and Short Exposures

No exposure compensation for reciprocity failure is necessary for exposures between 1/10,000 and 120 seconds. We do not recommend exposures longer than 120 seconds. For critical applications, make tests under your conditions.

Filter Factors

Multiply the normal (unfiltered) exposure time by the filter factor.

KODAK WRATTEN Gelatin Filter	Daylight	Tungsten
	Multiply Exposure By (Filter Factor)	Multiply Exposure By (Filter Factor)
No. 8 (yellow)	1.4	1.25
No. 11 (yellowish Green)	3	3
No. 15 (deep yellow)	2	1.4
No. 25 (red)	8	3
No. 47 (blue)	12.5	16
No. 58 (green)	5.6	4
Polarizing Filter*	2.5	2.5

*Average filter factor, which may vary slightly depending on the manufacturer. Polarizing filters are not manufactured by Kodak.

PROCESSING

Process PORTRA 400BW Film in KODAK FLEXICOLOR Chemicals for Process C-41. You can have this film processed by any photofinisher who processes color negative films like KODAK PROFESSIONAL PORTRA Film. PORTRA 400BW Film is fully compatible with Process C-41, and can be intermixed with color negative films during processing in all equipment, from minilabs to high volume continuous, roller transport, or rack-and-tank processors.

You can also use KODAK FLEXICOLOR Chemicals in the 1-gallon size to process this film in a small tank or a rotary-tube processor. For specifications on Process C-41, see Kodak Publication No. Z-131, *Using KODAK FLEXICOLOR Chemicals*.

✳ Important

Do not process this film in conventional black-and-white chemicals.

Negative Appearance

The appearance of processed negatives on PORTRA 400BW Film is similar to color negative films, but with no color in the negative images, and a much lower D-min or base density. The film base will appear very light brown. This is normal, and will not affect image quality or printing characteristics.

JUDGING NEGATIVE EXPOSURES

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

Densities of Properly Exposed and Processed Negatives:

Area on the Negative:	Densities:
The KODAK Gray Card[1] (gray side) receiving the same illumination as the subject	0.80 to 1.00
The lightest step (darkest in the negative) of a KODAK Paper Gray Scale receiving the same illumination as the subject	1.15 to 1.35
Normally lighted forehead of person with light complexion[2]	1.05 to 1.35
Normally lighted forehead of person with dark complexion[2]	0.90 to 1.20

[1]KODAK Publication No. R-27
[2]Because of the extreme range in skin color, use these values only as a guide. For best results, use a KODAK Gray Card (gray side).

RETOUCHING

Treat the negative as if it were a color negative.

You can retouch 120 / 220-size PORTRA 400BW Film on both the emulsion and base sides. 35 mm film can be retouched on the emulsion side only.

Both retouching dye and black graphite lead pencil can be used to retouch this film. When retouching with pencil on the emulsion side, use KODAK Retouching Fluid to improve the tooth of the film.

If you plan to use retouched PORTRA 400BW Film for printing on color negative paper, follow the Dye / Filter "Layering" Technique.

For more information about retouching techniques, supplies, and equipment, see KODAK Publication E-71, *Retouching Color Negatives.*

Dye / Filter Layering Technique

To retouch small areas, use *diluted* KODAK Liquid Retouching Colors. For most retouching, you will need only two dyes: red-yellow and cyan. Prepare the diluted dyes according to the following formulas:

Diluted Dyes	Formula	Water:		
		Dilution 1	Dilution 2	Dilution 3
Red-yellow	5 drops red dye plus 1 drop yellow dye plus distilled water	18 drops distilled water (1:3)	30 drops distilled water (1:5)	60 drops distilled water (1:10)
Cyan	3 drops cyan dye plus distilled water	15 drops distilled water (1:5)	30 drops distilled water (1:10)	60 drops distilled water (1:20)

1. Hold a WRATTEN Gelatin Filter No. 58 (green) near your eye, and view the negative through the filter. Evaluate the areas to be retouched; if they appear lighter than the surrounding areas, apply red-yellow dye by using the technique described in step 2.

2. Dip the brush into the dye, and stroke the tip on water-dampened cotton, tissue, or paper towel until the tip is almost dry. Smoothly apply a small amount of dye to the **base side** of the negative.

Note: When you retouch along sharp edges in an image or make very fine corrections, apply dye to the **emulsion side**. This allows for more precise alignment of the retouching with the image and avoids parallax problems from inaccurate application.

3. Hold a WRATTEN Gelatin Filter No. 25 (red) near your eye, and view the negative through the filter. Evaluate the areas to be retouched; if they appear lighter than the surrounding area, apply cyan dye by using the technique described in step 2.

4. View the negative without using a filter. If a retouched area appears slightly red or slightly cyan, add a very small amount of the opposite-colored dye until the area appears neutral.

After you have finished retouching and the negative is dry, sandwich the PORTRA 400BW negative with a piece of unexposed and processed D-min of another color negative film, such as KODAK PROFESSIONAL PORTRA 160VC Film. Although you can print it onto color paper without the "extra D-min," this may make it easier to print on color paper.

PRINTING NEGATIVES

Printing on Color Papers and Display Materials

PORTRA 400BW Film is designed to deliver excellent black-and-white prints on professional color papers. When printing on color papers, you can also create special-effect tones, such as sepia, simply by changing the printer color balance.

You can make black-and-white prints from PORTRA 400BW negatives by enlarging them 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.

Starting Printing Filter Pack

When working with a color enlarger to print on professional color papers and display materials, add 5M to your KODAK PROFESSIONAL PORTRA 160NC Film filter balance, and make adjustments to balance the print to a desired tone.

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

IMAGE STRUCTURE

Sharpness: Extremely high
   Degree of Enlargement: Extremely high
   RMS Granularity: 9 (Extremely fine)
   (Read at a net diffuse visual density of 1.00, with a 48-micrometer aperture.)

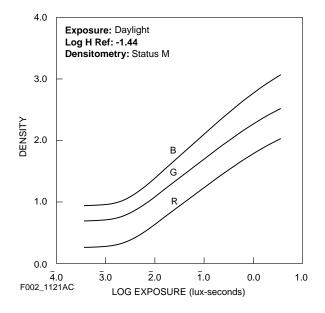### Print Grain Index Magnification Table:

Print Grain Index numbers for diffuse printing illumination.

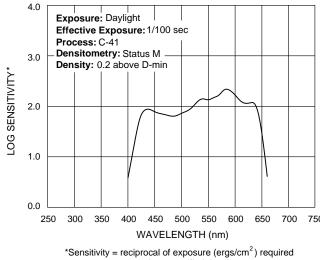Negative Size: 24 x 36 mm; 135 format or 35 mm Roll Film

Print Size in inches:	4x6	8x10	16x20
Print Size in centimeters:	10.2x15.2	20.3x25.4	40.6x50.8
Magnification:	4.4X	8.8X	17.8X
Print Grain Index number:	< 25	40	70

- This is a method which replaces rms granularity. It is on a different scale, which cannot be compared to rms granularity.

- The scale is a uniform perceptual scale, with a change of 4 units representing a Just Noticeable Difference for 90% of observers.

- Index value representing the approximate visual threshold for graininess: 25.

- Standardized inspection distance for all print sizes: 35.6 cm (14 inches).

- In practice, prints larger than 10.2 x 15.2 cm (4x6 inches) will likely be viewed from distances greater than 35.6 cm (14 inches), thereby reducing overall graininess that is perceived.

- These Grain Index numbers may not represent graininess observed from more specular printing illuminants, such as condenser enlargers.

CURVES

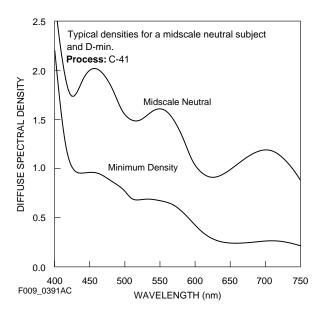## Characteristic Curve

Exposure: Daylight
Log H Ref: -1.44
Densitometry: Status M

DENSITY

LOG EXPOSURE (lux-seconds)

F002_1121AC

B

G

R

Spectral-Sensitivity Curve

Exposure: Daylight
Effective Exposure: 1/100 sec
Process: C-41
Densitometry: Status M
Density: 0.2 above D-min

LOG SENSITIVITY*

WAVELENGTH (nm)

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

F009_0390AC

Spectral-Dye-Density Curves

Typical densities for a midscale neutral subject
and D-min.
Process: C-41

DIFFUSE SPECTRAL DENSITY

Midscale Neutral

Minimum Density

WAVELENGTH (nm)

F009_0391AC

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.

MORE INFORMATION

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

Additional information is available on the Kodak website and through the U.S.A./Canada faxback system.

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	*Storage and Care of KODAK Photographic Materials—Before and After Processing*
E-58	*Print Grain Index*
E-71	*Retouching Color Negatives*
E-4021	*KODAK PROFESSIONAL PORTRA and SUPRA ENDURA Papers*
E-4020	*KODAK PROFESSIONAL ULTRA ENDURA Paper*
E-4030	*KODAK PROFESSIONAL ENDURA Transparency and Clear Optical Display Materials*
E-4031	*KODAK PROFESSIONAL ENDURA Transparency and Clear Digital Display Materials*
E-4028	*KODAK PROFESSIONAL ENDURA Metallic Paper*
E-2468	*KODAK PROFESSIONAL PORTRA 100T Film*
G-4006	*KODAK PROFESSIONAL PORTRA Black-and-White Paper*
G-4019	*KODAK PROFESSIONAL PORTRA Sepia Black-and-White Paper*
G-27	*KODAK PROFESSIONAL PANALURE SELECT RC Paper*
J-38	*Using KODAK FLEXICOLOR Chemicals in Sink-Line, Bath, and Rotary-Tube Processors*
Z-131	*Using KODAK FLEXICOLOR Chemicals*

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
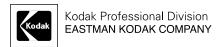9 a.m.–7 p.m. (Eastern time)

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 400BW Film are available from dealers who supply KODAK PROFESSIONAL Products. You can use other materials, but you may not obtain similar results.

KODAK PROFESSIONAL PORTRA 400BW Film

Kodak Professional Division
EASTMAN KODAK COMPANY

Kodak Professional