

# KODAK PROFESSIONAL T400 CN Film (Process C-41)



KODAK PROFESSIONAL T400 CN Film is a 400-speed, multi-purpose, black-and-white film designed for processing in Process C-41 with color negative films. The panchromatic film can be printed on either black-and-white papers or color negative papers. You can also make prints for short-term intermediate use on KODAK EKTAMAX RA Professional Paper.

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.

You can use filters when exposing this film to vary the tone and contrast. Results are similar to conventional black-and-white films.

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

You can use this film for general, advertising, education, industrial, law enforcement, medical, newspaper, portrait, real estate, scientific, sports, wedding, and other black-and-white photographic applications.

FEATURES	BENEFITS
<ul style="list-style-type: none"> <li>For processing in KODAK FLEXICOLOR Chemicals, Process C-41</li> </ul>	<ul style="list-style-type: none"> <li>No need for a dedicated black-and-white processing line</li> <li>Rapid turnaround in any lab that processes color negative film</li> </ul>
<ul style="list-style-type: none"> <li>EI 400</li> </ul>	<ul style="list-style-type: none"> <li>Excellent underexposure latitude and shadow detail</li> </ul>
<ul style="list-style-type: none"> <li>Wide exposure latitude</li> </ul>	<ul style="list-style-type: none"> <li>High quality prints from negatives exposed at speeds from EI 25 to 1600 (+4 stops/-2 stops from EI 400)</li> <li>Faithful tone reproduction over an extremely wide range of exposure</li> </ul>
<ul style="list-style-type: none"> <li>Pushable in Process C-41</li> </ul>	<ul style="list-style-type: none"> <li>Can be exposed up to EI 3200 with push processing</li> </ul>
<ul style="list-style-type: none"> <li>Excellent image structure</li> <li>Extremely fine grain and high sharpness</li> </ul>	<ul style="list-style-type: none"> <li>Allows a very high degree of enlargement</li> <li>Excellent rendering of fine detail</li> <li>Exposed at EI 400, image quality equals or surpasses 100-speed traditional black-and-white films</li> </ul>

FEATURES	BENEFITS
<ul style="list-style-type: none"> <li>Uses Kodak's newest color negative film technology</li> </ul>	<ul style="list-style-type: none"> <li>Built from newest materials to exacting specifications for excellent keeping properties and outstanding performance</li> </ul>
<ul style="list-style-type: none"> <li>Excellent latent-image keeping properties</li> </ul>	<ul style="list-style-type: none"> <li>Dependable results even if not processed as soon as possible after exposure</li> </ul>
<ul style="list-style-type: none"> <li>Intermixes with color negative film in Process C-41</li> </ul>	<ul style="list-style-type: none"> <li>Consistent negatives from virtually any facility running Process C-41</li> </ul>
<ul style="list-style-type: none"> <li>Prints on color negative papers, KODAK EKTAMAX RA Professional Papers, and black-and-white papers</li> </ul>	<ul style="list-style-type: none"> <li>Provides neutral, predictable black-and-white prints on color negative papers with a variety of printing devices</li> <li>Full scale prints on either selective-contrast or graded black-and-white papers</li> <li>Easily printed at any photofinisher or darkroom</li> </ul>
<ul style="list-style-type: none"> <li>Print tone is adjustable on color negative paper</li> </ul>	<ul style="list-style-type: none"> <li>Provides predictable palette of hues for a variety of special effects</li> </ul>
<ul style="list-style-type: none"> <li>Versatile in any printing situation</li> </ul>	<ul style="list-style-type: none"> <li>Process and proof at a local color minilab and make black-and-white fine-art prints in your home darkroom</li> </ul>
<ul style="list-style-type: none"> <li>Stable, long-term film keeping after processing</li> </ul>	<ul style="list-style-type: none"> <li>Keeping characteristics similar to Kodak color negative films</li> </ul>


## SIZES AVAILABLE

Sizes and CAT numbers may differ from country to country. See your dealer who supplies KODAK PROFESSIONAL Products.

Size	Base	Letter Code	CAT No.
135-24	5-mil acetate	T400 CN	147 6738* 867 7742†
135-36			180 4004* 869 4010†
120	3.9-mil acetate		197 5572* 865 5128†
220	3.9-mil acetate		847 0320

\* For worldwide (other than United States and Canada)

† For U. S. and Canada

Sheets	Sizes (inches)	Code	Base	CAT No.
10	4 x 5		7-mil ESTAR Thick	162 8213
25	4 x 5			809 6935

## STORAGE AND HANDLING

Load and unload your camera in subdued light.

High temperatures or high humidity may produce unwanted quality changes. Store *unexposed* film at 70°F (21°C) or lower in the original package. Always store film (exposed or unexposed) in a cool, dry place. For best results, process film as soon as possible after exposure.

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*.

## DARKROOM RECOMMENDATIONS

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."

## EXPOSURE

### 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)	Lens Opening
Bright or Hazy Sun on Light Sand or Snow	1/500	f/16
Bright or Hazy Sun (Distinct Shadows)	1/500	f/11*
Weak, Hazy Sun (Soft Shadows)	1/500	f/8
Cloudy Bright (No Shadows)	1/500	f/5.6
Heavy Overcast or Open Shade†	1/500	f/4

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

† Subject shaded from the sun but lit by a large area of clear 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 1/250	f/2.8
Circuses and Ice Shows —Floodlighted Acts —Spotlighted Acts	1/125 1/250	f/2.8
School—Stage 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 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	
	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 T400 CN Film in KODAK FLEXICOLOR Chemicals for Process C-41. You can have this film processed by any photofinisher who processes color negative films such as KODAK GOLD or VERICOLOR III Professional Film. T400 CN 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.

## PUSH PROCESSING

T400 CN Film can be rated at higher than normal exposure indexes for photography in dim light or where fast shutter speeds must be maintained. Push processing in Process C-41 results in acceptable negatives from exposure indexes as high as 3200.

Exposure Index	Approximate Developer Time in Process C-41
400 to 800	3:15
1600	3:45
3200	4:15

**Note:** Not all processing equipment can be used for push processing, and many photofinishers do not offer this service. Check with your lab or photofinisher before rating this film higher than EI 800.

## NEGATIVE APPEARANCE

The appearance is similar to color negative films, but with much lower D-min or base density. The film base of these processed negatives will appear light brown to orange. This is normal, and will not affect the image quality or printing characteristics.

## JUDGING NEGATIVE EXPOSURE

You can check the exposure level with a suitable 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.

Area Measured	Density Reading
The <i>KODAK Gray Card</i> (gray side), receiving the same illumination as the subject:	0.75 to 0.95
The lightest step (darkest in negative) of a <i>KODAK Paper Gray Scale</i> receiving the same illumination as the subject:	1.15 to 1.35
The highest diffuse density on a normally lighted forehead: —dark complexion —light complexion	1.05 to 1.35 0.80 to 1.20

Because of the extreme range in skin color, use these red density values for a normally lighted forehead 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, and sheet sizes of T400 CN Film on both the emulsion and base sides. The 135-size 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 a pencil on the emulsion side, use KODAK Retouching Fluid to improve the tooth of the film.

If you plan to use retouched T400 CN Film for printing on color negative paper, follow the “Dye / Filter Layering” Technique.

### 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 Dye	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.\* 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’ve finished retouching and the negative is dry, sandwich the T400 CN negative with a piece of unexposed and processed D-min of another color negative film, such as KODAK VERICOLOR III Professional or 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.

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

\* The base side of a roll-film negative faces you when the edgeprinting reads correctly. The base side of a sheet-film negative faces you when the code notch is at the top left edge of the sheet.

## PRINTING NEGATIVES

### Printing on Color Papers and Display Materials

T400 CN Film is designed to deliver excellent black-and-white prints on either color or black-and-white photographic papers. When printing on color papers, you can also create special-effect tones, such as sepia, simply by changing the printer color balance.

KODAK PROFESSIONAL T400 CN Printer Balancing Kit is available to help photofinishers optimize a printer channel to print this film on KODAK PROFESSIONAL PORTRA III, PROFESSIONAL SUPRA III, EKTACOLOR Edge 7, or EKTACOLOR ROYAL V Papers, so that it can be printed along with color negative films. This means you can receive high-quality black-and-white prints in the same amount of time as it takes your finisher to process and print a roll of color film.

You can also make black-and-white prints from T400 CN negatives by enlarging them on PROFESSIONAL PORTRA III and SUPRA III Papers or KODAK DURAFLEX® RA Print Material.

You can make black-and-white transparencies by direct exposure onto KODAK DURATRANS® RA or DURACLEAR® RA Display Materials, or VERICOLOR Slide or VERICOLOR Print Films.

When working with a color enlarger to print on PROFESSIONAL or EKTACOLOR Papers and DURAFLEX or DURACLEAR Print Materials, use a starting filter pack of 70M and 75Y, and make filter adjustments to balance the print to a desired tone.

### Printing on KODAK EKTAMAX RA Professional Paper

You can make black-and-white prints by enlarging them on KODAK EKTAMAX RA Professional Papers for Process RA-4. EKTAMAX RA Professional Papers are intended for *interim use*, such as school picture proofing, and are not recommended where long-term print keeping is desired.

### Printing on Black-and-White Papers

You can make black-and-white prints by enlarging them as you would any other black-and-white negative. You can use a graded paper, such as KODABROME II RC or a selective-contrast paper, such as KODAK POLYMAX Fine-Art Paper.

If you print on graded black-and-white papers, a normal exposure on this film will print well at grade 3.

When printing on selective-contrast papers with KODAK POLYMAX II Filters, a normally exposed negative will print well with a 3 or 3 1/2 filter. The light brown to orange color of the T400 CN Film base **does not** affect contrast control with POLYMAX II Filters.

# IMAGE STRUCTURE

Sharpness: Extremely high

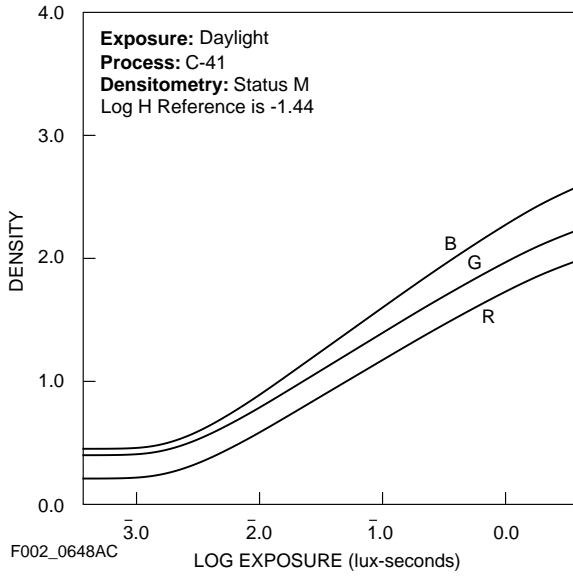
Degree of Enlargement: Extremely high

RMS Granularity: 9 (Extremely fine)

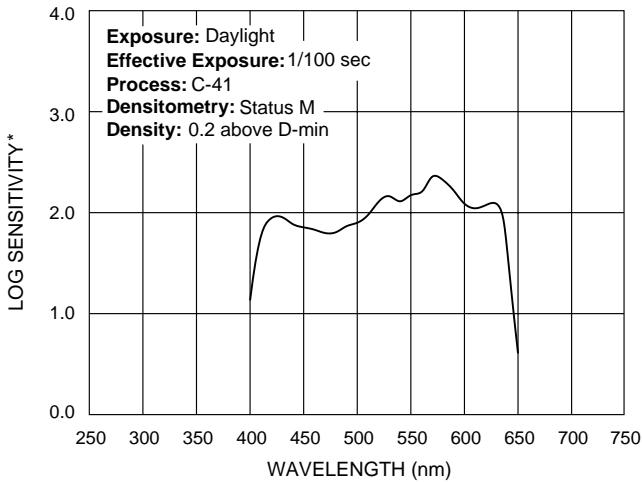
(Read at a net diffuse visual density of 1.00, with a 48-micrometre aperture.)

## CURVES

**Characteristic Curve**

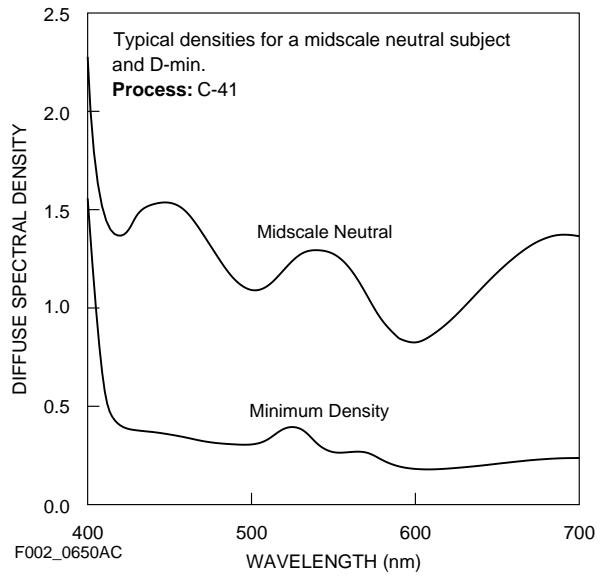


**Spectral-Sensitivity Curve**



\*Sensitivity = reciprocal of exposure (ergs/cm<sup>2</sup>) required to produce specified density

**Spectral-Dye-Density Curves**



## 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-19 *KODAK EKTACOLOR Edge 7 Paper*
- E-23 *KODAK EKTACOLOR ROYAL V Paper*
- E-30 *Storage and Care of KODAK Photographic Materials—Before and After Processing*
- E-103BP *KODAK Black-and White papers Applications Chart*
- E-140 *KODAK PROFESSIONAL PORTRA III Paper*
- E-141 *KODAK PROFESSIONAL SUPRA III Paper*
- E-142 *KODAK EKTACOLOR ULTRA II Paper*
- E-143 *KODAK Display and Print Material for Process RA-4*
- G-16 *KODABROME II RC Paper*
- G-22 *KODAK EKTAMAX Paper*
- G-24 *KODAK POLYMAX Fine-Art Paper*
- Z-131 *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>

Many technical support publications for KODAK PROFESSIONAL Products can be sent to your fax machine from the Kodak Information Center. Call:  
U.S. 1-800-242-2424, Ext. 33 / Canada 1-800-295-5531  
—Available 24 hours a day, 7 days a week—

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 T400 CN Film 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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Kodak Professional Division  
EASTMAN KODAK COMPANY

**Kodak Professional**

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Film (Process C-41)  
KODAK Publication No. F-2350

**CAT 828 5017**

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Minor Revision 2-99  
Printed in U.S.A.