

KODAK HAWKEYE Traffic Surveillance Color Film

Kodak

TECHNICAL DATA / COLOR NEGATIVE FILM

March 2010 • TI-2420

KODAK HAWKEYE Traffic Surveillance Color Film is a 400 speed color negative film for traffic surveillance applications. KODAK T-GRAIN emulsion technology provides extremely fine grain and high sharpness, and wide exposure latitude allows a range of exposures from 2 stops under to 3 stops over normal. Other features include:

- Improved color saturation; accurate colors
- Push performance to EI 800
- Optimized for use with film scanners; durable emulsion overcoat prevents scratches
- Panchromatic sensitivity to 660 nm
- Balanced for daylight or electronic flash, and may also be used under mixed lighting
- Prints compatibly with KODAK GOLD and MAX Versatility Films
- Process using KODAK FLEXICOLOR Chemicals, Process C-41
- Coated on a 0.0048-inch (0.12 mm) acetate base

DARKROOM RECOMMENDATIONS

Handle unprocessed film in total darkness—do not use a safelight.

Process this film in total darkness through the bleach step in Process C-41.

STORAGE AND HANDLING

Load and unload film in subdued light.

Store unexposed film at 70° F (21° C) or lower in the *original sealed package*. Process film as soon as possible after exposure. Protect negatives from strong light. For more information about storing negatives, see KODAK Publication No. E-30, *Storage and Care of KODAK 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.

Exposure Index (EI)

Arithmetic	Logarithmic
400	27°

Daylight Exposure:

Use the exposures in the table below for average frontlit subjects from 2 hours after sunrise to 2 hours before sunset when exposing at EI 400.

Lighting Conditions	Shutter Speed (Second) and 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 ¹
Weak, Hazy Sun (Soft Shadows)	1/500 f/8
Cloudy Bright (No Shadows)	1/500 f/5.6
Heavy Overcast or Open Shade ²	1/500 f/4

¹ Use f/5.6 for backlit close-up subjects.

² Subject shaded from the sun but lighted by a large area of sky.

Electronic Flash:

Use the guide numbers in the table below as starting-point recommendations for your equipment. To determine the lens opening, divide the guide number by the flash-to-subject distance.

Unit Output (BCPS) ¹	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

¹ BCPS = beam candlepower seconds

Filters

For light sources other than daylight, use the filtration and exposure compensation in the table below.

Light Source	KODAK WRATTEN Gelatin Filter	Exposure Adjustment
Photolamp (3400 K)	No. 80B	+ 1 2/3 stops
Tungsten (3200 K)	No. 80A	+ 2 stops

Note: Do not change the film speed setting when metering through a filter. Metering through filters may affect light meter accuracy; see the meter manual (or camera manual for built-in meters) for specific information.

Fluorescent and High Intensity Discharge Light:

Though this film is tolerant of mixed-lighting situations, for best color results under uniform fluorescent or high-intensity discharge sources, use the exposure and filter recommendations given below. These recommendations are starting points.

Actual filtration may vary between lamps and lamp manufacturers. Depending on the specific source, additional filtration or special printing may be required to achieve best results.

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 lamps, use exposure times of 1/125 second or longer.

Fluorescent Light Source

Fluorescent Lamp Type	KODAK Color Compensating Filter(s)	Exposure Adjustment
"Daylight"	40R	+ 2/3 stop
White	20C + 30M	+ 1 stop
Warm White	40B	+ 1 stop
Warm White Deluxe	30B + 30C	+ 1 1/3 stops
Cool White	30M	+ 2/3 stop
Cool White Deluxe	20C + 10M	+ 2/3 stop
Average fluorescent, or unknown lamp	10C + 20M	+ 2/3 stop

High-Intensity Discharge Lamp Source

High-Intensity Discharge Lamp Type	KODAK Color Compensating Filter(s)	Exposure Adjustment
High Pressure Sodium Vapor	70B + 50C	+ 3 stops
Metal Halide	10R + 20M	+ 2/3 stop
Mercury Vapor with Phosphor	20R + 20M	+ 2/3 stop
Mercury Vapor w/o Phosphor (clear envelope)	80R	+ 1 2/3 stops

Reciprocity

Compensation for reciprocity failure is not necessary for exposures of 1/10,000 second to 10 seconds. Exposures longer than 10 seconds may require exposure compensation and/or filtration, and should be tested for the application.

PROCESSING

Normal Processing:

Use KODAK FLEXICOLOR Chemicals, Process C-41, in any processing equipment designed to accommodate Process C-41.

Push Processing:

This film may be "pushed" 1 stop by exposing at EI 800, and extending the development time in Process C-41. (This time increase may not be possible in all processing equipment.)

Push Step	Exposure Index	Developer Time in Process C-41
Normal	EI 400	3 min 15 sec
Push 1 Stop	EI 800	3 min 45 sec

JUDGING NEGATIVE EXPOSURES

Expose this film properly for best results.

Check the exposure level of the color negative 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:

Expose this film properly for optimum results.

Check the exposure level of the color negative 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.

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

¹KODAK Publication No. R-27

²Because of the extreme range in skin color, use these values only as a guide. For best results, use a KODAK Gray Card (gray side).

SCANNING NEGATIVES

General

Traffic Surveillance Color Film negatives can be easily scanned with a variety of photomultiplier tube (PMT), linear-array charge-coupled device (CCD) and area-array CCD scanners. The film can be scanned using desktop as well as higher-end drum or flat-bed scanners. Since there is no established standard for filter sets used in film scanners, each manufacturer's scanner will have its own characteristic output. The sensitivity of a scanner to a film's dye set is determined by the spectral sensitivity of the CCD and the spectral distribution of the colored filters used to capture the red, green and blue information contained in the film. A scanner's characteristic output may also be affected by the look-up tables or matrices used by the scanner to output information for monitors, transmission, etc. These tables or matrices can be in the form of a "plug-in" program used with a specific image manipulation software package, updateable ROMs included with the equipment, or fixed algorithms for determining calibration and balancing, similar to those used in photographic color printing equipment.

The generic "color negative film" channel designation available with scanner software will provide only a starting point for balancing. The final color balancing and adjustment of scene-dependent contrast and brightness for any particular image can be done using scanner controls at the pre-scan stage, or after the image is imported through the imaging software or workstation.

Some scanners allow for the use of "plug-in" programs that will calibrate on D-min film stock. Since every color negative film has a different colored-coupler mask, the optimum D-min balance will be different for each film. Therefore, optimum scanning of these films are accomplished through the use of specifically calibrated channels.

KODAK Photo CD Imaging Workstation (PIW)

Photo CD Film Term tables store information that determines the tone scale and color reproduction characteristics of a Photo CD image. These tables also contain photographic information about different types of film, and parameters specific to each film.

Photo CD Film Term tables are intended for use by owners and operators of KODAK Photo CD Imaging Workstations (PIWs), and can be downloaded from Kodak's website.

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

PRINTING NEGATIVES

This film is optimized for printing on KODAK EKTACOLOR Edge 8, KODAK ROYAL VIII, KODAK EKTACOLOR Edge 9, and KODAK ROYAL IX Papers. The film can also be printed on KODAK PROFESSIONAL DURAFLEX Plus Digital Display Material.

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.

RETOUCHING

Retouch only the emulsion side; 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*.

IMAGE STRUCTURE

Print Grain Index Magnification Table:

Print Grain Index numbers for diffuse printing illumination.

Process C-41, normal cycle, film exposed at EI 400.

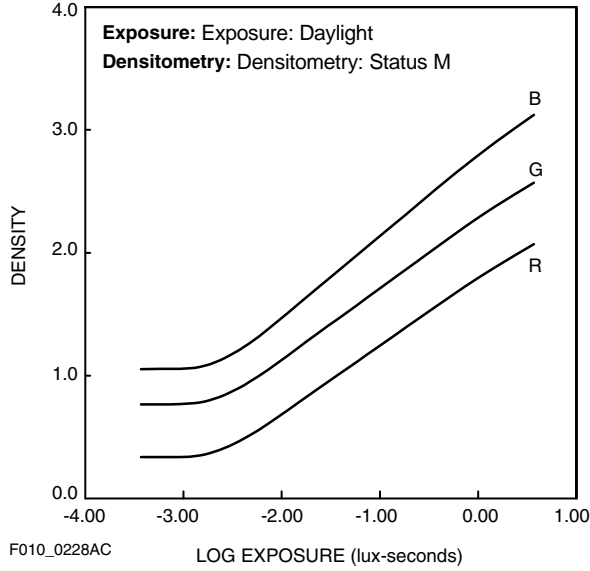
Negative Size: 24 x 36 mm; 135 format or 35 mm Roll Film

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:	39	61	90

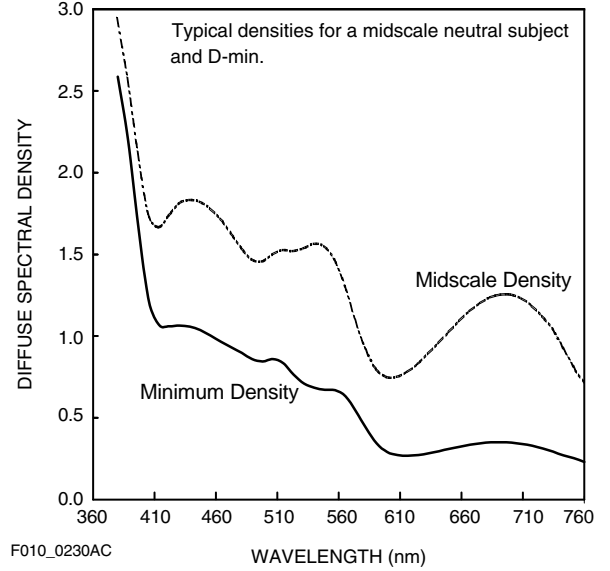
- This is a new method which replaces rms granularity. It is on a different scale, which cannot be compared to rms granularity.
- The scale is a uniform perceptual scale, with a change of 4 units representing a Just Noticeable Difference for 90% of observers.
- Index value representing the approximate 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

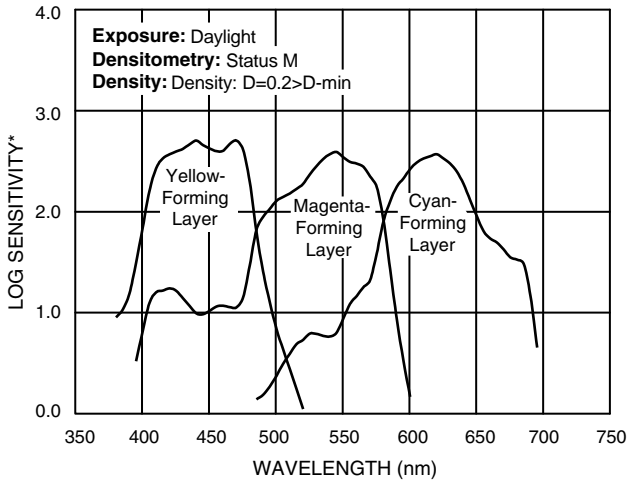
Characteristic Curves



Spectral Dye Density

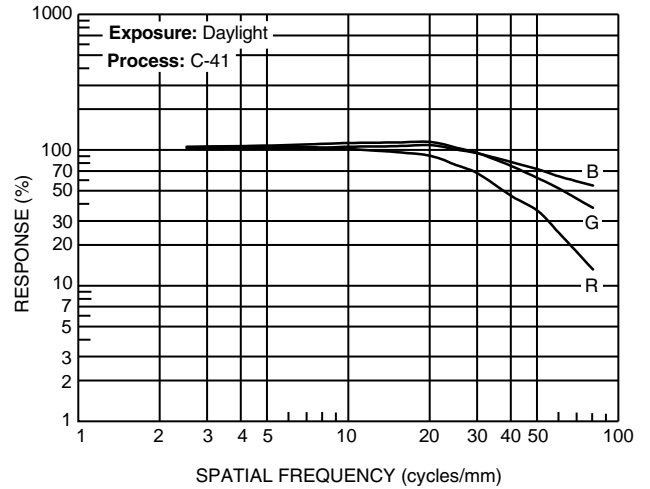


Spectral Sensitivity



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

Modulation Transfer Function



KODAK HAWKEYE Traffic Surveillance Color Film

MORE INFORMATION

For the latest version of technical support publications for Kodak products, visit Kodak on-line at:
<http://www.kodak.com/go/SDRproducts>

If you have questions about Kodak 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)

From outside the US/Canada: 1-716-724-4000

Note: The Kodak materials described in this publication for use with KODAK HAWKEYE Traffic Surveillance Color Film are available from dealers who supply Kodak products. You can use other materials, but you may not obtain similar results.

NOTICE: While the sensitometric data in this publication are typical of production coatings, they do not represent standards which must be met by Kodak. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

Kodak, Duraclear, Duraflex, Duratrans, Ektacolor, Ektamax, Flexicolor, Panalure, Vericolor, and Wratten, are trademarks.

Revised 3-10

KODAK HAWKEYE Traffic Surveillance
Color Film
KODAK Publication No. TI-2420

Aerial and Industrial Markets
EASTMAN KODAK COMPANY • ROCHESTER, NY 14650-0505

Kodak
