KODAK High Definition 400 Film

KODAK High Definition 400 Film is the world’s finest grain 400-speed color print film. It provides a unique balance of fine grain, sharpness, color reproduction, and contrast to yield results with excellent clarity and enlargement capability. This multi-purpose film is designed for exposure with daylight or electronic flash. You can also obtain pleasing results under most existing-light sources without filters.

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very fine grain, unprecedented among 400-speed color films</td>
<td>• Pictures that are very clear</td>
</tr>
<tr>
<td>• Excellent sharpness</td>
<td>• Improved enlargements</td>
</tr>
<tr>
<td>• ISO 400 speed</td>
<td>• Improved picture detail</td>
</tr>
<tr>
<td>• Excellent color reproduction, improved color consistency</td>
<td>• Pictures very clear, crisp</td>
</tr>
<tr>
<td>• KODAK Color Precision Technology for better skin tones</td>
<td>• Great enlargements</td>
</tr>
<tr>
<td>• Scratch-resistant overcoat technology</td>
<td>• Better pictures in a wider range of light conditions</td>
</tr>
<tr>
<td>• Print compatibility</td>
<td>• Fewer underexposed pictures</td>
</tr>
<tr>
<td>• Scan ready</td>
<td>• Sharper pictures with moving objects</td>
</tr>
<tr>
<td></td>
<td>• Longer flash range for better flash pictures over greater distances</td>
</tr>
<tr>
<td></td>
<td>• Reduced impact of “camera shake”</td>
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<tr>
<td></td>
<td>• Better pictures from zoom cameras</td>
</tr>
<tr>
<td></td>
<td>• Bright, vibrant prints</td>
</tr>
<tr>
<td></td>
<td>• Improved color consistency across a wider range of picture-taking situations</td>
</tr>
<tr>
<td></td>
<td>• Optimized performance with KODAK EKTACOLOR Edge Paper</td>
</tr>
<tr>
<td></td>
<td>• More natural-looking skin tones for improved “people pictures”</td>
</tr>
<tr>
<td></td>
<td>• Less negative scratching for fewer print defects</td>
</tr>
<tr>
<td></td>
<td>• Compatibility with all other Kodak films makes photofinishing workflows faster, easier</td>
</tr>
<tr>
<td></td>
<td>• High-quality results from digital output systems</td>
</tr>
<tr>
<td></td>
<td>• Great prints for digital zoom and crop</td>
</tr>
</tbody>
</table>

**DARKROOM RECOMMENDATIONS**

Handle unprocessed film in total darkness.

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

Do not use a safelight.

**STORAGE AND HANDLING**

Store unexposed film at 21°C (70°F) or lower in the original sealed package. Always store film (exposed or unexposed) in a cool, dry place. Process film as soon as possible after exposure.

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

**EXPOSURE**

**Film Speed:**

Use these speed numbers with meters and cameras marked for ISO, ASA, or DIN speeds or exposure indexes. Do not change the ISO-speed setting when metering through a filter.

<table>
<thead>
<tr>
<th>Light Source</th>
<th>KODAK WRATTEN Gelatin Filter¹</th>
<th>ISO Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylight or Electronic Flash</td>
<td>None</td>
<td>400/27°</td>
</tr>
<tr>
<td>Photolamp (3400 K)</td>
<td>No. 80B</td>
<td>125/22°</td>
</tr>
<tr>
<td>Tungsten (3200 K)</td>
<td>No. 80A</td>
<td>100/21°</td>
</tr>
</tbody>
</table>

¹For best results without special printing.

¹Compared to Kodak 200-speed film.
Daylight Exposure:
Use the exposures in the table below for average frontlit subjects from 2 hours after sunrise to 2 hours before sunset.

<table>
<thead>
<tr>
<th>Lighting Conditions</th>
<th>Shutter Speed (seconds)</th>
<th>Lens Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bright/Hazy Sun on Light Sand or Snow</td>
<td>1/500</td>
<td>f/16</td>
</tr>
<tr>
<td>Bright or Hazy Sun, Distinct Shadows</td>
<td>1/500</td>
<td>f/11¹</td>
</tr>
<tr>
<td>Weak, Hazy Sun, Soft Shadows</td>
<td>1/500</td>
<td>f/8</td>
</tr>
<tr>
<td>Cloudy Bright, No Shadows</td>
<td>1/500</td>
<td>f/5.6</td>
</tr>
<tr>
<td>Heavy Overcast, Open Shade²</td>
<td>1/500</td>
<td>f/4</td>
</tr>
</tbody>
</table>

¹ Use f/5.6 for backlit close-up subjects.
² Subject shaded from the sun but lighted by a large area of sky.

Existing Light

<table>
<thead>
<tr>
<th>Subject and Lighting Conditions</th>
<th>Shutter Speed</th>
<th>Lens Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Interiors at Night</td>
<td></td>
<td></td>
</tr>
<tr>
<td>—Average Light</td>
<td>1/30</td>
<td>f/2.8</td>
</tr>
<tr>
<td>—Bright Light</td>
<td>1/30</td>
<td>f/2.8</td>
</tr>
<tr>
<td>Aerial Fireworks</td>
<td>Bulb¹</td>
<td>f/4</td>
</tr>
<tr>
<td>Interiors with Bright Fluorescent Light</td>
<td>1/60²</td>
<td>f/4</td>
</tr>
<tr>
<td>Brightly Lighted Street Scenes at Night</td>
<td>1/60</td>
<td>f/2.8</td>
</tr>
<tr>
<td>Neon and Other Lighted Signs</td>
<td>1/125</td>
<td>f/2.8</td>
</tr>
<tr>
<td>Floodlighted Buildings, Fountains, Monuments</td>
<td>1/60</td>
<td>f/2</td>
</tr>
<tr>
<td>Night Football, Soccer, Baseball, Racetracks</td>
<td>1/125</td>
<td>f/2.8</td>
</tr>
<tr>
<td>Basketball, Hockey, Bowling</td>
<td>1/125</td>
<td>f/2</td>
</tr>
<tr>
<td>Stage Shows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>—Average Light</td>
<td>1/15¹</td>
<td>f/2.8</td>
</tr>
<tr>
<td>—Bright Light</td>
<td>1/15¹</td>
<td>f/2.8</td>
</tr>
<tr>
<td>Circuses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>—Floodlighted Acts</td>
<td>1/125</td>
<td>f/2.8</td>
</tr>
<tr>
<td>—Spotlighted Acts</td>
<td>1/250</td>
<td>f/2.8</td>
</tr>
<tr>
<td>Ice Shows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>—Floodlighted Acts</td>
<td>1/125</td>
<td>f/2.8</td>
</tr>
<tr>
<td>—Spotlighted Acts</td>
<td>1/250</td>
<td>f/2.8</td>
</tr>
<tr>
<td>School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>—Stage and Auditorium</td>
<td>1/30</td>
<td>f/2</td>
</tr>
</tbody>
</table>

¹ Use a tripod or other firm camera support for exposure times longer than 1/30 second.
² 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.

<table>
<thead>
<tr>
<th>Unit Output (BCPS)¹</th>
<th>Guide Number for Distances in Feet/Metres</th>
</tr>
</thead>
<tbody>
<tr>
<td>350</td>
<td>85/26</td>
</tr>
<tr>
<td>500</td>
<td>100/30</td>
</tr>
<tr>
<td>700</td>
<td>120/36</td>
</tr>
<tr>
<td>1000</td>
<td>140/42</td>
</tr>
<tr>
<td>1400</td>
<td>170/50</td>
</tr>
<tr>
<td>2000</td>
<td>200/60</td>
</tr>
<tr>
<td>2800</td>
<td>240/70</td>
</tr>
<tr>
<td>4000</td>
<td>280/85</td>
</tr>
<tr>
<td>5600</td>
<td>340/104</td>
</tr>
<tr>
<td>8000</td>
<td>400/120</td>
</tr>
</tbody>
</table>

¹ BCPS = beam candlepower seconds.
Fluorescent and High-Intensity Discharge Lights

For best results without special printing, use the color-correction filters in the table below as starting points when you expose these films under fluorescent and high-intensity discharge lamps. Use exposure times of 1/60 second or longer to avoid the brightness and color variations that occur during a single alternating-current cycle.

### Fluorescent Light Source

<table>
<thead>
<tr>
<th>Fluorescent Lamp Type</th>
<th>KODAK Color Compensating Filter(s)</th>
<th>Exposure Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Daylight&quot;</td>
<td>20R + 5M</td>
<td>+ 1 stop</td>
</tr>
<tr>
<td>White</td>
<td>50C + 30M</td>
<td>+ 1 2/3 stop</td>
</tr>
<tr>
<td>Warm White</td>
<td>40B + 50C</td>
<td>+ 2 stops</td>
</tr>
<tr>
<td>Warm White Deluxe</td>
<td>90C + 30M</td>
<td>+ 2 stops</td>
</tr>
<tr>
<td>Cool White</td>
<td>30B</td>
<td>+ 1 stop</td>
</tr>
<tr>
<td>Cool White Deluxe</td>
<td>40C + 10M</td>
<td>+ 1 stop</td>
</tr>
</tbody>
</table>

### High-Intensity Discharge Lamp Source

<table>
<thead>
<tr>
<th>High-Intensity Discharge Lamp Type</th>
<th>KODAK Color Compensating Filter(s)</th>
<th>Exposure Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Pressure Sodium Vapor (2700 K)</td>
<td>50B + 70C</td>
<td>+ 2 2/3 stops</td>
</tr>
<tr>
<td>High-Pressure Sodium Vapor (2200 K)</td>
<td>50B + 90C</td>
<td>+ 3 stops</td>
</tr>
<tr>
<td>High-Pressure Sodium Vapor (2100 K)</td>
<td>20M + 200C</td>
<td>+ 4 stops</td>
</tr>
<tr>
<td>Metal Halide (4300 K)</td>
<td>10M</td>
<td>+ 2 2/3 stop</td>
</tr>
<tr>
<td>Metal Halide (3200 K)</td>
<td>80C + 10M</td>
<td>+ 1 2/3 stops</td>
</tr>
<tr>
<td>Mercury Vapor (3700 K)</td>
<td>20B + 10C</td>
<td>+ 1 stop</td>
</tr>
</tbody>
</table>

**PROCESSING**

Process KODAK High Definition 400 Film in KODAK FLEXICOLOR Chemicals for Process C-41. For more information, see KODAK Publication No. Z-131, *Using KODAK FLEXICOLOR Chemicals*.

**JUDGING NEGATIVE EXPOSURES**

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.

### Densities of Properly Exposed and Processed Negatives:

<table>
<thead>
<tr>
<th>Area on the Negative:</th>
<th>Densities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The KODAK Gray Card¹ (gray side) receiving the same illumination as the subject</td>
<td>0.80 to 1.00</td>
</tr>
<tr>
<td>The lightest step (darkest in the negative) of a KODAK Paper Gray Scale receiving the same illumination as the subject</td>
<td>1.15 to 1.35</td>
</tr>
<tr>
<td>Normally lighted forehead of person with light complexion²</td>
<td>1.05 to 1.35</td>
</tr>
<tr>
<td>Normally lighted forehead of person with dark complexion²</td>
<td>0.90 to 1.20</td>
</tr>
</tbody>
</table>

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).

**PRINTING NEGATIVES**

This film is optimized for printing on KODAK EDGE Generations, KODAK EKTACOLOR EDGE 8, KODAK ROYAL Generations, KODAK EKTACOLOR ROYAL VIII, KODAK EKTACOLOR EDGE 9 AP, and KODAK EKTACOLOR ROYAL IX AP, and KODAK PROFESSIONAL Color Metallic Papers. The film can also be printed on KODAK EKTACOLOR EDGE 7 Paper.

Make color slides and transparencies by printing the negatives on KODAK VERICOLOR Slide Film, KODAK PROFESSIONAL ENDURA Transparency Optical Display Material, or KODAK PROFESSIONAL ENDURA Clear Optical Display Material.


RETOUCHING
Negatives on this film can be retouched on the emulsion side with retouching pencils, after applying a retouching fluid, such as KODAK Retouching Fluid.

IMAGE STRUCTURE

<table>
<thead>
<tr>
<th>Sharpness:</th>
<th>Extremely High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of</td>
<td>Extremely High</td>
</tr>
<tr>
<td>Enlargement:</td>
<td></td>
</tr>
<tr>
<td>Print Grain Index:</td>
<td>39</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Negative Size:</th>
<th>24 x 36 mm (135 size)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Size in inches:</td>
<td>4x6</td>
</tr>
<tr>
<td>Print Size in centimeters:</td>
<td>10.2x15.2</td>
</tr>
<tr>
<td>Magnification:</td>
<td>4.4X</td>
</tr>
<tr>
<td>Print Grain Index number:</td>
<td>39</td>
</tr>
</tbody>
</table>

- 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.
**Characteristic Curves**

- **Exposure:** Daylight
- **Process:** C-41
- **Densitometry:** Status M

**Spectral Sensitivity Curves**

- **Effective Exposure:** 1/50 Second
- **Process:** C-41
- **Densitometry:** Status M
- **Density:** D > D-min

**Spectral Dye Density Curves**

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

**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 at www.kodak.com.

Many publications are available online, or you can contact Kodak in your country for more information.

<table>
<thead>
<tr>
<th>For the latest version of technical support publications for KODAK Products, visit Kodak on-line at:</th>
<th><a href="http://www.kodak.com">http://www.kodak.com</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>If you have questions about KODAK Products, call Kodak. In the U.S.A.:</td>
<td>1-800-242-2424, Monday–Friday 9 a.m.–7 p.m. (Eastern time)</td>
</tr>
<tr>
<td>In Canada:</td>
<td>1-800-465-6325, Monday–Friday 8 a.m.–5 p.m. (Eastern time)</td>
</tr>
</tbody>
</table>

Note: The Kodak materials described in this publication for use with KODAK High Definition 400 Film are available from dealers who supply Kodak products. You can use other materials, but you may not obtain similar results.