

# KODAK T-MAX Professional Films



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### KODAK T-MAX P3200 PROFESSIONAL FILM

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**KODAK T-MAX 100 Professional Film** is a continuous-tone panchromatic black-and-white negative film for general outdoor and indoor photography. It is especially useful for detailed subjects when you need maximum image quality. It is also excellent for copying black-and-white photographs, for making black-and-white copies from color transparencies, and for photomicrography. This film features medium speed (ISO 100/21° in most developers), extremely high sharpness, extremely fine grain, and very high resolving power. It allows a very high degree of enlargement.

You can also use T-MAX 100 Professional Film to produce high-quality black-and-white slides from camera-original exposures, continuous-tone photographs, drawings, artwork, and radiographs when you process it with the KODAK T-MAX 100 Direct Positive Film Developing Outfit. The T-MAX Outfit also lets you use this film to produce copy negatives from black-and-white or color negatives, to make duplicate black-and-white slides, or to make black-and-white slides from color slides.

**KODAK T-MAX 400 Professional Film** is a continuous-tone panchromatic black-and-white negative film especially useful for photographing dimly lighted subjects or fast action, for extending flash distance range, and for photographing subjects that require good depth of field and fast shutter speeds with maximum image quality for the film speed. It is also useful for scientific and biomedical work, especially when fluorescence photography is required. It has high speed (ISO 400/27° in most developers), very high sharpness, extremely fine grain, and high resolving power; it allows a high degree of enlargement.

**KODAK T-MAX P3200 Professional Film** is a multi-speed continuous-tone panchromatic black-and-white negative film that combines high to ultra-high film speeds with finer grain than that of other fast black-and-white films. It is especially useful for very fast action; for dimly lighted scenes where you can't use flash; for subjects that require good depth of field combined with fast shutter speeds; and for handholding telephoto lenses for fast action or in dim light. It is an excellent choice for indoor or nighttime sports events and available-light press photography, as well as law-enforcement and general surveillance applications that require exposure indexes of 3200 to 25,000.

## KODAK T-MAX 100, 400, AND P3200 PROFESSIONAL FILMS

FEATURES	BENEFITS
<ul style="list-style-type: none"> <li>• KODAK T-GRAIN® Emulsion that reshapes pebble-like crystals into a tabular form with more surface to catch light</li> </ul>	<ul style="list-style-type: none"> <li>• Allows films with extremely fine grain to be made faster; high-speed films have finer grain. T-MAX Professional Films offer the best of both worlds: high speed and fine grain.</li> </ul>
<ul style="list-style-type: none"> <li>• Improved sharpness</li> </ul>	<ul style="list-style-type: none"> <li>• Maintains subject detail in prints at higher degrees of magnification than conventional films.</li> </ul>
<ul style="list-style-type: none"> <li>• Expanded exposure latitude</li> </ul>	<ul style="list-style-type: none"> <li>• Greater “forgiveness” with overexposure errors; quality prints from moderately under- or overexposed negatives.</li> <li>• Better highlight separation.</li> </ul>
<ul style="list-style-type: none"> <li>• Improved reciprocity at long and short exposure times</li> </ul>	<ul style="list-style-type: none"> <li>• Less compensation required than with conventional films.</li> </ul>
<ul style="list-style-type: none"> <li>• 120-size film coated on a thicker (4.7-mil) base than other black-and-white roll films</li> </ul>	<ul style="list-style-type: none"> <li>• Improved dimensional stability; easier darkroom handling.</li> </ul>
<ul style="list-style-type: none"> <li>• Virtually no difference between the daylight and tungsten film speeds</li> </ul>	<ul style="list-style-type: none"> <li>• No need to adjust exposure for different light sources.</li> </ul>
<ul style="list-style-type: none"> <li>• More responsive to zone-system development changes</li> </ul>	<ul style="list-style-type: none"> <li>• Smaller time adjustments needed.</li> </ul>
<ul style="list-style-type: none"> <li>• No increase in processing time required for one-stop “push” with most developers</li> </ul>	<ul style="list-style-type: none"> <li>• No need to segregate one-stop-pushed film from normally exposed film. You can mix normal exposures and one-stop-pushed exposures on the same roll. (You may want to use paper one-half grade higher in contrast to print one-stop-pushed exposures.)</li> </ul>

FEATURES	BENEFITS
<ul style="list-style-type: none"> <li>• Less development-time increase required for film pushed by two or more stops</li> </ul>	<ul style="list-style-type: none"> <li>• Saves processing time.</li> </ul>
<ul style="list-style-type: none"> <li>• Processed in standard developers, including KODAK T-MAX Developer and KODAK T-MAX RS Developer and Replenisher</li> </ul>	<ul style="list-style-type: none"> <li>• No need for a special developer. You can process T-MAX Professional Films with other black-and-white films.</li> </ul>
<ul style="list-style-type: none"> <li>• T-MAX 100 Professional Film—excellent for use in copy applications with normal exposure and processing</li> </ul>	<ul style="list-style-type: none"> <li>• No need for contrast adjustment or special processing.</li> </ul>
<ul style="list-style-type: none"> <li>• T-MAX 100 Professional Film—high-quality black-and-white slides with processing in the T-MAX 100 Direct Positive Film Developing Outfit</li> </ul>	<ul style="list-style-type: none"> <li>• Reversal applications with shorter processing times.</li> </ul>
<ul style="list-style-type: none"> <li>• T-MAX 400 Professional Film—a versatile film for all-around use</li> </ul>	<ul style="list-style-type: none"> <li>• Excellent for use under lighting conditions from bright sunlight to dim existing light.</li> </ul>
<ul style="list-style-type: none"> <li>• T-MAX P3200 Professional Film—speeds ranging from high to ultra high</li> </ul>	<ul style="list-style-type: none"> <li>• Allows photography in situations where it was previously impossible.</li> </ul>

# KODAK T-MAX 100 and 400 Professional Films

## DARKROOM RECOMMENDATIONS

Do not use a safelight. Handle unprocessed film in total darkness. *Do not* develop these films by inspection.

**Note:** The afterglow from fluorescent lights may fog these films. Make sure your darkroom is *completely* dark before you handle unprocessed film.

## STORAGE AND HANDLING

Store unexposed film at 75°F (24°C) or lower in the original sealed package. For protection from heat in areas with temperatures consistently higher than 75°F (24°C), you can store the film in a refrigerator. If film has been refrigerated, allow the package to warm up to room temperature for 2 to 3 hours before opening it.

Load and unload roll-film cameras in subdued light, and rewind the film completely before unloading the camera. Total darkness is required when you remove film from the magazine or load and unload film holders.

For best results, process the film promptly after exposure. Store processed film in a cool, dry place.

## EXPOSURE

The nominal speed of KODAK T-MAX 100 Professional Film is EI 100. It was determined in a manner published in ISO standards. Exposing the film at EI 100 should usually lead to the minimum exposure required to produce negatives of very high quality. (See the table at the right.) This film has good latitude and responds well to changes in development time. For consistent results, use the rated speed or make tests to determine a speed rating that meets your needs. For information on methods of determining your best exposure and developer combination, see KODAK Publication No. F-5, *KODAK Professional Black-and-White Films*.

When you use T-MAX 100 Film for reversal applications, expose it at EI 50. For more information on reversal processing, see KODAK Publication No. J-87, *KODAK T-MAX 100 Direct Positive Film Developing Outfit*.

The nominal speed of KODAK T-MAX 400 Professional Film is EI 400. It was determined in a manner published in ISO standards. Because of its great latitude, you can underexpose this film by one stop (at EI 800) and still obtain high quality with normal development in most developers. There will be no change in the grain in the final print, but there will be a slight loss of shadow detail and a reduction in printing contrast of about one-half paper grade.

When you need very high speed, you can expose T-MAX 400 Film at EI 1600 and increase the development time. With the longer development time, there will be an increase in contrast and graininess with additional loss of shadow detail, but negatives will still produce good prints. You can even expose this film at EI 3200 with a longer development time. Underexposing by three stops and using three-stop push-processing produces a further increase in contrast and

graininess, and additional loss of shadow detail, but the results will be acceptable for some applications.

The speed numbers for these films are expressed as Exposure Indexes (EI). Use these exposure indexes with meters or cameras marked for ISO/ASA or ISO°/DIN speeds in daylight or artificial light.

The developer you use to process these films affects the exposure index. Set your camera or meter (marked for ISO/ASA or ISO°/DIN speeds) at the speed for your developer given in the table.

Exposure Index (EI) / ISO		
KODAK Developer or Developer and Replenisher	T-MAX 100 Professional Film	T-MAX 400 Professional Film
<b>T-MAX</b>	<b>100/21°</b>	<b>400/27°</b>
<b>T-MAX RS</b>	<b>100/21°</b>	<b>400/27°</b>
<b>XTOL</b>	<b>100/21°</b>	<b>400/27°</b>
<b>D-76</b>	<b>100/21°</b>	<b>400/27°</b>
<b>D-76 (1:1)</b>	<b>100/21°</b>	<b>400/27°</b>
HC-110 (Dil B)	100/21°	320/26°
MICRODOL-X	50/18°	200/24°
MICRODOL-X (1:3)	100/21°	320/26°
<b>DURAFLO RT</b>	<b>80/20°</b>	<b>400/27°</b>

**Note:** The developers and exposure indexes in bold type are the primary recommendations.

Under most conditions, you'll obtain highest quality with normal exposure at the rated exposure index and normal development. For high-contrast scenes, you'll obtain highest quality if you increase exposure by one or two stops and process the film normally.

If normal development produces negatives that are consistently too low in contrast, increase the development time slightly (10 to 15 percent). If negatives are too contrasty, decrease the development time slightly (10 to 15 percent). See "Adjusting Film Contrast."

If your negatives are too thin, increase exposure by using a lower exposure index; if too dense, reduce exposure by using a higher exposure index.

Pushing Exposure* with KODAK T-MAX Developer and KODAK T-MAX RS Developer and Replenisher			
KODAK Film	1-Stop Push	2-Stop Push	3-Stop Push†
T-MAX 100 Professional	EI 200/ 24°Normal Processing	EI 400/27° 2-Stop Push Processing	EI 800/30° 3-Stop Push Processing
T-MAX 400 Professional	EI 800/30° Normal Processing	EI 1600/33° 2-Stop Push Processing	EI 3200/36° 3-Stop Push Processing

\* Pushing exposure results in slight losses of quality compared with normal exposure and normal processing. You can also use other Kodak developers for pushing these films; however, T-MAX Developer and T-MAX RS Developer and Replenisher produce higher-quality tone reproduction (better shadow detail) under these conditions. For high-contrast scenes, such as spotlighted performers under harsh lighting, expose and process as indicated in the table. However, when detail in the deep-shadow areas is important to the scene, increase exposure by 2 stops and process your film normally.

† Pushing exposure and processing by 3 stops increases contrast and graininess and decreases shadow detail further. Expose and process a test roll to determine if the results are acceptable for your needs.

**Note:** See "Processing" for processing times.

## Adjustments for Long and Short Exposures

At the exposure times in the table below, compensate for the reciprocity characteristics of these films by increasing the exposure as shown.

Adjustments for Long and Short Exposures						
If Indicated Exposure Time Is (seconds)	KODAK T-MAX 100 Professional Film			KODAK T-MAX 400 Professional Film		
	Use This Lens-Aperture Adjustment	OR	This Adjusted Exposure Time (seconds)	Use This Lens-Aperture Adjustment	OR	This Adjusted Exposure Time (seconds)
1/10,000	+ $\frac{1}{3}$ stop		Change Aperture	None		None
1/1000	None		None	None		None
1/100	None		None	None		None
1/10	None		None	None		None
1	+ $\frac{1}{3}$ stop		Change Aperture	+ $\frac{1}{3}$ stop		Change Aperture
10	+ $\frac{1}{2}$ stop		15	+ $\frac{1}{2}$ stop		15
100	+1 stop		200	+1 $\frac{1}{2}$ stops		300

## Filter Corrections

The filter corrections for T-MAX 100 and T-MAX 400 Professional Films are the same.

Increase exposure by the filter factor or the number of stops indicated when you use filters. For greatest exposure accuracy with a through-the-lens meter, take the meter reading without the filter over the lens, and then increase your exposure as shown in the table.

Filter Corrections						
KODAK T-MAX 100 and 400 Professional Films						
KODAK WRATTEN Gelatin Filter	Daylight			Tungsten		
	Increase Lens Aperture By (f-stops)	OR	Increase Exposure By (filter factor)	Increase Lens Aperture By (f-stops)	OR	Increase Exposure By (filter factor)
No. 8 (yellow)	$\frac{2}{3}$		1.5	$\frac{1}{3}$		1.2
No. 11 (yellowish green)	1 $\frac{2}{3}$		3	1 $\frac{2}{3}$		3
No. 12 (deep yellow)	1		2	$\frac{1}{3}$		1.2
No. 15 (deep yellow)	1		2	$\frac{2}{3}$		1.5
No. 25 (red)	3		8	2		4
No. 47 (blue)	3		8	4 $\frac{2}{3}$		25
No. 58 (green)	2 $\frac{2}{3}$		6	2 $\frac{2}{3}$		6
Polarizing Filter	1 $\frac{1}{3}$		2.5	1 $\frac{1}{3}$		2.5

**Note:** Filter factors for other black-and-white professional films are different.

## PROCESSING

Handle unprocessed film in total darkness.

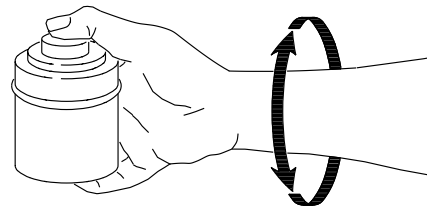
These starting-point recommendations are intended to produce negatives with a contrast appropriate for printing with a diffusion enlarger. To print negatives with a condenser enlarger, you may need to adjust the contrast by reducing your development time; see "Adjusting Film Contrast." Tank development times shorter than 5 minutes may produce nonuniformity.

# MANUAL PROCESSING

## Small-Tank Processing (8- or 16-ounce tank)—Rolls

With small single- or double-reel tanks, drop the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank on the top of the work surface to dislodge any air bubbles. Provide initial agitation of 5 to 7 inversion cycles in 5 seconds, i.e., extend your arm and vigorously twist your wrist 180 degrees.

Then repeat this agitation procedure at 30-second intervals for the rest of the development time.



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Small-Tank Processing (8- or 16-ounce tank)—Rolls											
KODAK Developer or Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film					
	Development Time in Minutes					Development Time in Minutes					
	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	
T-MAX (1:4)*	NR	8	7 1/2	7	6 1/2	NR	7	6 1/2	6 1/2	6	
T-MAX (1:7)†	—	—	—	—	10	—	—	—	—	10	
T-MAX (1:9)†	—	—	—	—	14	—	—	—	—	15	
T-MAX RS*	NR	8	7	7	6	NR	7	6	6	5	
T-MAX RS (1:7)†	—	—	—	—	8	—	—	—	—	7	
T-MAX RS (1:9)†	—	—	—	—	12	—	—	—	—	13	
XTOL	8	6 3/4	6	5 1/2	4 1/2‡	7 1/2	6 1/2	5 3/4	5 1/4	4 1/2‡	
XTOL (1:1)†	Size 135:	—	9 1/4	8 1/2	8	7	—	8 3/4	8	7 1/2	7
	Size 120:	—	10	9	8	6 3/4	—	9 1/4	8 1/2	8	7
XTOL (1:2)†§	Size 135:	—	12 1/2	11 1/2	10 3/4	9 1/2	—	10 1/2	10	9 1/2	8 1/2
	Size 120:	—	13	12	11 1/4	10	—	12 1/2	11 1/2	10 1/2	9
XTOL (1:3)†§	Size 135:	—	16	15	14	12 1/2	—	13 1/2	13	12 1/4	11
	Size 120:	—	16 3/4	15 1/2	14 1/2	12 3/4	—	15 1/2	14	12 3/4	11
D-76	10 1/2	9	8	7	6	9	8	7	6 1/2	5 1/2	
D-76 (1:1)	14 1/2	12	11	10	8 1/2	14 1/2	12 1/2	11	10	9	
HC-110 (Dil B)	8	7	6 1/2	6	5	6 1/2	6	5 1/2	5	4 1/2‡	
MICRODOL-X	16	13 1/2	12	10 1/2	8 1/2	12	10 1/2	9	8 1/2	7 1/2	
MICRODOL-X (1:3)	NR	NR	20	18 1/2	16	NR	NR	20	18 1/2	16	

\* The recommended standard dilution is 1:4.

† We do not recommend using more dilute solutions of these developers than indicated in the table. Dilute developers require longer development times; they give slightly higher film speed and a slight increase in graininess.

‡ Development times shorter than 5 minutes may produce unsatisfactory uniformity.

§ For recommended minimum volumes of diluted KODAK XTOL Developer, see "Capacity" in KODAK XTOL Developer, KODAK Publication No. J-109.

NR = Not recommended

**Note:** The development times in the table are suggested starting points.

## MANUAL PROCESSING

### Large-Tank Processing (1/2- to 3 1/2-gallon tank)—Rolls and Sheets

Agitate continuously for the first 15 to 30 seconds by raising and lowering the basket, rack, or spindle 1/2 inch. *Do not* agitate the basket, rack, or spindle for the remainder of the first minute. Then agitate once per minute by lifting the basket, rack, or spindle out of the developer, tilting it approximately 30 degrees, draining it for 5 to 10 seconds, and reimmersing it. Alternate the direction of tilting the basket, rack, or spindle.

Large-Tank Processing (1/2- to 3 1/2-gallon tank)—Rolls											
KODAK Developer or Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film					
	Development Time in Minutes					Development Time in Minutes					
	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	
T-MAX	NR	8	7 1/2	7	6 1/2	NR	7	6 1/2	6 1/2	6	
T-MAX RS	NR	10	9	8	7 1/2	NR	8 1/2	8	7 1/2	7	
XTOL*	Size 135:	11 1/2	9 1/2	8 1/2	7 1/2	6 1/4	9	7 3/4	7	6 1/2	5 1/2
	Size 120:	11	8 1/4	7 1/2	6 3/4	5 1/2	9 1/4	7 3/4	6 3/4	6 1/4	5 1/4
D-76	11 1/2	10	9	8	6 1/2	10	9	8	7 1/2	6 1/2	
HC-110 (Dil B)	8 1/2	7 1/2	7	6 1/2	5 1/2	8	7	6 1/2	6	5	
MICRODOL-X	16	13 1/2	12	11	9	13	11 1/2	10	9	8	

\* For more information on using KODAK XTOL Developer in replenished systems, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** The development times in the table are suggested starting points.

Large-Tank Processing (1/2- to 3 1/2-gallon tank)—Sheets*										
KODAK Developer or Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film				
	Development Time in Minutes					Development Time in Minutes				
	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)
T-MAX RS	NR	12	11	9 1/2	8	NR	10	8	7 1/2	6
XTOL†	10 3/4	9	8	7 1/4	6 1/4	10	8 1/2	7 1/4	6 3/4	5 3/4
D-76	11 1/2	9 1/2	8 1/2	7 1/2	7	11	10	9	8	7
HC-110 (Dil B)	11 1/2	9 1/2	8 1/2	7 1/2	7	10	8 1/2	7 1/2	7	6 1/2

\* Do not use KODAK T-MAX Developer to process sheet films.

† For more information on using KODAK XTOL Developer in replenished systems, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** The development times in the table are suggested starting points.

## MANUAL PROCESSING

### Tray Processing—Sheets

Provide continuous agitation; rotate the sheets 90 degrees as you interleave them. Prewetting sheet film may improve tray process uniformity.

Tray Processing—Sheets										
KODAK Developer or Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film				
	Development Time in Minutes					Development time in Minutes				
	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)
T-MAX RS	NR	11	10	9	8	NR	8	7 ½	7	6
XTOL*	8 ½	7 ¼	6 ½	6	5	8 ½	7 ¼	6 ¼	5 ¾	5
D-76	9 ½	7	6 ½	5 ½	5	9 ½	7	6 ½	6	5 ½
HC-110 (Dil B)	8 ½	7 ½	7	6 ½	5 ½	9	7 ½	7	6 ½	6

\* For instructions on using 1:1, 1:2, and 1:3 dilutions of KODAK XTOL Developer in trays, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** The development times in the table are suggested starting points.

## MANUAL PROCESSING

### Push Processing

#### Small-Tank Processing (8- or 16-ounce tank)—Rolls

Use the agitation procedure described under “Small-Tank Processing.”

Small-Tank Processing (8- or 16-ounce tank)—Rolls											
KODAK Developer or Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film					
	Development Time in Minutes					Development Time in Minutes					
	EI 200		EI 400		EI 800	EI 800		EI 1600		EI 3200	
	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	75°F (24°C)	
T-MAX	8	6 ½	12	9	10 ½	7	6	10	8	9 ½	
T-MAX RS	8	6	12	9	11 ½	7	5	10	7	9 ½	
XTOL*	Size 135:	7 ¾	5 ¼	9	6 ¼	7 ¼	7 ¼	5	8 ½	6	6 ¾
	Size 120:	7 ¾	5 ¼	9	6	7 ¼	7 ¼	5 ¼	8 ½	6	7
D-76	9	6	11	7 ½	NR	8	5 ½	10 ½	7	NR	
HC-110 (Dil B)	7	5	9 ½	6 ½	NR	6	4 ½†	8 ½	6	NR	

\* For instructions on using 1:1, 1:2, and 1:3 dilutions of KODAK XTOL Developer in a small tank, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

† Development times shorter than 5 minutes may produce unsatisfactory uniformity.

NR = Not recommended

**Note:** The development times in the table are suggested starting points.

# MANUAL PROCESSING

## Push Processing

### Large-Tank Processing (1/2- to 3 1/2-gallon tank)— Rolls and Sheets

Use the agitation procedure described under “Large-Tank Processing.”

Large-Tank Processing (1/2- to 3 1/2-gallon tank)—Rolls											
KODAK Developer or Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film					
	Development Time in Minutes					Development Time in Minutes					
	EI 200		EI 400			EI 800		EI 1600		EI 3200	
	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)
T-MAX RS	10	7 1/2	NR	11 1/2		8 1/2	7	12	9	NR	12
XTOL*	Size 135:	11 1/4	7 1/2	13	8 3/4	9	6	10	7	11 1/2	8
	Size 120:	9 1/2	6 1/4	10 3/4	7 1/4	8 1/2	6	10	6 3/4	11 1/4	7 3/4

\* For more information on using KODAK XTOL Developer in replenished systems, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** The development times in the table are suggested starting points.

Large-Tank Processing (1/2- to 3 1/2-gallon tank)—Sheets										
KODAK Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film				
	Development Time in Minutes					Development Time in Minutes				
	EI 200			EI 400		EI 800			EI 1600	
	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	75°F (24°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	75°F (24°C)
T-MAX RS	12	11	9 1/2	8	12	10	8	7 1/2	6	9
XTOL*	10 1/4	9	8 1/4	7 1/4	8 1/2	9 1/2	8 1/4	7 1/2	6 1/2	7 3/4

\* For more information on using KODAK XTOL Developer in replenished systems, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** The development times in the table are suggested starting points.



## ROTARY-TUBE PROCESSING

### Rotary-Tube Processing—Rolls and Sheets

Follow the agitation recommendations for your processor.

Use T-MAX Developer for *roll films only*.

Rotary-Tube Processing—Rolls									
KODAK Developer or Developer and Replenisher		KODAK T-MAX 100 Professional Film				KODAK T-MAX 400 Professional Film			
		Development Time in Minutes				Development Time in Minutes			
		68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)
T-MAX (1:4)*		6 ½	6 ½	6	5 ½	6 ½	6 ½	6	5 ½
T-MAX (1:7)†		—	—	—	10	—	—	—	10
T-MAX (1:9)†		—	—	—	11 ½	—	—	—	11
T-MAX (1:15)†		—	—	—	13	—	—	—	14
T-MAX RS*		7	6 ½	6	5	6 ½	6	5 ½	5 ½
T-MAX RS (1:7)†		—	—	—	8 ½	—	—	—	7 ½
T-MAX RS (1:9)†		—	—	—	10	—	—	—	8 ½
XTOL	Size 135:	6	5 ¼	4 ¾	4	5 ½	5	4 ½	4
	Size 120:	5 ¾	5	4 ½	3 ¾	5 ¼	4 ¾	4 ¼	3 ¾
XTOL (1:1)†	Size 135:	8 ¾	8	7 ¼	6 ¼	7 ¾	7	6 ½	5 ½
	Size 120:	7 ¾	7 ½	7 ¼	6 ¾	7	6 ½	6	5 ¼
XTOL (1:2)†	Size 135:	12	11	10	8 ½	9 ½	9	8 ½	7 ½
	Size 120:	10	9 ½	9	8 ½	9	8 ½	8	7 ¼
XTOL (1:3)†	Size 135:	15 ½	14 ½	13 ¼	11 ½	12	11 ½	10 ½	9 ¼
	Size 120:	13	12 ½	12	11 ½	11 ¾	11	10 ¼	9
D-76		6 ½	6	5 ½	5	7	6 ½	6	5 ½
HC-110 (Dil B)		6 ½	6	5 ½	4 ½	6	5 ½	5	5

Rotary-Tube Processing—Sheets									
KODAK Developer or Developer and Replenisher		KODAK T-MAX 100 Professional Film				KODAK T-MAX 400 Professional Film			
		Development Time in Minutes				Development Time in Minutes			
		68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)
T-MAX RS*		7	6 ½	6	5	6 ½	6	5 ½	5 ½
T-MAX RS (1:7)†		—	—	—	8 ½	—	—	—	7 ½
T-MAX RS (1:9)†		—	—	—	10	—	—	—	8 ½
XTOL		6 ¼	5 ½	5	4 ¼	6 ¼	5 ½	5	4
XTOL (1:1)†		7 ¾	7 ½	7 ¼	6 ¾	8 ¼	7 ¼	6 ¾	5 ¾
XTOL (1:2)†		10 ½	10	9 ½	9	10 ½	9 ½	8 ¾	7 ½
XTOL (1:3)†		13 ¾	13	12 ½	11 ½	14	12 ½	11 ¼	9 ¾
D-76		6 ½	6	5 ½	5	7	6 ½	6	5 ½
HC-110 (Dil B)		6 ½	6	5 ½	4 ½	6	5 ½	5	5

\* The recommended standard dilution is 1:4.

† We do not recommend using more dilute solutions of these developers than indicated in the table. Dilute developers require longer development times; they give slightly higher film speed and a slight increase in graininess.

**Note:** The development times in the tables are suggested starting points.

# ROTARY-TUBE PROCESSING

## Push Processing

### Rotary-Tube Processors—Rolls and Sheets

Follow the agitation recommendations for your processor.

Push Processing—Rotary-Tube—Rolls											
KODAK Developer or Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film					
	Development Time in Minutes					Development Time in Minutes					
	EI 200		EI 400		EI 800	EI 800		EI 1600		EI 3200	
	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	75°F (24°C)	
T-MAX	6 ½	5 ½	10 ½	9	12 ½	6 ½	5 ½	8 ½	7	9 ½	
T-MAX RS	7	5	12	8	12	6 ½	5	10	8	12	
XTOL*	Size 135:	7	4 ½	8	5 ½	6 ½	6 ½	4 ½	7 ½	5	5 ¾
	Size 120:	6 ¾	4 ¼	8 ¼	5	6	6 ¼	4 ¼	7 ¼	5	5 ¾
D-76	6 ½	5	9	7	NR	7	5 ½	9	7	NR	
HC-110 (Dil B)	6 ½	4 ½	11	8	NR	6	5	8 ½	7	NR	

Push Processing—Rotary-Tube—Sheets										
KODAK Developer or Developer and Replenisher	KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film				
	Development Time in Minutes					Development Time in Minutes				
	EI 200		EI 400		EI 800	EI 800		EI 1600		EI 3200
	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	68°F (20°C)	75°F (24°C)	75°F (24°C)
T-MAX RS	7	5	12	8	12	6 ½	5 ½	10	8	12
XTOL*	7 ¼	5	8 ¼	5 ¾	6 ¾	7	4 ½	8	5 ¼	6
D-76	6 ½	5	9	7	NR	7	5 ½	9	7	NR
HC-110 (Dil B)	6 ½	4 ½	11	8	NR	6	5	8 ½	7	NR

\* For instructions on push processing with 1:1, 1:2, and 1:3 dilutions of KODAK XTOL Developer in a rotary-tube processor, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** The development times in the tables are suggested starting points.

## FINAL STEPS IN TANK, TRAY, AND ROTARY-TUBE PROCESSING

**Rinse** at 65 to 75°F (18 to 24°C) with agitation in KODAK Indicator Stop Bath or running water for 30 seconds.

**Fix** at 65 to 75°F (18 to 24°C) for 3 to 5 minutes with vigorous agitation in KODAK Rapid Fixer. Be sure to agitate the film frequently during fixing.

**Note:** To keep fixing times as short as possible, we strongly recommend using KODAK Rapid Fixer. If you use another fixer, such as KODAK Fixer or KODAFIX Solution, fix for 5 to 10 minutes or twice the time it takes for the film to clear. You can check the film for clearing after 3 minutes in KODAK Rapid Fixer or 5 minutes in KODAK Fixer or KODAFIX Solution.

**Important:** Your fixer will be exhausted more rapidly with these films than with other films. If your negatives show a magenta (pink) stain after fixing, your fixer may be near exhaustion, or you may not have used a long enough time. If the stain is slight, it will not affect image stability, negative contrast, or printing times. You can remove a slight pink stain with KODAK Hypo Clearing Agent. However, if the stain is pronounced and irregular over the film surface, refix the film in fresh fixer.

**Wash** for 20 to 30 minutes in running water at 65 to 75°F (18 to 24°C) with a flow rate that provides at least one complete change of water in 5 minutes. You can wash long rolls on the processing reel. To save time and conserve water, use KODAK Hypo Clearing Agent.

**Dry** film in a dust-free place. To minimize drying marks, treat the film with KODAK PHOTO-FLO Solution after washing, or wipe the surface carefully with a KODAK Photo Chamois or a soft viscose sponge.

## MACHINE PROCESSING

### Roller-Transport Processors

#### KODAK VERSAMAT Film Processors

You can process these films in roller-transport processors, such as the KODAK VERSAMAT Film Processor, Model 5, 11, or 411, with KODAK DURAFLO RT Developer Starter, KODAK DURAFLO RT Developer Replenisher, and KODAK Rapid Fixer.

Processing Steps and Conditions for KODAK VERSAMAT Film Processors				
KODAK T-MAX 100 and 400 Professional Films				
Step	No. of Racks	Path Length		Temperature
		Model 11	Models 5 and 411	
Develop	2	8.5 ft (2.6 m)	4 ft (1.2 m)	80 ± 0.5°F (26.5 ± 0.3°C)
Fix	3	12 ft (3.8 m)	6 ft (1.9 m)	80°F (26.5°C) nominal
Wash	2	8 ft (2.4 m)	4 ft (1.2 m)	70 to 75°F (21 to 24°C)
Dry		8 ft (2.4 m)	4 ft (1.2 m)	105 to 140°F (40.5 to 60°C)

The recommended machine speeds for processing KODAK T-MAX 100 and 400 Professional Films are as follows:

KODAK VERSAMAT Film Processor, Models 5 and 411	2.6 ft (0.8 m)/minute
KODAK VERSAMAT Film Processor, Model 11	5.5 ft (1.7 m)/minute

You may need to use higher dryer temperatures (135 to 140°F [57 to 60°C]) to dry several sheet films processed in succession. If you are processing only roll films, a lower temperature will be adequate.

#### Processing Conditions for Other Roller-Transport Processors

Adjust the machine speed so that the development time for normally exposed film is approximately 85 seconds. The development time is measured from the time the film enters the developer to the time it enters the fixer. Differences in machine design that affect agitation and crossover times from one tank to the next may require development-time adjustments.

#### Replenishment Rates

**Developer**—Because most film loads will consist of a variety of film types, use an average replenishment rate of 0.20 mL per square inch of film processed.

**Fixer**—Use 0.55 mL per square inch or 1.5 times your current fixer replenishment rate.

**Important:** T-MAX Films require a higher-than-normal fixer replenishment rate.

## MACHINE PROCESSING

### Large-Tank Rack-and-Tank Processors

To prepare a normal working solution or replenisher solution of KODAK T-MAX RS Developer and Replenisher, dilute Part A with water to one-half the total volume (½ or 5 gallons, depending on the package size). While stirring, add Part B. Add water to bring the solution to the total volume (1 or 10 gallons, depending on the package size). Use this solution as the normal working solution or replenisher.

The development times for large-tank rack-and-tank processors are based on a machine speed that transfers the film every 2 minutes. The times given below are starting-point recommendations for T-MAX RS Developer and Replenisher. Make tests to determine if results are acceptable for your needs.

Large-Tank Rack-and-Tank Processing with KODAK T-MAX RS Developer and Replenisher*		
KODAK Film	EI	Development Time† in Minutes at 72°F (22°C)
T-MAX 100	100/21° 200/24°	6 to 8
T-MAX 400	400/27° 800/30°	

\* For information on using KODAK XTOL Developer or KODAK Developer D-76, see *KODAK XTOL Developer*, KODAK Publication No. J-109, or *KODAK Developer D-76*, KODAK Publication No. J-78.

† Development time depends on agitation and tank size.

### Replenishment Rates

**Developer**—Add 45 mL (1.5 ounces) of replenisher solution for each 135-36 or 120 roll or 8 x 10-inch sheet of film processed. Stir or recirculate the solution after each addition of replenisher solution.

**Note:** Do not use T-MAX RS Developer and Replenisher to replenish T-MAX Developer. They are not designed to work together.

## MACHINE PROCESSING

### Push Processing

#### Roller-Transport Processors

To process pushed T-MAX 100 or 400 Film in a machine with DURAFLO RT Developer, use a normal machine process with the machine speed shown in the appropriate table below.

KODAK Film	EI	Machine Speed
<b>KODAK VERSAMAT Film Processor, Models 5 and 411</b>		
T-MAX 100	200/24°	2.6 ft (0.8 m)/min (normal)
T-MAX 400	800/30°	
T-MAX 100	400/27°	2.2 ft (0.7 m)/min
T-MAX 400	1600/33°	
<b>KODAK VERSAMAT Film Processor, Model 11</b>		
T-MAX 100	200/24°	5.5 ft (1.7 m)/min (normal)
T-MAX 400	800/30°	
T-MAX 100	400/27°	4.5 ft (1.4 m)/min
T-MAX 400	1600/33°	

#### Other Roller-Transport Processors

KODAK Film	EI	Development Time at 80°F (26.5°C)
T-MAX 100	200/24°	85 seconds (normal)
T-MAX 400	800/30°	
T-MAX 100	400/27°	115 seconds
T-MAX 400	1600/33°	

## MACHINE PROCESSING

### Push Processing

#### Large-Tank Rack-and-Tank Processors

The development times for these processors are based on a machine speed that transfers the film every 2 minutes. The times given below are starting-point recommendations for KODAK T-MAX RS Developer and Replenisher. Make tests to determine if results are acceptable for your needs.

Push Processing—Large-Tank Rack-and-Tank Processing with KODAK T-MAX RS Developer and Replenisher*		
KODAK Film	EI	Development Time† in Minutes at 72°F (22°C)
T-MAX 100	200/24°	6 to 8
T-MAX 400	800/30°	
T-MAX 100	400/27°	8 to 10
T-MAX 400	1600/33°	

\* For information on using KODAK XTOL Developer or KODAK Developer D-76, see *KODAK XTOL Developer*, KODAK Publication No. J-109, or *KODAK Developer D-76*, KODAK Publication No. J-78.

† Development time depends on agitation and tank size.

## ADJUSTING FILM CONTRAST

If you want to increase or decrease film contrast from its normal value, you can adjust your standard development time. Your standard development time is the time that produces normal negative contrast based on your processing equipment and conditions, agitation, and processing technique.

The table below provides adjustment factors for several developers. The factors are based on a developer temperature of 75°F (24°C) for KODAK T-MAX Developers and a temperature of 68°F (20°C) for the others. The “standard” for each developer is indicated by **1.0**. To increase or decrease film contrast or to use a different developer temperature, find the adjustment factor in the table. Multiply the standard development time by this factor to find the development time to use for a different contrast or developer temperature (or both).

For detailed processing instructions for KODAK XTOL Developer, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

**Note:** These tables apply to negatives you will print with a diffusion enlarger. If you use a condenser enlarger, shift your selection one column to the left.

Development-Time Adjustment Factors				
Temperature	20% Less Contrast	Normal Contrast	20% More Contrast	40% More Contrast
<b>KODAK T-MAX Developer and T-MAX RS Developer and Replenisher</b>				
68°F (20°C)	0.9*	1.2	1.4	NR
72°F (22°C)	0.8*	1.1	1.3	1.7
75°F (24°C)	0.7*	<b>1.0</b>	1.2	1.5
<b>KODAK Developer D-76 and MICRODOL-X Developer</b>				
65°F (18°C)	1.0*	1.2	1.4	1.6
68°F (20°C)	0.8*	<b>1.0</b>	1.2	1.4
70°F (21°C)	0.7*	0.9	1.1	1.3
72°F (22°C)	0.7*	0.8	1.0	1.2
75°F (24°C)	0.6*	0.7	0.9	1.0
<b>KODAK HC-110 Developer (Dil B)</b>				
65°F (18°C)	0.7*	1.2	1.6	2.1
68°F (20°C)	0.6*	<b>1.0</b>	1.4	1.8
70°F (21°C)	0.6*	0.9	1.3	1.6
72°F (22°C)	0.5*	0.8	1.2	1.5
75°F (24°C)	0.4*	0.7	1.0	1.3
<b>KODAK MICRODOL-X Developer (1:3)</b>				
75°F (24°C)	0.8*	<b>1.0</b>	1.3	1.5

\* If you select one of these factors, increase camera exposure by one stop.

NR = Not recommended

## RETOUCHING

You can retouch KODAK T-MAX Professional Film in 120 and sheet sizes by applying liquid dyes to the base or emulsion side. You can also use retouching pencil on the base side after applying KODAK Retouching Fluid.

## IMAGE-STRUCTURE CHARACTERISTICS

The data in this section are based on development at 68°F (20°C) in KODAK Developer D-76.

### KODAK T-MAX 100 Professional Film

Diffuse rms Granularity\* **8**

Resolving Power†	TOC 1.6:1	63 lines/mm
	TOC 1000:1	200 lines/mm

### KODAK T-MAX 400 Professional Film

Diffuse rms Granularity\* **10**

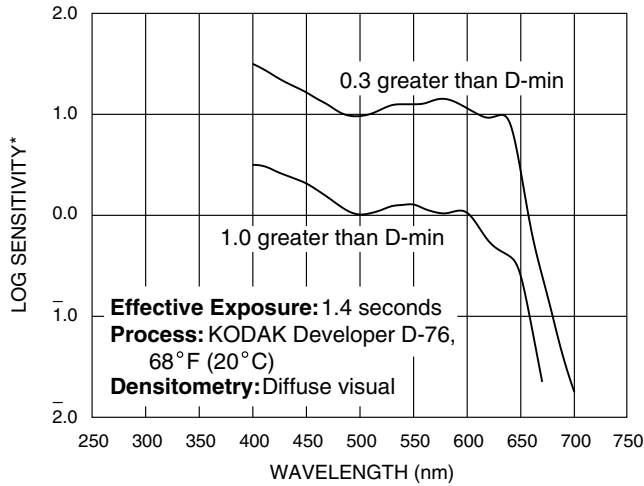
Resolving Power†	TOC 1.6:1	50 lines/mm
	TOC 1000:1	125 lines/mm

\* Read at a net diffuse density of 1.00, using a 48-micrometre aperture, 12X magnification.

† Determined according to a method similar to the one described in ISO 6328, *Photography—Determination of ISO Resolving Power*.

## KODAK T-MAX 100 Professional Film / TMX

### Spectral-Sensitivity Curves

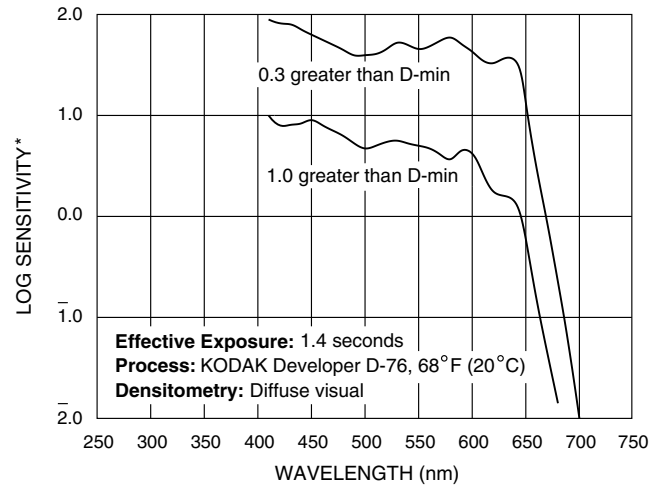


\*Sensitivity = reciprocal of exposure (ergs/cm<sup>2</sup>) required to produce specified density

F002\_0547AC

## KODAK T-MAX 400 Professional Film / TMY

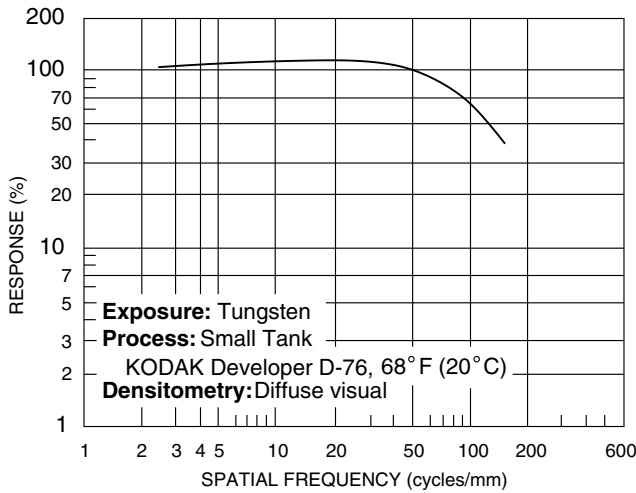
### Spectral-Sensitivity Curves\*



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

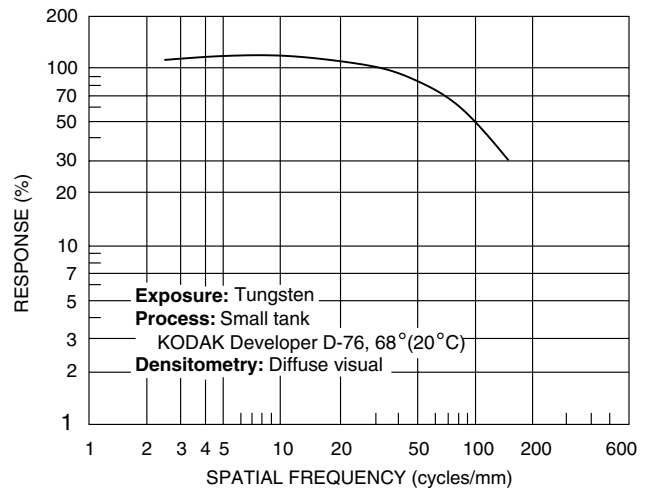
F002\_0511AC

### Modulation Transfer Curve



F002\_0542AC

### Modulation Transfer Curve

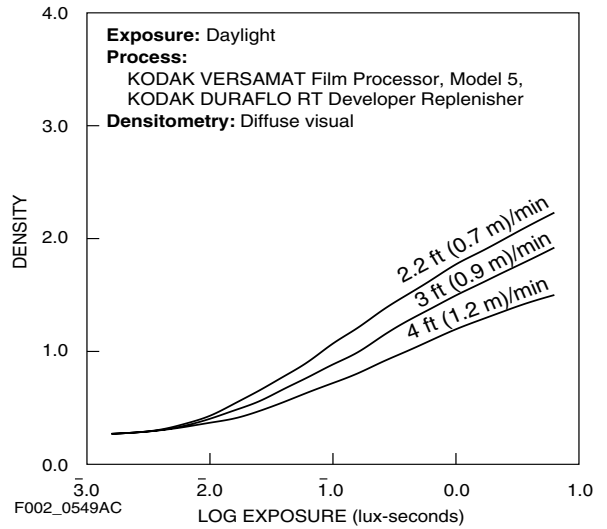
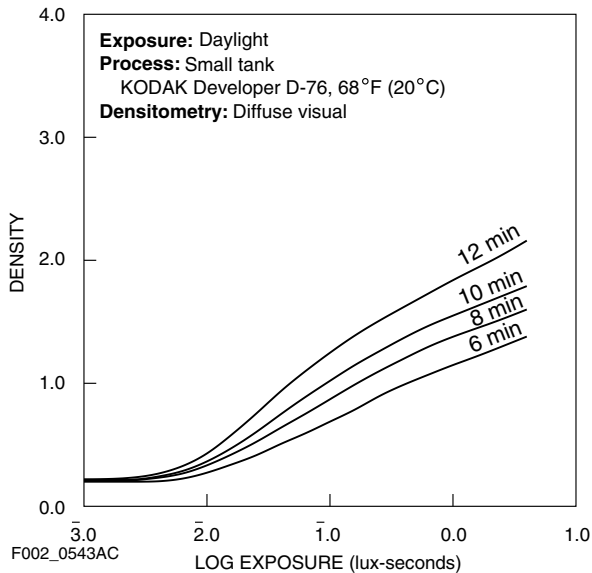
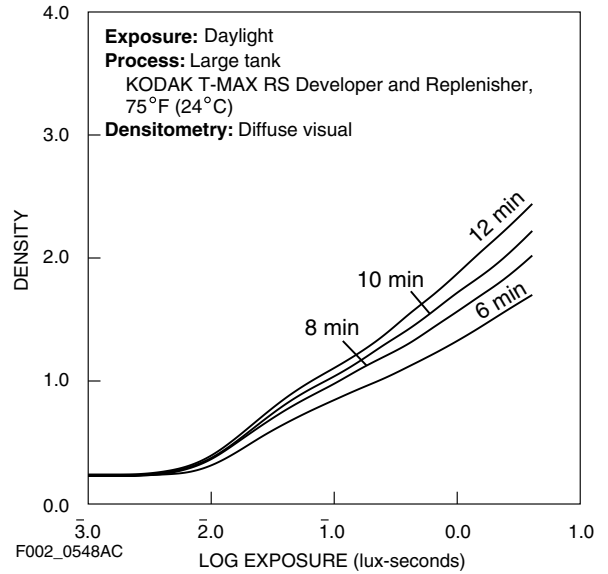
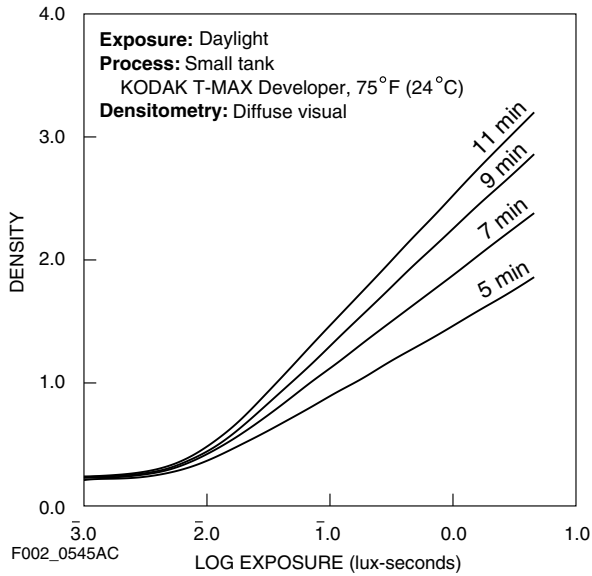


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\*The blue sensitivity of KODAK T-MAX 100 and 400 Professional Films is slightly less than that of other Kodak panchromatic black-and-white films. This enables the response of these films to be closer to the response of the human eye. Therefore, blues may be recorded as slightly darker tones with these films—a more natural rendition.

**KODAK T-MAX 100 Professional Film / TMX**

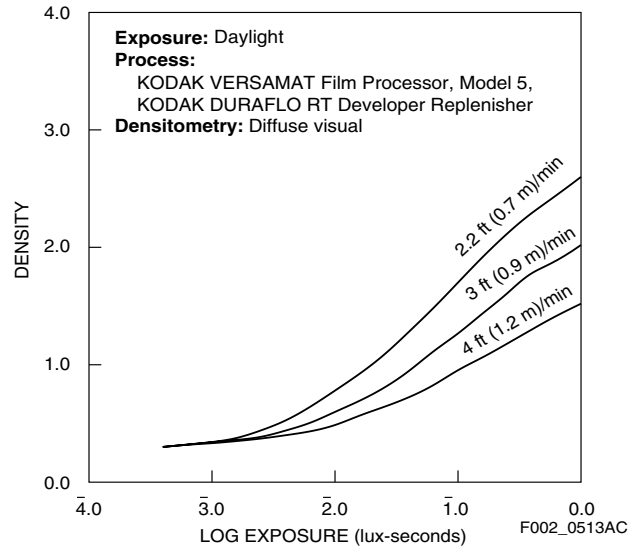
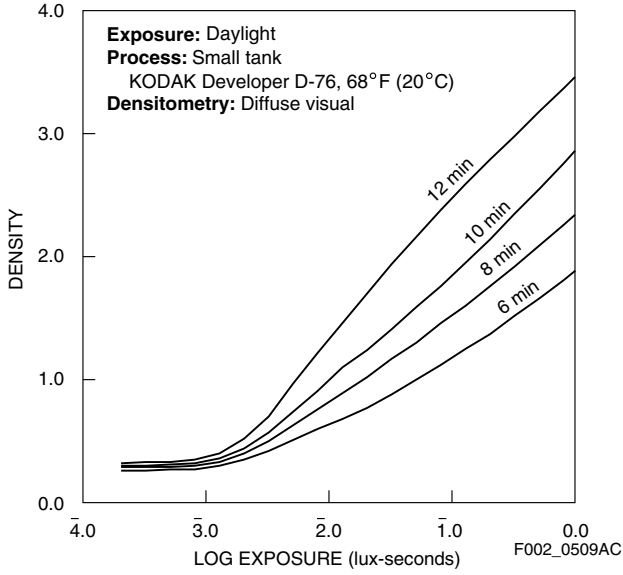
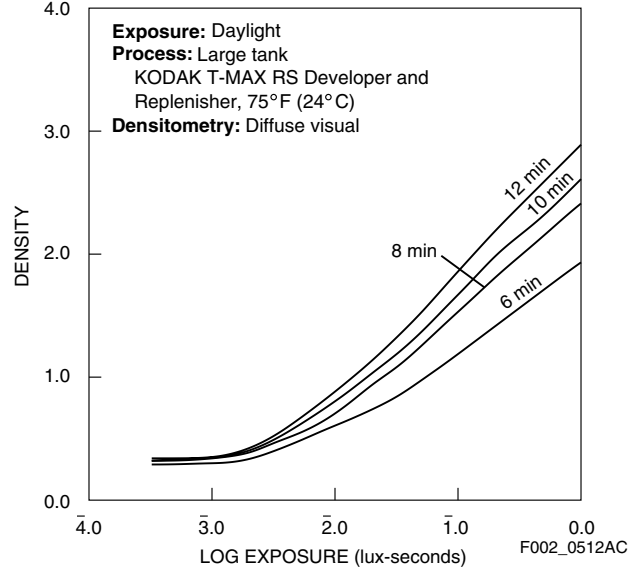
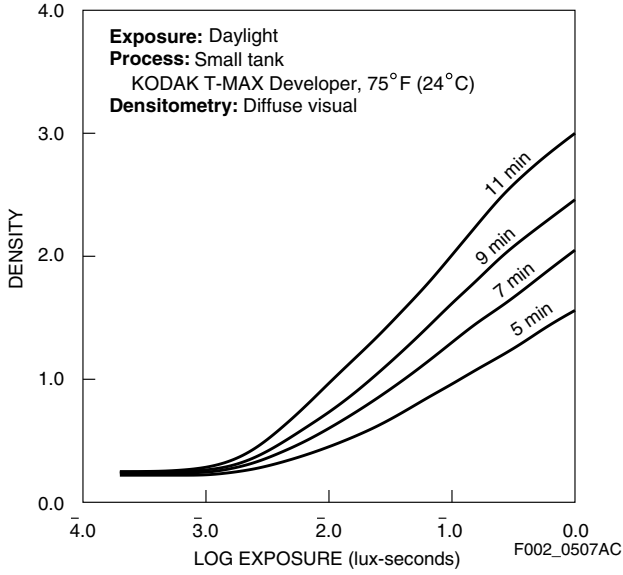
**Characteristic Curves**



**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.

# KODAK T-MAX 400 Professional Film / TMY

## Characteristic Curves





# KODAK T-MAX P3200 Professional Film

## DARKROOM RECOMMENDATIONS

Do not use a safelight. Handle unprocessed film in total darkness. **Do not** develop this film by inspection.

**Note:** Some darkroom timers will glow (fluoresce) for some time after you turn off the lights in a darkroom. To avoid fogging this film, turn the face of timers away from the area where you handle unprocessed film.

The afterglow from fluorescent lights will also fog this film. Make sure your darkroom is *completely* dark before you handle unprocessed film.

## STORAGE AND HANDLING

KODAK T-MAX P3200 Professional Film is very sensitive to environmental radiation; expose and process it promptly. Request *visual* inspection of this film at airport x-ray inspection stations.

Store unexposed film at 75°F (24°C) or lower in the original sealed package. For protection from heat in areas with temperatures consistently higher than 75°F (24°C), you can store the film in a refrigerator. If film has been refrigerated, allow the package to warm up to room temperature for 1 to 1 ½ hours before opening it.

Load and unload your camera in subdued light, and rewind the film completely before unloading the camera.

Store processed film in a cool, dry place.

## EXPOSURE

KODAK T-MAX P3200 Professional Film is specially designed to be used as a *multi-speed* film. The speed you use depends on your application; make tests to determine the appropriate speed.

The nominal speed is EI 1000 when the film is processed in KODAK T-MAX Developer or KODAK T-MAX RS Developer and Replenisher, or EI 800 when it is processed in other Kodak black-and-white developers. It was determined in a manner published in ISO standards. For ease in calculating exposure and for consistency with the commonly used scale of film-speed numbers, the nominal speed has been rounded to EI 800.

Because of its great latitude, you can expose this film at EI 1600 and yield negatives of high quality. There will be no change in the grain of the final print, but there may be a slight loss of shadow detail. When you need a higher speed, you can expose this film at EI 3200 or 6400. At these speeds, there will be a slight increase in contrast and graininess with additional loss of shadow detail. (See the processing tables for adjusted development times.)

Because of the shape of the characteristic curve of the film, you will obtain better shadow detail and highlight separation when you expose it at EI 3200 or 6400 than you can obtain with 400-speed films pushed by 3 stops. These higher speeds allow you to take photographs in many situations where photography was previously impossible.

To expose this film at speeds higher than EI 6400, it is critical that you make tests to determine if the results are appropriate for your needs. For best results when you expose the film at these speeds, use T-MAX Developer or T-MAX RS Developer and Replenisher.

**Note:** Contrast and graininess will increase when you use higher exposure indexes.

To expose film at speed settings that are higher than the maximum setting on your camera or meter, set the meter at a lower speed; then reduce the aperture or increase the shutter speed to compensate.

You can also expose this film at EI 400 and obtain outstanding shadow detail. See the processing tables.

The speed numbers for this film are expressed as Exposure Indexes (EI). Use these exposure indexes with meters or cameras marked for ISO/ASA or ISO°/DIN speeds in daylight or artificial light.

KODAK T-MAX P3200 Professional Film	
KODAK Developer or Developer and Replenisher	Exposure Index (EI)
T-MAX or T-MAX RS	800/30°
	1600/33°
	3200/36°
	6400/39°
	12,500/42°*
XTOL	25,000/45°*
	800/30°
	1600/33°
	3200/36°
D-76	6400/39°
	800/30°
	1600/33°
	3200/36°
HC-110 (Dil B)	6400/39°
	800/30°
	1600/33°
	3200/36°
DURAFLO RT	6400/39°
	800/30°
	1600/33°
	3200/36°

\* Expose and process a test roll to determine if results at these exposure indexes are acceptable for your needs.

## Adjustments for Long and Short Exposures

At the exposure times in the table below, compensate for the reciprocity characteristics of this film by increasing the exposure as shown.

Adjustments for Long and Short Exposures		
If Indicated Exposure Time Is (seconds)	Use This Lens-Aperture Adjustment	OR This Adjusted Exposure Time (seconds)
1/10,000	None	None
1/1000	None	None
1/100	None	None
1/10	None	None
1	+ $\frac{1}{3}$ stop	Change Aperture
10	+ $\frac{2}{3}$ stop	15
100	+2 stops	400

## Filter Corrections

Increase exposure by the filter factor or the number of stops indicated when you use filters. For greatest exposure accuracy with a through-the-lens meter, take the meter reading without the filter over the lens, and then increase your exposure as shown in the table.

Filter Corrections						
KODAK WRATTEN Gelatin Filter	Daylight			Tungsten		
	Increase Lens Aperture By ( <i>f</i> -stops)	OR	Increase Exposure By (filter factor)	Increase Lens Aperture By ( <i>f</i> -stops)	OR	Increase Exposure By (filter factor)
No. 8 (yellow)	$\frac{2}{3}$		1.5	$\frac{1}{3}$		1.2
No. 11 (yellowish green)	1 $\frac{2}{3}$		3	1 $\frac{2}{3}$		3
No. 12 (deep yellow)	$\frac{2}{3}$		1.5	$\frac{1}{3}$		1.2
No. 15 (deep yellow)	$\frac{2}{3}$		1.5	$\frac{2}{3}$		1.5
No. 25 (red)	2 $\frac{2}{3}$		6	2		4
No. 47 (blue)	3 $\frac{1}{3}$		9.5	4 $\frac{1}{3}$		19
No. 58 (green)	2 $\frac{2}{3}$		6	2 $\frac{2}{3}$		6
Polarizing Filter	1 $\frac{1}{3}$		2.5	1 $\frac{1}{3}$		2.5

## PROCESSING

Handle unprocessed film in total darkness. **Do not** develop this film by inspection.

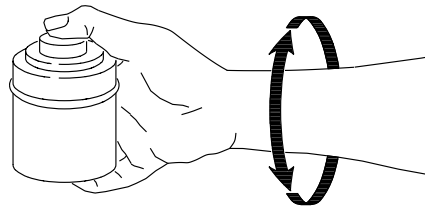
With properly exposed film, the starting-point development times in the tables should produce negative contrast suitable for printing with a diffusion enlarger. For printing with a condenser enlarger, you may want to reduce the development time to produce a lower contrast; as a starting point, you can use the development time for the exposure index *one stop lower* than the exposure index you used to expose the film (see the processing tables). For example, if you exposed your film at EI 3200 and will print the negatives with a condenser enlarger, use the development time given for EI 1600.

## MANUAL PROCESSING

### Small-Tank Processing (8- or 16-ounce tank)

With small single- or double-reel tanks, drop the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank on the top of the work surface to dislodge any air bubbles. Provide initial agitation of 5 to 7 inversion cycles in 5 seconds, i.e., extend your arm and vigorously twist your wrist 180 degrees.

Then repeat this agitation procedure at 30-second intervals for the rest of the development time.



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Small-Tank Processing (8- or 16-ounce tank)							
KODAK T-MAX P3200 Professional Film							
KODAK Developer or Developer and Replenisher	Exposed at EI	Development Time in Minutes					
		68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	80°F (27°C)	85°F (29°C)
T-MAX	400/27°	7 ½	7	6 ½	6	5	4*
	800/30°	8	7 ½	7	6 ½	5 ½	4 ½*
	1600/33°	8 ½	8	7 ½	7	6	5
	3200/36°	11 ½	11	10 ½	9 ½	8	6 ½
	6400/39°	14	13	12	11	9 ½	8
	12,500/42°†	16	15 ½	14 ½	12 ½	10 ½	9
	25,000/45°†	NR	17 ½	16	14	12	10
T-MAX (1:7)	800/30°	—	—	—	12 ½	—	—
T-MAX (1:9)	800/30°	—	—	—	17	—	—
T-MAX RS	400/27°	8	7	6 ½	6	5 ½	5
	800/30°	9	8 ½	7 ½	6 ½	6	5 ½
	1600/33°	10 ½	9 ½	8 ½	7 ½	7	6
	3200/36°	13	12	11	10	9	8
	6400/39°	15	14	13	11	10	9
	12,500/42°†	18	16	14	12	11	10
	25,000/45°†	NR	NR	16	14	13	11
XTOL‡	400/27°	7 ½	6 ¾	6 ¼	5 ½	4*	3*
	800/30°	8 ¼	7 ½	7	6	4 ¾*	3 ¾*
	1600/33°	9 ¼	8 ½	8	7	5 ¼	4 ¼*
	3200/36°	11	10	9 ¼	8	6 ¼	4 ¾ ‡
	6400/39°	12 ½	11 ½	10 ½	9 ¼	7	5 ½
D-76	400/27°	10 ½	9 ½	8 ½	7 ½	6	4 ½*
	800/30°	11	10	9	8	6 ½	5
	1600/33°	11 ½	10 ½	9 ½	8 ½	7	5 ½
	3200/36°	15	13 ½	12 ½	11	8 ½	7 ½
	6400/39°	17 ½	16	14 ½	12 ½	10 ½	9
HC-110 (Dil B)	400/27°	7 ½	6 ½	5 ½	5	4 ½*	3 ½*
	800/30°	8	7	6	5 ½	4 ¾*	4*
	1600/33°	9	7 ½	6 ½	6	5	4 ½*
	3200/36°	11 ½	10	8 ½	7 ½	6 ½	5 ¾
	6400/39°	14	12	10 ½	9 ½	8	6 ¾

\* Development times shorter than 5 minutes may produce unsatisfactory uniformity.

† Make tests to determine if results at these speeds are acceptable for your needs.

‡ For instructions on using 1:1, 1:2, and 1:3 dilutions of KODAK XTOL Developer in a small tank, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** These development times are suggested starting points. Make tests to determine the best development time for your application.

## MANUAL PROCESSING

### Large-Tank Processing (1/2- to 3 1/2-gallon tank)

Agitate continuously for the first 15 to 30 seconds by raising and lowering the basket, rack, or spindle 1/2 inch. *Do not* agitate the basket, rack, or spindle for the remainder of the first minute. Then agitate once per minute by lifting the basket, rack, or spindle out of the developer, tilting it approximately 30 degrees, draining it for 5 to 10 seconds, and reimmersing it. Alternate the direction of tilting the basket, rack, or spindle.

Large-Tank Processing (1/2- to 3 1/2-gallon tank)					
KODAK T-MAX P3200 Professional Film					
KODAK Developer or Developer and Replenisher	Exposed at EI	Development Time in Minutes			
		68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)
T-MAX RS	400/27°	10 1/2	9 1/2	8 1/2	7 1/2
	800/30°	11 1/2	10	9	8
	1600/33°	13 1/2	11 1/2	10 1/2	9 1/2
	3200/36°	17	14 1/2	13	12
	6400/39°	NR	18	16	14
	12,500/42°*	NR	NR	18	17
XTOL†	400/27°	9	8	7 1/4	6 1/4
	800/30°	10	9	8 1/4	7
	1600/33°	11	10	9	7 3/4
	3200/36°	13	11 1/2	10 1/2	9
	6400/39°	15	13 1/2	12 1/4	10 1/2

\* Make tests to determine if results at this speed are acceptable for your needs.

† For more information on using KODAK XTOL Developer in replenished systems, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

**Note:** These development times are suggested starting points. Make tests to determine the best development time for your application.

# ROTARY-TUBE PROCESSING

## Rotary-Tube Processors

Follow the agitation recommendations for your processor.

Rotary-Tube Processing							
KODAK T-MAX P3200 Professional Film							
KODAK Developer or Developer and Replenisher	Exposed at EI	Development Time in Minutes					
		68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	80°F (27°C)	85°F (29°C)
T-MAX	400/27°	6 ½	6	5 ½	4	3 ½	3
	800/30°	7 ½	6 ½	6	5	4	3 ½
	1600/33°	8	7	6 ½	5 ½	4 ½	4
	3200/36°	11	9 ½	8 ½	7 ½	6	5 ½
	6400/39°	13	11	10 ½	9	7 ½	6 ½
	12,500/42°*	14 ½	13	12	10 ½	9	8
	25,000/45°*	NR	15	14	12	11	10
T-MAX RS	400/27°	9	8	7 ½	7	6 ½	4 ½
	800/30°	10	9	8	7 ½	7	5
	1600/33°	12	11	10	9 ½	9	5 ½
	3200/36°	15	13	11 ½	10 ½	9 ½	7
	6400/39°	16	14	12 ½	11 ½	10	8
	12,500/42°*	NR	15	14	13	11 ½	9 ½
	25,000/45°*	NR	16	15	14	12 ½	11
XTOL	400/27°	7	6	5 ½	5	—	—
	800/30°	8	7	6 ½	5 ½	—	—
	1600/33°	9	8	7 ¼	6	—	—
	3200/36°	10	9	8 ¼	7	—	—
	6400/39°	11 ½	10	9 ¼	8	—	—
D-76	400/27°	8	7 ½	7 ¼	6 ½	5	4
	800/30°	8 ½	8	7 ¾	7	5 ½	4 ½
	1600/33°	9	8 ½	8	7 ½	6	4 ¾
	3200/36°	11 ½	11	10 ½	9 ½	7 ½	6
	6400/39°	13 ½	13	12	11 ½	8 ½	7
HC-110 (Dil B)	400/27°	7	6 ¼	5 ¾	5	4 ¼	3 ¼
	800/30°	8	7	6	5 ¼	4 ½	3 ½
	1600/33°	8 ¾	7 ½	6 ½	5 ¾	4 ¾	3 ¾
	3200/36°	11 ½	10	8 ½	7 ½	6 ½	5
	6400/39°	13	11 ½	10	9	8	6

\* Make tests to determine if results at these speeds are acceptable for your needs.

NR = Not recommended

**Note:** These development times are suggested starting points. Make tests to determine the best development time for your application.

## FINAL STEPS IN TANK AND ROTARY-TUBE PROCESSING

**Rinse** at 70 to 85°F (21 to 29°C) with agitation in KODAK Indicator Stop Bath or running water for 30 seconds.

**Fix** at 70 to 85°F (21 to 29°C) for 3 to 5 minutes with vigorous agitation in KODAK Rapid Fixer. Be sure to agitate the film frequently during fixing.

**Note:** To keep fixing times as short as possible, we strongly recommend using KODAK Rapid Fixer. If you use another fixer, such as KODAK Fixer or KODAFIX Solution, fix for 5 to 10 minutes or twice the time it takes for the film to clear. You can check the film for clearing after 3 minutes in KODAK Rapid Fixer or 5 minutes in KODAK Fixer or KODAFIX Solution.

**Important:** Your fixer will be exhausted more rapidly with this film than with other films. If your negatives show a magenta (pink) stain after fixing, your fixer may be near exhaustion, or you may not have used a long enough time. If the stain is slight, it will not affect image stability, negative contrast, or printing times. You can remove a slight pink stain with KODAK Hypo Clearing Agent. However, if the stain is pronounced and irregular over the film surface, refix the film in fresh fixer.

**Wash** for 20 to 30 minutes in running water at 70 to 85°F (21 to 29°C) with a flow rate that provides at least one complete change of water in 5 minutes. To save time and conserve water, use KODAK Hypo Clearing Agent.

**Dry** film in a dust-free place. To minimize drying marks, treat the film with KODAK PHOTO-FLO Solution after washing, or wipe the surfaces carefully with a KODAK Photo Chamois or a soft viscose sponge.

## MACHINE PROCESSING

### Roller-Transport Processors

#### KODAK VERSAMAT Film Processors

You can process this film in roller-transport processors, such as the KODAK VERSAMAT Film Processor, Model 5, 11, or 411, with KODAK DURAFLO RT Developer Starter, KODAK DURAFLO RT Developer Replenisher, and KODAK Rapid Fixer.

Processing Steps and Conditions for KODAK VERSAMAT Film Processors				
KODAK T-MAX P3200 Professional Film				
Step	No. of Racks	Path Length		Temperature
		Model 11	Models 5 and 411	
Developer	2	8.5 ft (2.6 m)	4 ft (1.2 m)	80 ± 0.5°F (26.5 ± 0.3°C)
Fixer	3	12 ft (3.8 m)	6 ft (1.9 m)	80°F (26.5°C) nominal
Wash	2	8 ft (2.4 m)	4 ft (1.2 m)	70 to 75°F (21 to 24°C)
Dry		8 ft (2.4 m)	4 ft (1.2 m)	105 to 140°F (40.5 to 60°C)

The recommended machine speeds for processing KODAK T-MAX P3200 Professional Films are as follows:

EI	Machine Speed	Development Time
<b>KODAK VERSAMAT Film Processor, Models 5 and 411</b>		
800/30°	2.2 ft (0.7 m)/min	109 seconds
1600/33°	2 ft (0.6 m)/min	120 seconds
3200/36°	1.7 ft (0.5 m)/min	141 seconds
6400/39°	1.5 ft (0.5 m)/min	160 seconds
<b>KODAK VERSAMAT Film Processor, Model 11</b>		
800/30°	4.5 ft (1.4 m)/min	113 seconds
1600/33°	4 ft (1.2 m)/min	128 seconds
3200/36°	3.5 ft (1.1 m)/min	146 seconds
6400/39°	3 ft (0.9 m)/min	170 seconds

### Processing Conditions for Other Roller-Transport Processors

Adjust the machine speed so that the development time for normally exposed film is approximately 85 seconds. The development time is measured from the time the film enters the developer to the time it enters the fixer. Differences in machine design that affect agitation and crossover times from one tank to the next may require development-time adjustments.

### Replenishment Rates

**Developer**—Use an average replenishment rate of 0.20 mL per square inch of film processed.

**Fixer**—Use 0.55 mL per square inch or 1.5 times your current fixer replenishment rate.

**Important:** T-MAX Professional Films require a higher-than-normal fixer replenishment rate.

## MACHINE PROCESSING

### Large-Tank Rack-and-Tank Processors

To prepare a normal working solution or replenisher solution of KODAK T-MAX RS Developer and Replenisher, dilute Part A with water to one-half the total volume ( $\frac{1}{2}$  or 5 gallons, depending on the package size). While stirring, add Part B. Add water to bring the solution to the total volume (1 or 10 gallons, depending on the package size). Use this solution as the normal working solution or replenisher.

The development times for large-tank rack-and-tank processors are based on a machine speed that transfers the film every 2 minutes. The times given below are starting-point recommendations for T-MAX RS Developer and Replenisher. Make tests to determine if results are acceptable for your needs.

Large-Tank Rack-and-Tank Processing with KODAK T-MAX RS Developer and Replenisher*		
KODAK Film	EI	Development Time† in Minutes at 72°F (22°C)
T-MAX P3200	400/27°	6 to 8
	800/30°	6 to 8
	1600/33°	8 to 10
	3200/36°	10 to 12
	6400/39°	12 to 14
	12,500/42°‡	14 to 16

\* For information on using KODAK XTOL Developer or KODAK Developer D-76, see *KODAK XTOL Developer*, KODAK Publication No. J-109, or *KODAK Developer D-76*, KODAK Publication No. J-78.

† Development time depends on agitation and tank size.

‡ Make tests to determine if results at this rating are acceptable for your needs.

### Replenishment Rates

**Developer**—Add 45 mL (1.5 ounces) of replenisher solution for each 135-36 roll of film processed. Stir or recirculate the solution after each addition of replenisher solution.

**Note:** Do not use T-MAX RS Developer and Replenisher to replenish T-MAX Developer. They are not designed to work together.

## IMAGE-STRUCTURE CHARACTERISTICS

The data in this section are based on development at 68°F (20°C) in KODAK Developer D-76.

### Diffuse rms Granularity\* 18

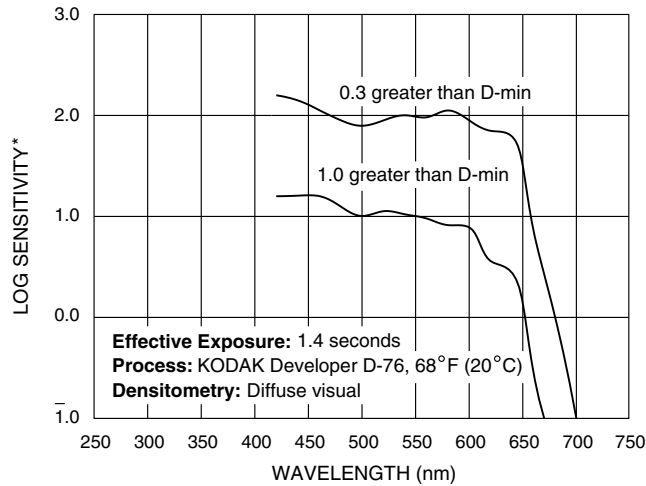
Resolving Power†	TOC 1.6:1	40 lines/mm
	TOC 1000:1	125 lines/mm

\* Read at a net diffuse density of 1.00, using a 48-micrometre aperture, 12X magnification.

† Determined according to a method similar to the one described in ISO 6328, *Photography—Determination of ISO Resolving Power*.

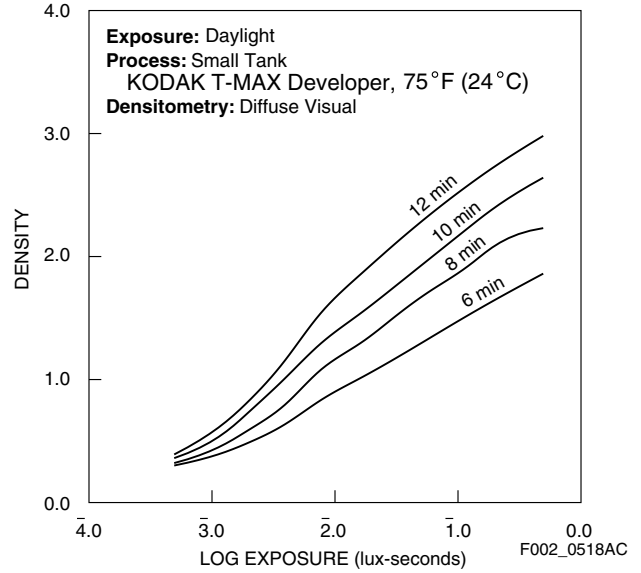
# KODAK T-MAX 3200 Professional Film / TMZ

## Spectral-Sensitivity Curves\*

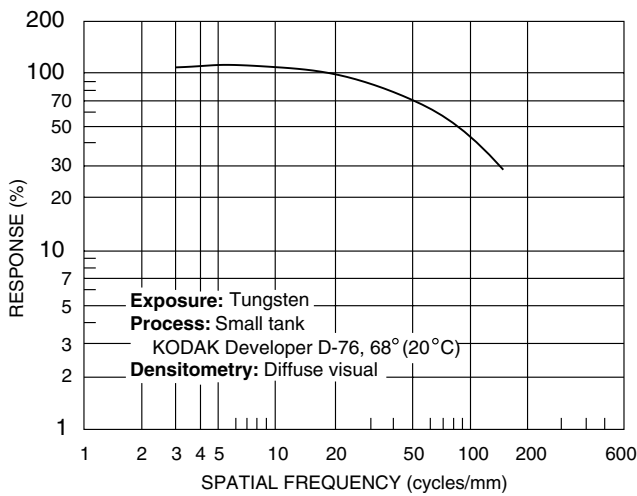


\*Sensitivity = reciprocal of exposure (ergs/cm<sup>2</sup>) required to produce specified density  
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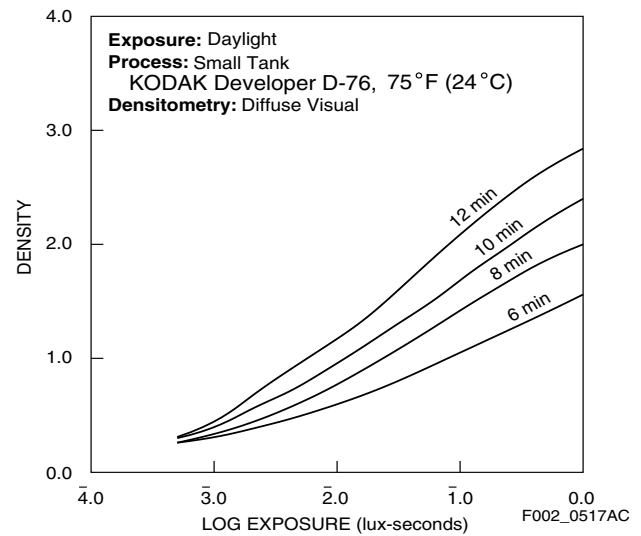
## Characteristic Curves



## Modulation-Transfer Curve

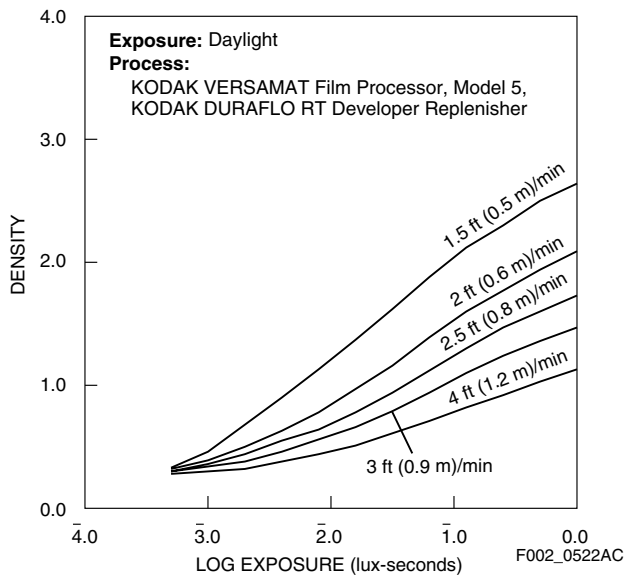
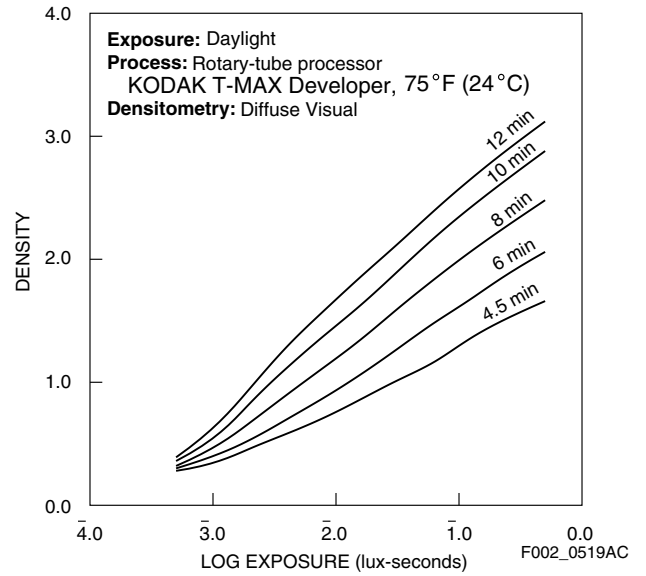
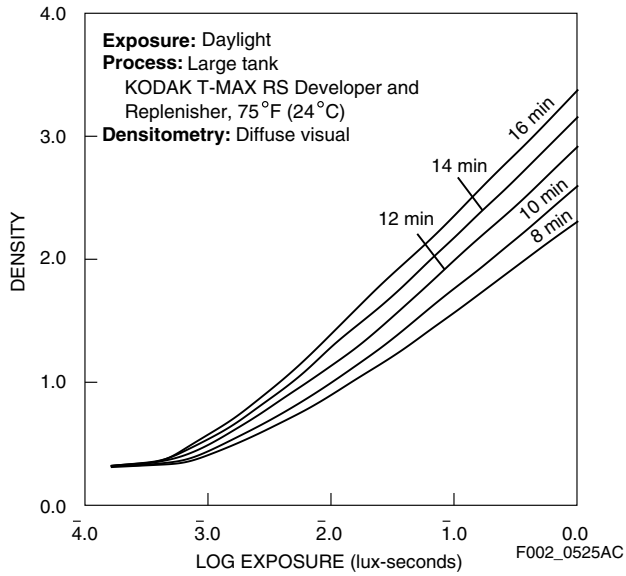


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\*The blue sensitivity of KODAK T-MAX P3200 Professional Films is slightly less than that of other Kodak panchromatic black-and-white films. This enables the response of these films to be closer to the response of the human eye. Therefore, blues may be recorded as slightly darker tones with these films—a more natural rendition.






**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.

## SIZES AVAILABLE

Sizes and CAT numbers may differ from country to country. The numbers below apply to products sold in the United States. Different sizes are available by special order. See your dealer who supplies KODAK PROFESSIONAL Products.

### KODAK T-MAX 100 Professional Film (TMX)


Rolls	Base	CAT No.
135-24	5-mil (0.13 mm) acetate	135 8787
135-36		156 2537
135-36 Press Pack 50 (6 cartons of 50 rolls each)		865 3800
35 mm x 100 ft (Sp 402) 70 mm x 100 ft (Sp 473)		850 1546 801 1702
120 120 pro-pack (5 rolls)	4.7-mil (0.11 mm) acetate	199 7717 174 8417

Sheets Per Package	Size (Inches)	Code Notch	ESTAR Thick Base	CAT No.
25	4 x 5		7-mil (0.18 mm)	802 0737
100				805 0221
100	5 x 7			178 3737
25	8 x 10			805 0890
10	11 x 14			179 0971
KODAK PROFESSIONAL READYLOAD Single-Sheet Packet				
20*	4 x 5		7-mil (0.18 mm)	113 1812

\* For use with the double sheet KODAK READYLOAD Packet Film Holder, the KODAK PROFESSIONAL READYLOAD Single-Sheet Holder, or other holders such as the POLAROID Model 545i Film Holder.

### KODAK T-MAX 400 Professional Film (TMY)

Rolls	Base	CAT No.
135-24	5-mil (0.13 mm) acetate	122 2538
135-36		139 7538
135-36 Press Pack 50 (6 cartons of 50 rolls each)		897 0113
35 mm x 100 ft (Sp 402) 35 mm x 100 ft (Sp 653)		137 8629 828 3582
120 120 pro-pack (5 rolls)	4.7-mil (0.11 mm) acetate	883 3402 885 1479

Sheets Per Package	Size (Inches)	Code Notch	Base	CAT No.
25	4 x 5		7-mil (0.18 mm) ESTAR Thick	818 2016
100				804 5924
100	5 x 7			109 6676
25	8 x 10			800 0929

### KODAK T-MAX P3200 Professional Film (TMZ)

Rolls	Base	CAT No.
135-36	5-mil (0.13 mm) acetate	849 4528
35 mm x 100 ft (Sp 651)		884 1090

### KODAK T-MAX 100 PROFESSIONAL PLATE

The KODAK T-MAX 100 Professional Plate is a continuous-tone panchromatic plate that has the same sensitometric characteristics as KODAK T-MAX 100 Professional Film / TMX. It is especially useful for photomicrography, electron micrography, and laser recording, as well as solar and astronomical photography. It provides maximum image quality for detailed subjects. You can process this plate in KODAK T-MAX RS Developer and Replenisher, KODAK XTOL Developer, KODAK HC-110 Developer (Dilution B), or KODAK Developer D-76. For ordering information, see a dealer who sells KODAK PROFESSIONAL Products.

## QUICK REFERENCE TO PROCESSING *KODAK T-MAX* PROFESSIONAL FILMS

### Before Processing

- Make sure all hangers and reels are clean and dry before loading film.
- Handle unprocessed film in total darkness.
- Make sure all solution temperatures are close to the temperature of the developer (within  $\pm 3^{\circ}\text{F}$  [ $\pm 1.7^{\circ}\text{C}$ ]).

Step	Time	Agitation and Notes
<b>1. Developer</b>	See development tables.	<p><b>Small Tank</b> (closed, cylindrical container that holds a single stack of spiral reels)—Drop the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank on the top of the work surface to dislodge air bubbles. Provide initial agitation of 5 to 7 inversion cycles in 5 seconds, i.e., extend your arm and vigorously twist your wrist 180 degrees. If you can't invert the tank without spilling the developer, slide it back and forth in about a 10-inch arc for the same length of time.</p> <p><b>Large Tank</b> (open rectangular container usually used for sheet or roll films)—Tap the basket, rack, or spindle against the top of the tank to dislodge air bubbles. Then agitate continuously for the first 15 to 30 seconds by raising and lower the basket, rack, or spindle <math>\frac{1}{2}</math> inch. Do not agitate for the remainder of the first minute. Then agitate once per minute by lifting the basket, rack, or spindle out of the developer, tilting it approximately 30 degrees, draining it for 5 to 10 seconds, and reimmersing it. Alternate the direction of tilting the basket, rack, or spindle.</p>
<b>2. Stop Bath</b>	30 seconds	Agitate continuously.
<b>3. Fixer</b>	Fix for 3 to 5 minutes in KODAK Rapid Fixer. If you use another fixer, such as KODAK Fixer or KODAFIX Solution, fix for 5 to 10 minutes or twice the time it takes for the film to clear (lose its milky appearance). You can check the film for clearing after 3 minutes with KODAK Rapid Fixer or 5 minutes with KODAK Fixer or KODAFIX Solution.	Agitate continuously for the first 30 seconds and at 30-second intervals after that.
<b>4. Rinse</b>	30 seconds	Rinse the film in the tank under running water.
<b>5. Hypo Clearing Agent</b>	1 to 2 minutes	Agitate continuously for the first 30 seconds and then at 30-second intervals.
<b>6. Wash</b>	5 minutes	Run the wash water at least fast enough to provide a complete change of water in the container in 5 minutes. For rapid washing in a small tank, fill the tank to overflowing with fresh water and then dump it all out. Repeat this cycle 10 times.
<b>7. Wetting Agent</b>	30 seconds	Provide gentle agitation for 5 seconds of the total time. To reduce drying scum, mix KODAK PHOTO-FLO Solution with distilled water in areas that have hard water.
<b>8. Dry</b>	As necessary	Hang film in a clean, dust-free place.
<b>9. After Processing</b>	Wash and dry all the equipment that came in contact with chemical solutions.	When thoroughly dry, store negatives in sleeves or envelopes away from dust and extreme temperature and humidity. For more information, see <i>Storage and Care of KODAK Photographic Materials—Before and After Processing</i> , KODAK Publication No. E-30.

### QUICK REFERENCE TO FILM SPEEDS

KODAK T-MAX Film	Exposure Index (EI)								
	100/21°	200/24°	400/27°	800/30°	1600/33°	3200/36°	6400/39°	12,500/42°	25,000/45°
100	X	X	X	X					
400	X	X	X	X	X	X			
P3200	X	X	X	X	X	X	X	X	X

# KODAK T-MAX Professional Films

## 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 dealers who sell Kodak products, or you can contact Kodak in your country for more information.

E-30	<i>Storage and Care of Photographic Materials— Before and After Processing</i>
ED-1	<i>Processing KODAK Black-and-White Films and Papers</i>
E-103BF	<i>KODAK PROFESSIONAL Black-and-White Films</i>
E-103BP	<i>KODAK PROFESSIONAL Black-and-White Papers</i>
E-103CF	<i>Chemicals for KODAK PROFESSIONAL Black-and-White Films</i>
F-2	<i>Pathways to Black and White</i>
G-7	<i>KODAK POLYMAX Fiber Paper</i>
G-10	<i>KODAK AZO Paper</i>
G-16	<i>KODABROME II RC Paper</i>
G-21	<i>KODAK POLYCONTRAST III RC Paper</i>
G-24	<i>KODAK POLYMAX Fine-Art Paper</i>
G-28	<i>KODAK P-MAX Art RC Paper</i>
G-27	<i>KODAK PANALURE SELECT RC Paper</i>
G-29	<i>KODAK POLYMAX RC Paper</i>
J-24	<i>KODAK HC-110 Developer</i>
J-78	<i>KODAK Developer D-76</i>
J-86	<i>KODAK T-MAX Developers</i>
J-87	<i>KODAK T-MAX 100 Direct Positive Film Developing Outfit</i>
J-109	<i>KODAK XTOL Developer</i>

The following books are available from photo-specialty dealers who sell Kodak products:

F-5	<i>KODAK Professional Black-and-White Films</i>
R-20	<i>KODAK Black-and-White Darkroom DATAGUIDE</i>

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 T-MAX Professional Films are available from dealers who supply KODAK PROFESSIONAL Products. You can use other materials, but you may not obtain similar results.

## Kodak Professional