

# KODAK PROFESSIONAL T-MAX P3200 Black & White Negative Film

Kodak alaris

TECHNICAL DATA / BLACK-AND-WHITE FILM

March 2018 • F-4001

**KODAK PROFESSIONAL T-MAX P3200 Black & White Negative Film / 3200TMZ** 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 nighttime photography.

FEATURES	BENEFITS
<ul style="list-style-type: none"><li>• KODAK T-GRAIN Emulsion</li></ul>	<ul style="list-style-type: none"><li>• High speed</li><li>• Fine grain</li></ul>
<ul style="list-style-type: none"><li>• High to Ultra-High speed</li></ul>	<ul style="list-style-type: none"><li>• Allows available light photography in situations where it was previously impossible.</li></ul>
<ul style="list-style-type: none"><li>• Superior sharpness</li></ul>	<ul style="list-style-type: none"><li>• Maintains subject detail in prints higher degrees of magnification than conventional films.</li></ul>

## DARKROOM RECOMMENDATIONS

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

**Note:** Some darkroom timers will glow (fluoresce) for a while 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 PROFESSIONAL T-MAX P3200 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 2 hours before opening it.

Load and unload roll-film cameras in subdued light, and rewind the film completely before unloading the camera.

Store exposed film in a cool, dry place, and process it promptly. Store processed film in a cool dry place. For more information, see Current Information Summary CIS-2017-1, Storage and Care of KODAK Photographic Materials—Before and After Processing.

## EXPOSURE

KODAK PROFESSIONAL T-MAX P3200 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 PROFESSIONAL T-MAX Developer or KODAK PROFESSIONAL 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 XTOL, 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 Developer or Developer and Replenisher	Exposure Index (EI)
T-MAX, T-MAX RS, or XTOL	400/27° 800/30° 1600/33° 3200/36° 6400/39° 12,500/42°* 25,000/45°*
D-76	400/27° 800/30° 1600/33° 3200/36° 6400/39°
HC-110 (Dilution B)	400/27° 800/30° 1600/33° 3200/36° 6400/39°

\* 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 these films by increasing the exposure as shown.

If Indicated Exposure Time Is (Seconds)	Use This Lens-Aperture Adjustment	OR	This Adjusted Exposure Time (Seconds)
1/10,000	None		None
1/1,000	None		None
1/100	None		None
1/10	None		None
1	None		None

## 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.

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)	2/3		1.5	1/3		1.2
No. 11 (yellowish green)	1 2/3		3	1 2/3		3
No. 12 (deep yellow)	2/3		2	1/3		1.2
No. 15 (deep yellow)	2/3		2	2/3		1.5
No. 25 (red)	3		8	2		4
No. 47 (blue)	3		8	4 2/3		25
No. 58 (green)	2 2/3		6	2 2/3		6
Polarizing Filter	1 2/3		2.5	1 1/3		2.5

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

## MANUAL PROCESSING

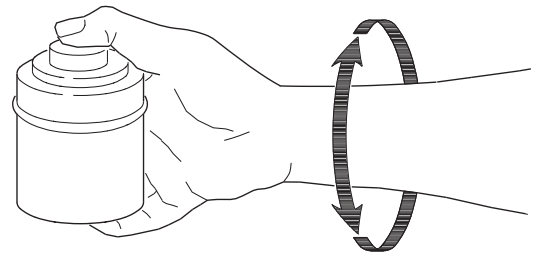
Handle unprocessed film in total darkness. Do not develop this film by inspection.

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.

### 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.



KODAK PROFESSIONAL Developer or Developer and Replenisher	Exposed at EI/DIN	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°	8½	8	7½	6½	5½	4½
	800/30°	9½	9	8½	7½	6½	5½
	1600/33°	10½	10	9	8	7	6
	3200/36°	12	11½	10½	9½	8	6½
	6400/39°	13½	13	12	11	9	7½
	12,500/42°	15½	14½	13½	12	10	8½
	25,000/45°	NR	16	15	13½	11½	9½
T-MAX (1:7)	800/30°	—	—	—	13	—	—
T-MAX (1:9)	800/30°	—	—	—	19½	—	—
T-MAX RS	400/27°	9	8½	7½	7	6½	5½
	800/30°	10½	9½	9	8½	7½	6½
	1600/33°	12	11	10	9½	8½	7
	3200/36°	14½	13	12	11½	10	8½
	6400/39°	16½	15	13½	13	11½	10
	12,500/42°	18½	17	15½	14½	13	11
	25,000/45°	NR	NR	17	16½	14½	12½
XTOL	400/27°	9½	8½	7¾	6¾	5¼	4¼
	800/30°	10½	9½	8¾	7½	6	4½
	1600/33°	11½	10½	9½	8¼	6½	5
	3200/36°	13½	12¼	11¼	9½	7½	6
	6400/39°	15¼	14	12¾	11	8½	6¾
	12,500/42°	17¼	15¾	14¼	12¼	9¾	7½
	25,000/45°	19	17½	15¾	13¾	10¾	8½
XTOL (1:1)	400/27°	12½	11½	—	10	8	—
	800/30°	14	13	—	11½	9	—
	1600/33°	16	14	—	12½	10	—
	3200/36°	18½	16½	—	14½	11½	—
	6400/39°	20½	18½	—	16	13	—
	12,500/42°	22½	20½	—	18	14½	—
	25,000/45°	25	23	—	20	16	—
D-76	400/27°	10½	9½	8½	7½	6	5
	800/30°	11½	10½	9½	8½	6½	5½
	1600/33°	12½	11½	10½	9	7½	6
	3200/36°	14	13	11½	10½	8½	6½
	6400/39°	15½	14	13	11½	9	7½
HC-110 (B)	400/27°	7½	6½	5½	5	4¼*	¾*
	800/30°	8½	7¼	6¼	5¾	4¾*	4¼*
	1600/33°	9¼	8	6¾	6¼	5¼	4½*
	3200/36°	10½	9	7¾	7	6	5¼
	6400/39°	12	10¼	8¾	8	6¾	5¾

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

NR = Not recommended.

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

### 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.

KODAK PROFESSIONAL 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	9½	8½	8
	800/30°	12	10½	10	9½
	1600/33°	13½	12½	11½	10½
	3200/36°	16½	14½	13½	13
	6400/39°	NR	17	15	14½
	12,500/42°	NR	NR	17½	16½
XTOL	400/27°	10½	9½	—	7½
	800/30°	11¾	10¾	—	8½
	1600/33°	13	12	—	9¼
	3200/36°	15¼	13¾	—	10¾
	6400/39°	17¼	15¾	—	12¼
	12,500/42°	19¼	17½	—	13¾
25,000/45°	21½	19½	—	15¼	

NR = Not Recommended

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

## Rotary-Tube Processing

Follow the agitation recommendations for your processor.

KODAK PROFESSIONAL Developer or Developer and Replenisher	Exposed at EI/DIN	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°	8½	8	7½	6½	5½	4½
	800/30°	9½	9	8½	7½	6½	5½
	1600/33°	10½	10	9	8	7	6
	3200/36°	12	11½	10½	9½	8	6½
	6400/39°	13½	13	12	11	9	7½
	12,500/42°	15½	14½	13½	12	10	8½
	25,000/45°	NR	16	15	13½	11½	9½
T-MAX RS	400/27°	9	8½	7½	7	6½	5½
	800/30°	10½	9½	9	8½	7½	6½
	1600/33°	12	11	10	9½	8½	7
	3200/36°	14½	13	12	11½	10	8½
	6400/39°	16½	15	13½	13	11½	10
	12,500/42°	18½	17	15½	14½	13	11
	25,000/45°	NR	NR	17	16½	14½	12½
XTOL	400/27°	9½	8½	7¾	6¾	5¼	4¼
	800/30°	10½	9½	8¾	7½	6	4½
	1600/33°	11½	10½	9½	8¼	6½	5
	3200/36°	13½	12¼	11¼	9½	7½	6
	6400/39°	15¼	14	12¾	11	8½	6¾
	12,500/42°	17¼	15¾	14¼	12¼	9¾	7½
	25,000/45°	19	17½	15¾	13¾	10¾	8½
XTOL (1:1)	400/27°	12½	11½	—	10	8	—
	800/30°	14	13	—	11½	9	—
	1600/33°	16	14	—	12½	10	—
	3200/36°	18½	16½	—	14½	11½	—
	6400/39°	20½	18½	—	16	13	—
	12,500/42°	22½	20½	—	18	14½	—
	25,000/45°	25	23	—	20	16	—
D-76	400/27°	10½	9½	8½	7½	6	5
	800/30°	11½	10½	9½	8½	6½	5½
	1600/33°	12½	11½	10½	9	7½	6
	3200/36°	14	13	11½	10½	8½	6½
	6400/39°	15½	14	13	11½	9	7½
HC-110 (B)	400/27°	7½	6½	5½	5	4¼*	3¾*
	800/30°	8½	7¼	6¼	5¾	4¾*	4¼*
	1600/33°	9¼	8	6¾	6¼	5¼	4½*
	3200/36°	10½	9	7¾	7	6	5¼
	6400/39°	12	10¼	8¾	8	6¾	5¾

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

NR = Not recommended.

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

## FINAL STEPS

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 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.

## IMAGE STRUCTURE

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

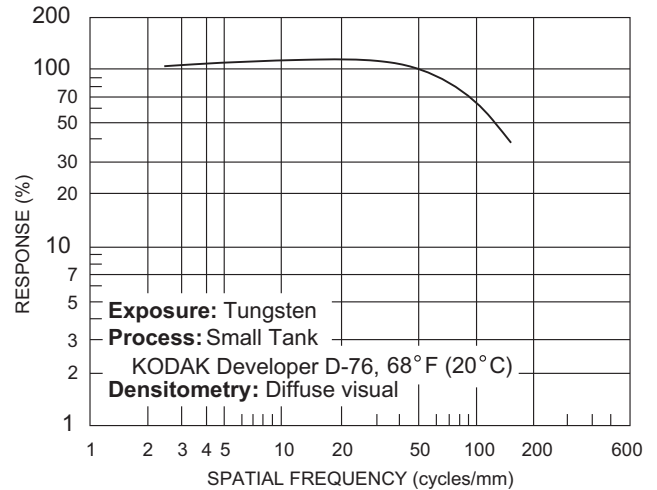
Resolving Power*	Diffuse rms Granularity†
40 lines/mm (TOC 1.6:1)	18
125 lines/mm (TOC 1000:1)	

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

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

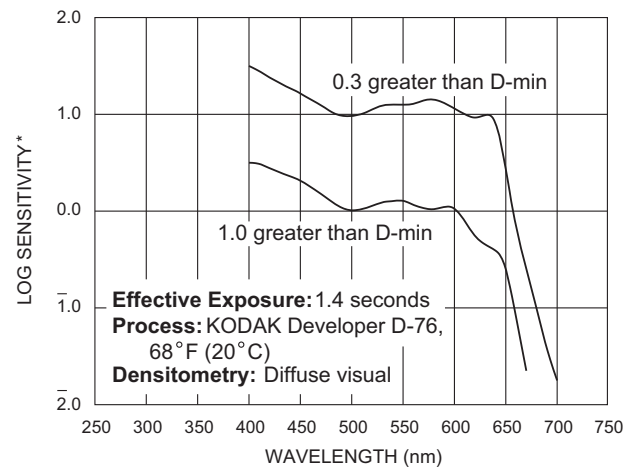
## CURVES

### Modulation Transfer Curves



F002\_0542AC

### Spectral Sensitivity Curves\*

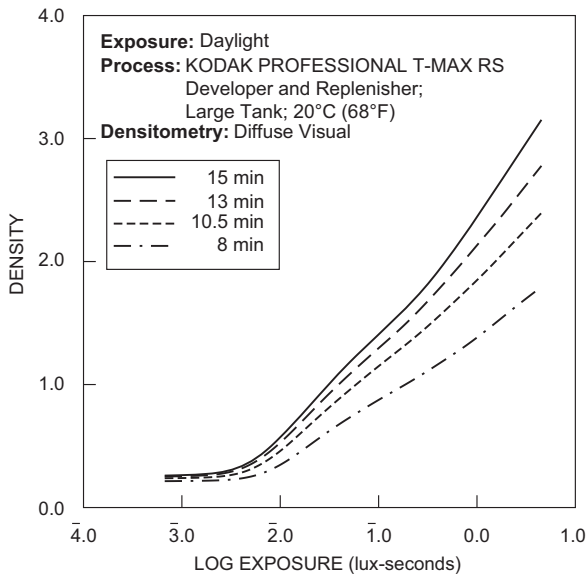
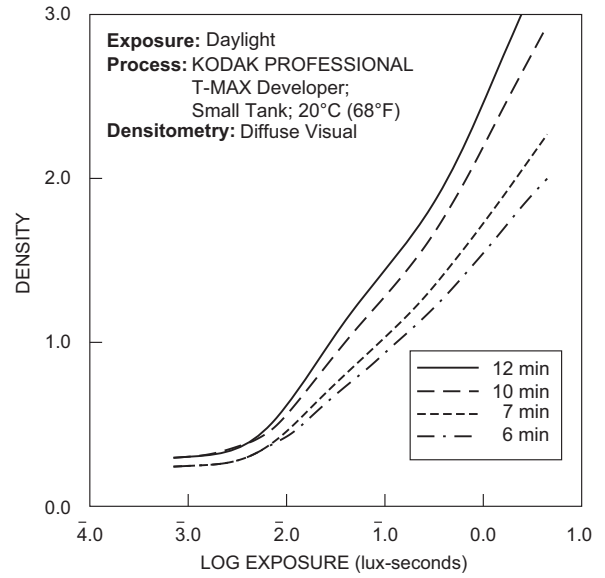
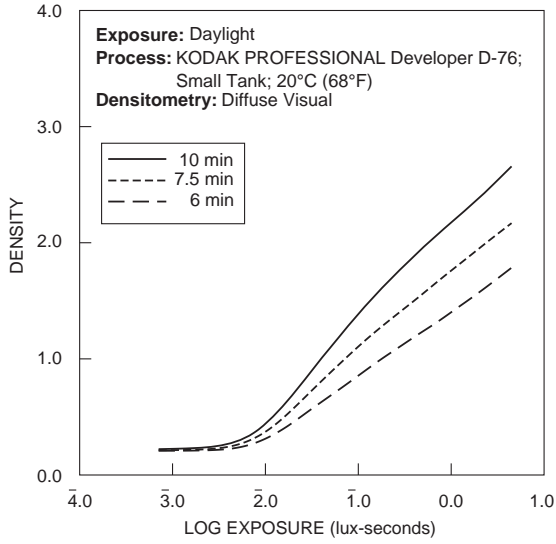


\*Sensitivity = reciprocal of exposure (ergs/cm<sup>2</sup>) required to produce specified density

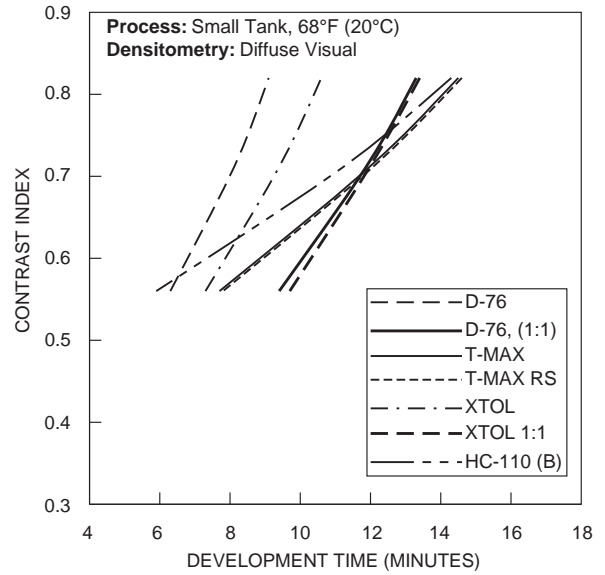
F002\_0547AC

\* The blue sensitivity of KODAK PROFESSIONAL T-MAX Films is slightly less than that of other KODAK panchromatic black-and-white films. This enables the response of this film 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.

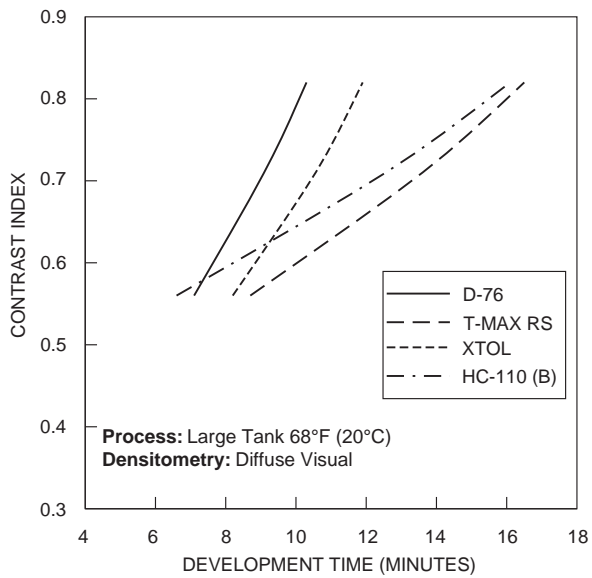
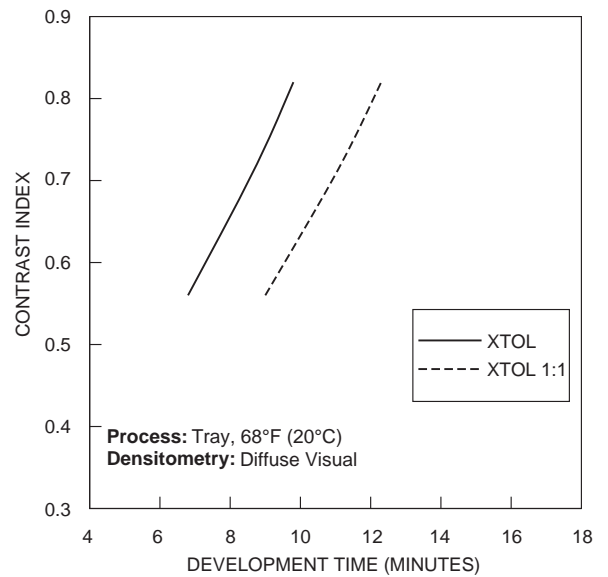
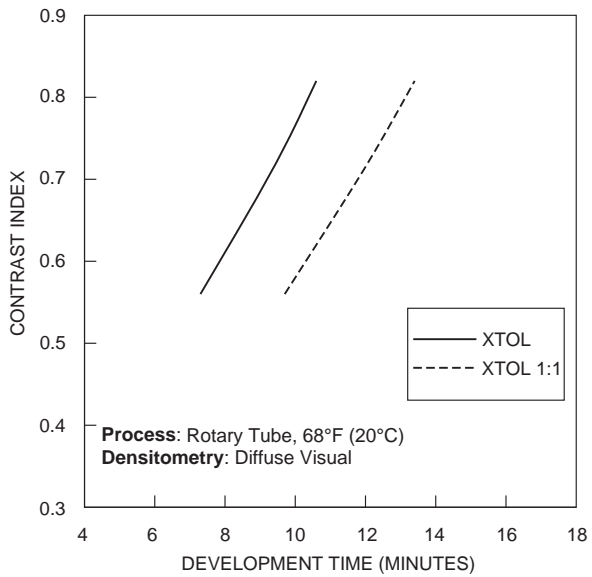
## Characteristic Curves



## Contrast Index Curves







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TM/MC/MR: D-76, HC-110, Photo-Flo, T-Max, and Xtol

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