

KODAK XTOL Developer



DESCRIPTION

KODAK XTOL Developer is a two-part powder developer for processing Kodak and other manufacturers' normally exposed, pushed, or pulled black-and-white films. It offers full emulsion speed and easy mixing, and can be used as both a developer and a replenisher in a variety of equipment, from small tanks (8 to 64 fluidounces), trays, or rotary tubes to high-volume processors.

FEATURES	BENEFITS
<ul style="list-style-type: none"> • Ascorbic acid based black-and-white film developer 	<ul style="list-style-type: none"> • Offers very high image quality at full emulsion speed
<ul style="list-style-type: none"> • No hydroquinone 	<ul style="list-style-type: none"> • Convenient, room-temperature mixing
<ul style="list-style-type: none"> • Easy mixing 	<ul style="list-style-type: none"> • Two-part powder dissolves quickly in room-temperature water; ready for immediate use
<ul style="list-style-type: none"> • Versatile 	<ul style="list-style-type: none"> • Stable performance through a wide range of temperatures, dilutions, and agitation methods • Serves as both a developer and a replenisher
<ul style="list-style-type: none"> • Excellent keeping properties • Long, stable useful life 	<ul style="list-style-type: none"> • Mixed solution has excellent shelf life (full bottles keep one year after mixing) • High resistance to breakdown from oxidation during storage or in replenished processors • Less waste
<ul style="list-style-type: none"> • Robust, abuse tolerant, and clean working 	<ul style="list-style-type: none"> • Stable performance across a wide range of temperatures, dilutions, and agitation methods • Long solution life • Less frequent tank cleaning
<ul style="list-style-type: none"> • Contrast index similar to other developers 	<ul style="list-style-type: none"> • Produces negatives with printing characteristics like those expected from other general-purpose developers

FEATURES	BENEFITS
<ul style="list-style-type: none"> • Provides more emulsion speed (shadow detail) than most developers for normal and push processing 	<ul style="list-style-type: none"> • Most films yield about 1/3 stop more emulsion speed than other developers • Enhanced shadow contrast and improved highlight detail with some films
<ul style="list-style-type: none"> • Fine grain and high sharpness 	<ul style="list-style-type: none"> • Enhanced sharpness, especially with dilution • Able to print 10 percent larger with equivalent sharpness and grain (image quality) than with other common developers

SIZES AVAILABLE

Sizes and catalog numbers may differ from country to country. See your dealer who supplies Kodak Professional products.

To Make	CAT No.
1 litre	888 8182
5 litres	875 1752
50 litres	818 4517

MIXING



Important

Observe precautionary information on the containers and in the Material Safety Data Sheets.

For this amount of developer:	Start with this amount of water:
1 litre	750 mL
5 litres	4 litres
50 litres	40 litres

1. Start with an amount of water that is approximately 3/4 of the total volume indicated on the package. See the table above. The water should be at normal room temperature, about 65 to 85°F (18 to 30°C).
2. With stirring, slowly add Part A. Stir until the powder is completely dissolved. At this point, the solution may appear somewhat tawny or copper-colored. This is normal.

3. Continue stirring, and slowly add Part B. Stir until the powder is completely dissolved. The coppery tint will clear from the solution as Part B is added.
4. Add water to bring the final solution to 1, 5, or 50 litres.
5. Stir until the solution is uniform.

If correctly mixed, the specific gravity of the working-tank solution is 1.085 0.003 measured at 77°F (25°C) 0.5 at pH 8.2 0.05.

MANUAL PROCESSING

See the tables on the following pages for development time and temperature starting-point recommendations.

First Use, Full-Strength Developer

Refer to **Table 1** on Page 6 for starting-point (manual) development times for roll films in fresh, full-strength developer. See **Table 5** on Page 19 for sheet films. Some rotary-tube equipment allows replenishment of the developer. See Page 4 for more information.

Dilute Developer

You may dilute KODAK XTOL Developer 1:1, 1:2, or 1:3 with water (developer : water) for one-shot processing. Dilution will provide slightly greater film speed, enhanced sharpness and shadow detail, and slightly enhanced grain.

Refer to **Tables 3 and 4** on Pages 14 through 18 for starting-point development times for **roll** films in fresh, diluted developer. **Table 5, on Page 19**, gives times for **sheet** films.

Note: Use diluted developer only once. Do not replenish or reuse diluted developer.

Important: If your water supply is exceptionally hard (above 200 ppm of CaCO₃), you may need to use conditioned water for higher dilutions to avoid cloudiness. Contact your water authority for information on the water in your area.

Seasoned Developer

Refer to **Table 2** on Page 10 for starting-point development times for roll films in seasoned developer and to **Tables 5 and 6** on Pages 19 and 20 for sheet films.

Seasoned XTOL Developer can be taken from the developer overflow line or from the working tank of an in-control replenished processor.

Fresh XTOL Developer can be “preseasoned” by adding 6.5 mL KODAK Developer Starting Solution (CAT 146 6382) per litre of developer. Or use 1 mL of KODAK EKTACHROME R-3 First Developer II Starter (CAT 869 9795 [U.S. and Australia] or CAT 524 0007 [Europe]) per litre of XTOL Developer.

Capacity

The capacity of this developer used full strength with normal, unreplenished processing is approximately 15 rolls of 135-36 or 120 film (or the equivalent of 80 square inches [516 square centimetres]) per litre, with time compensation.

The minimum-volume requirements for the amount of KODAK XTOL Developer needed to cover the film will depend on the size of your tank or tray. This minimum amount of diluted developer may not contain enough active ingredients to fully develop the film in the recommended times. We recommend always starting with at least 100 mL (3.5 fluidounces) of full-strength developer to prepare the diluted solution for each 135-36 or 120 roll (or the equivalent of 80 square inches [516 square centimetres]). For example, with 1:3 dilution, this would produce about 400 mL (14 fluidounces) of solution. This is the minimum amount per roll, even though a lesser amount may be adequate to cover the film.

Do **not** reuse diluted developer.

Time Compensation

To process the maximum number of rolls of film per litre of full-strength XTOL Developer, use time compensation according to the table below. Discard the developer after you process 15 rolls of film.

Time Compensation for KODAK XTOL Developer		
Film Size	Number of Rolls (per litre)	Development-Time Increase
135-36 or 120 rolls (80 square inches* or equivalent)	1 to 5	Use normal development time
	6 to 10	Increase normal development time by 15 percent
	11 to 15	Increase adjusted development time by 15 percent

*80 square inches = 1 roll of 35 mm 36 exposures
1 roll of 120 film
4 4 x 5-inch sheets
1 8 x 10-inch sheet

160 square inches = 1 roll of 220 film

Agitating Rolls in Small Tanks

Fill the tank with developer. Immerse the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank against the sink or counter to dislodge any air bubbles that cling to the film.

After 30 seconds of gentle, continuous initial agitation, agitate for 5 seconds at 30-second intervals.

Note: Sufficient agitation is important for consistent and uniform results. Agitation helps remove the by-products of development from the surface of the film so that fresh developer can act on the exposed silver halide in the emulsion. Since agitation affects the rate of development, particularly in high-density areas, consistent negative quality requires consistent agitation.

Agitating Sheet Film in Trays

To process 1 sheet:

1. Fill a tray with water that is the same temperature as the developer.
2. Slip the film into the developer. Rock the tray immediately to make sure the film is covered with solution.
3. Agitate the film by first raising the left side of the tray about $\frac{3}{4}$ inch (2 cm). Lower it smoothly, and then immediately raise and lower the side nearest to you. Next, raise and lower the right-hand side, then the near side again. This agitation cycle takes about 8 seconds.
4. Agitate continuously throughout the development time.
5. At the end of the development time, drain the sheet for a few seconds and transfer it to the stop bath. To avoid contaminating the developer with stop bath, use one hand for lifting the sheet from the developer and the other hand for placing it in the stop bath.

To process 2 to 6 sheets together:

1. Fill a tray with water that is the same temperature as the developer.
2. Immerse the sheets one at a time, emulsion side up, in the tray of water. Make sure that each sheet is covered with water before inserting the next one. Agitate by moving the bottom sheet to the top of the stack every few seconds. Go through the stack twice. Be careful that the corners of the sheet you are handling do not scratch the sheet under it.
3. Take the bottom sheet out of the tray of water, drain it for a few seconds, and place it in the developer, emulsion side up. Make sure that the sheet is covered with developer. Transfer the rest of the sheets to the developer in the same way. Interleave the stack, from bottom to top, until development is complete.
Note: When you use interleaving agitation, go through the stack of sheets completely. Rotate the first sheet in the developer 180° from the rest of the stack so that the notch is at the opposite end. This identifies it as the first sheet; be sure that it is the first sheet you remove from each solution.

4. At the end of the development time, transfer the sheets to the stop bath one at a time in the order they were placed in the developer. Drain each sheet for the same time the sheets were drained in Step 3 when placed in the developer. To avoid contaminating the developer with stop bath, use one hand for lifting the sheets from the developer and the other hand for placing them in the stop bath.

Final Steps in Processing Black-and-White Films Manually

Step	Time	Comments
• Stop Bath	30 seconds	Agitate continuously.
• Fixer	Fix for twice as long as it takes the film to clear (lose its milky appearance); see the instructions for the specific film or fixer.	Agitate continuously for the first 30 seconds and at 30-second intervals after that.
• Rinse	30 seconds	Rinse the film in the tank under running water.
• Hypo Clearing Agent	1 to 2 minutes	Agitate continuously for the first 30 seconds and at 30-second intervals after that.
• Wash	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.
• PHOTO-FLO Solution	30 seconds to 1 minute	To minimize drying marks, treat the film with KODAK PHOTO-FLO Solution after washing
• Dry	As needed	Dry in a dust-free place. If desired, wipe the surface carefully with a soft, viscose sponge.

LARGE-TANK PROCESSING SYSTEMS

The development times and temperatures in **Tables 2 and 5** on Pages 10 and 19 are starting-point recommendations for replenished processors using preseasoned KODAK XTOL Developer. For critical applications, run tests to determine the best development time. These recommendations are based on a nitrogen burst cycle of two seconds every eight seconds. Significantly more (less) agitation may require slightly shorter (longer) development times.

If you have a broad film mix requiring a wide variety of development times, you may wish to establish a few standard batch cycles, such as 5, 6, 7, 8, 10, and 12 minutes, and assign each film to the nearest of these batch conditions, based on the recommendations in the tables.

Starting (Preseasoning) a Fresh Working-Tank Solution

To start or preseason a fresh working-tank solution:

1. Add 6.5 mL of KODAK Developer Starting Solution (CAT 146 6382) per litre of tank volume to the empty processor working tank. Or use 1 mL of KODAK EKTACHROME R-3 First Developer II Starter (CAT 869 9795 [U.S. and Australia] or CAT 524 0007 [Europe]) per litre of XTOL Developer.
2. Fill the working tank of the processor with KODAK XTOL Developer solution.
3. Stir or recirculate until the solution is uniform.

If you choose not to preseason the fresh tank, initial times will be about 10 percent shorter than those in the tables, but will approach table times as the tank approaches a steady state.

Converting to KODAK XTOL Developer from Another Developer

Before changing to KODAK XTOL Developer, run several KODAK Black-and-White Film Process Control Strips (CAT 180 2990) through your current in-control process at each of your standard development times. Measure and note the Contrast Index of these strips. Drain and clean the developer tank of the processor.

To make a fresh working-tank solution, follow the mixing directions above for starting a fresh working tank. Run several more process control strips, adjusting the developer time and/or temperature until you identify a condition that matches each of your previous Contrast Index results.

For more information, see KODAK Publication No. Z-133E, *Monitoring and Troubleshooting KODAK Black-and-White Film Processes* (CAT 889 4784).

System Maintenance

KODAK XTOL Developer is very clean working, and will rarely need replacement in a properly replenished and maintained processor.

Take these steps for routine maintenance:

- Minimize air access to the replenishment tanks. Use floating lids.
- Use a small amount of water to rinse the developer from processor parts left exposed to air after shutdown.
- Replace evaporation losses with water prior to processor start-up.
- If your processor is equipped with recirculation filters, check them frequently, and change them as needed.

REPLENISHMENT

You can replenish this developer (full strength only, not dilute) to increase the capacity of the developer. Use XTOL Developer as a replenisher at a rate of 70 mL for each roll of 135-36 exposure, or the equivalent of 80 square inches (516 square centimetres) of film processed.

You can monitor replenished process systems with KODAK Black-and-White Film Process Control Strips and adjust the replenishment rate up or down in 10 mL increments to keep the process on aim. Allow adequate time for the process to stabilize between replenishment rate adjustments. Use the lowest replenishment rate that will maintain process control. For more information, see KODAK Publication No. Z-133E, mentioned in the column to the left.

STORAGE

Store mixed KODAK XTOL Developer in a full, tightly closed container, or a replenishment tank with a floating lid. To maintain shelf life, minimize the amount of air space in the storage container. Partially filled containers allow oxidation of the solution.

STORAGE LIFE OF UNUSED SOLUTIONS		
Full, Tightly Closed Container	Partially Filled, Tightly Closed Container	Replenisher Tank with a Floating Lid
Approximately 1 year	At least 2 months	Indefinitely, if new solution is added to replace that used by the processor

DISPOSAL

Dispose of used developer in accordance with your local regulations. Refer to the Material Safety Data Sheets for additional information.

If you have environmental or safety questions about Kodak products or services, contact Kodak Environmental Services at 1-716-477-3194, between 8 a.m. and 5 p.m. (Eastern time).

Kodak also maintains a 24-hour health hotline to answer questions about the safe handling of photographic chemicals. If you need health-related information about Kodak products, call 1-716-722-5151.

DEVELOPMENT TABLES

The following pages contain tables of starting-point development times and temperatures for developer solutions with and without dilution in small tanks, trays, rotary tubes, and large-tank replenished systems. This information includes processing data for Kodak films as well as for a sampling of other manufacturers' films. For critical applications, run tests to determine the best development time. Data for nominal film speeds are in **bold face** type.

Table No.	Title	Page
Roll Films:		
1	Processing Roll Film with FRESH, FULL-STRENGTH DEVELOPER	6
2	Processing Roll Film in Replenished Systems with FULL-STRENGTH DEVELOPER	10
3	Processing Roll Film with FRESH, DILUTE DEVELOPER	14
4	Processing KODAK Technical Pan Film / 2415 in Small Tanks with FRESH, DILUTE DEVELOPER	18
Sheet Films:		
5	Processing Sheet Film in Trays or Large Tanks with FULL-STRENGTH DEVELOPER	19
6	Processing Sheet Film in Rotary Tubes with FULL-STRENGTH DEVELOPER	20
7	Processing Sheet Film with FRESH, DILUTE DEVELOPER	21

Roll Films

**Important**

Development times shorter than 5 minutes (4 minutes in rotary tubes) may produce unsatisfactory uniformity.

TABLE 1: Processing Roll Film with FRESH, FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Small Tanks					Rotary Tubes (with Continuous Agitation)			
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)
KODAK PLUS-X Pan / PX / 5062 KODAK PLUS-X 125 Pro	135	32/64	0.52	5.75	4.50*	4.00*	3.00*	2.50*	5.00	4.00	3.25*	2.50*
		125	0.58	6.50	5.25	4.75*	3.75*	2.75*	5.50	4.50	4.00	3.00*
		250	0.65	7.75	6.50	5.75	4.50*	3.50*	6.25	5.50	4.75	3.50*
		500	0.75	9.25	8.00	7.25	5.50	4.25*	7.75	6.50	6.00	4.50
		1000	0.85	12.25	10.25	9.25	7.25	5.25	10.00	8.00	7.50	6.00
KODAK PLUS-X Pan Professional / PXP / 6057 KODAK PLUS-X 125 Pro	120/220	32/64	0.52	5.75	4.50*	4.00*	3.00*	2.50*	5.00	4.00	3.25*	2.50*
		125	0.58	6.75	5.50	5.00*	3.75*	3.00*	5.75	4.50	4.00	3.00*
		250	0.65	8.00	6.75	6.00	4.75*	3.50*	6.75	5.50	5.00	3.50*
		500	0.75	11.00	8.50	7.50	5.75	4.50*	8.50	7.00	6.00	4.50
		1000	0.85	16.00	11.50	10.00	7.75	6.00	11.00	9.00	8.00	6.00
KODAK VERICHROME Pan / VP / 6041	120	32/64	0.52	6.25	5.00	4.50*	3.50*	2.50*	5.00	4.00	3.50*	2.50*
		125	0.58	7.50	6.00	5.25	4.00*	3.00*	6.00	5.00	4.00	3.00*
		250	0.65	8.75	7.00	6.00	4.75*	3.50*	7.00	6.00	5.00	4.00
		500	0.75	11.00	8.50	7.50	5.75	4.50*	8.50	7.50	6.50	5.00
		1000	0.85	13.50	11.00	9.50	7.25	5.50	10.50	9.00	8.00	6.00
KODAK TRI-X Pan / TX / 5063 KODAK TRI-X 400 Pro	135	100/200	0.52	6.50	5.50	5.00	4.00*	3.25*	5.00	4.50	4.00	3.00*
		400	0.58	7.75	6.75	6.00	4.75*	3.75*	5.75	5.00	4.50	3.50*
		800	0.65	9.00	7.75	7.00	5.50	4.25*	6.50	5.50	5.00	4.00
		1600	0.75	10.50	9.00	8.00	6.50	5.00	8.00	7.00	6.00	5.00
		3200	0.85	12.50	10.50	9.50	7.50	5.75	9.50	8.00	7.00	6.00
KODAK TRI-X Pan / TX / 6043 KODAK TRI-X 400 Pro	120	100/200	0.52	6.75	5.50	4.75*	3.75*	3.00*	5.00	4.25	4.00	3.00*
		400	0.58	7.50	6.25	5.50	4.25*	3.50*	6.00	5.00	4.50	3.50*
		800	0.65	8.50	7.00	6.25	5.00	4.00*	7.00	5.75	5.00	4.00
		1600	0.75	10.25	8.75	7.75	6.00	4.75*	8.50	7.00	6.25	5.00
		3200	0.85	12.00	10.25	9.00	7.00	5.50	10.00	8.00	7.50	6.00

TABLE 1: Processing Roll Film with FRESH, FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Small Tanks					Rotary Tubes (with Continuous Agitation)			
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)
KODAK TRI-X Pan Professional / TXP / 6049	120/220	80/160	0.52	6.25	5.25	4.75*	3.75*	3.00*	5.00	4.00	3.50*	3.00*
		320	0.58	7.50	6.25	5.50	4.50*	3.50*	5.50	4.50	4.00	3.50*
		640	0.65	9.00	7.50	6.75	5.50	4.25*	6.50	5.50	5.00	4.00
		1250	0.75	11.50	9.50	8.50	6.75	5.50	8.50	7.00	6.50	5.00
		2500	0.85	14.50	11.75	10.50	8.50	7.00	11.00	9.00	8.50	6.50
KODAK T-MAX 100 Professional / TMX / 5052 KODAK T-MAX 100 Pro	135	25/50	0.52	7.00	5.75	5.00	4.00*	3.25*	6.00	5.00	4.50	3.50*
		100	0.58	8.00	6.75	6.00	4.50*	3.75*	7.00	6.00	5.25	4.00
		200	0.65	9.00	7.75	7.00	5.25	4.25*	8.00	7.00	6.00	4.50
		400	0.75	10.50	9.00	8.00	6.25	5.00	9.50	8.00	7.00	5.50
		800	0.85	12.00	10.50	9.50	7.25	6.00	11.50	9.00	8.00	6.50
KODAK T-MAX 100 Professional / TMX / 6052 KODAK T-MAX 100 Pro	120	25/50	0.52	7.00	5.75	5.00	4.00*	3.25*	6.00	5.00	4.50	3.25*
		100	0.58	8.00	6.75	6.00	4.50*	3.75*	7.00	5.75	5.00	3.75*
		200	0.65	9.00	7.75	7.00	5.25	4.25*	8.25	6.75	5.75	4.25
		400	0.75	10.50	9.00	8.00	6.00	5.00	10.00	8.25	7.00	5.00
		800	0.85	12.00	10.25	9.50	7.25	6.00	11.75	9.50	8.25	6.00
KODAK T-MAX 400 Professional / TMY / 5053 KODAK T-MAX 400 Pro	135	100/200	0.52	6.75	5.75	5.00	4.00*	3.25*	6.00	5.00	4.50	3.50*
		400	0.58	7.50	6.50	5.75	4.50*	3.50*	6.50	5.50	5.00	4.00
		800	0.65	8.50	7.25	6.50	5.00	4.00*	7.50	6.50	5.50	4.50
		1600	0.75	10.00	8.50	7.50	6.00	4.75*	8.50	7.50	6.50	5.00
		3200	0.85	11.50	9.50	8.50	6.75	5.50	10.00	8.50	7.50	5.75
KODAK T-MAX 400 Professional / TMY / 6053 KODAK T-MAX 400 Pro	120	100/200	0.52	6.75	5.75	5.25	4.00*	3.25*	5.50	4.75	4.25	3.25*
		400	0.58	7.50	6.50	5.75	4.50*	3.50*	6.25	5.25	4.75	3.75*
		800	0.65	8.50	7.25	6.50	5.25	4.00*	7.25	6.25	5.50	4.25
		1600	0.75	10.00	8.50	7.75	6.00	4.75*	8.50	7.25	6.50	5.00
		3200	0.85	11.50	10.00	9.00	7.00	5.50	10.00	8.50	7.50	5.75
KODAK T-MAX P3200 Professional / TMZ / 5054	135	100/200	0.48	8.50	7.00	6.25	5.00	4.00*	7.00	6.00	5.50	4.50
		400	0.52	9.00	7.50	6.75	5.50	4.25*	8.00	7.00	6.00	5.00
		800	0.58	10.00	8.25	7.50	6.00	4.75*	9.00	8.00	7.00	5.50
		1600	0.65	11.00	9.25	8.50	7.00	5.25	10.00	9.00	8.00	6.00
		3200	0.75	13.00	11.00	10.00	8.00	6.25	12.00	10.00	9.00	7.00
		6400	0.85	15.00	12.50	11.50	9.25	7.00	14.50	11.50	10.00	8.00
		12500	0.95	19.00	15.25	13.25	10.75	8.25	17.00	13.50	12.00	9.00
		25000	1.05	23.00	18.50	16.50	12.50	9.50	NR	NR	NR	NR

TABLE 1: Processing Roll Film with FRESH, FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Small Tanks					Rotary Tubes (with Continuous Agitation)				
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	
KODAK EKTAPAN / PNT / 4162	70 mm	25/50	0.52	6.00	5.25	4.50*	3.75*	2.75*	Not Applicable				
		100	0.58	8.50	7.00	6.25	5.00	4.00*					
		200	0.65	10.50	9.00	8.00	6.50	5.00					
		400	0.75	13.50	11.50	10.00	8.00	6.50					
		800	0.85	16.75	14.25	13.00	10.00	8.25					
KODAK High Speed Infrared / HIE / 2481	135	See Pub No. F-13	0.52	6.50	5.50	5.00	4.00*	3.25*	5.25	4.50	4.00	3.25*	
			0.58	7.25	6.00	5.50	4.50*	3.75*	5.75	5.00	4.50	3.75*	
			0.65	8.00	6.75	6.00	5.00	4.25*	6.25	5.50	5.00	4.00	
			0.75	9.25	7.75	7.00	5.75	4.75*	7.00	6.25	5.50	4.50	
			0.85	10.50	9.00	8.00	6.50	5.50	8.00	7.00	6.25	5.25	
AGFAPAN APX 25	135	12	0.52	4.50*	3.75*	3.50*	2.75*	2.25*	4.00	NR	NR	NR	
		25	0.58	5.75	4.75*	4.25*	3.25*	2.75*	6.00	4.00	2.00*	1.00*	
		50	0.65	8.00	6.50	5.75	4.25*	3.50*	9.00	6.00	4.00	2.50*	
		100	0.75	14.50	10.25	8.75	6.50	5.25	14.00	10.00	7.50	5.00	
		200	0.85	NR	NR	NR	NR	NR	NR	NR	NR	NR	
AGFAPAN APX 100	135	25/50	0.52	6.50	5.75	5.25	4.50*	3.25*	5.00	4.50	4.25	2.50*	
		100	0.58	8.00	6.75	6.25	5.00	4.00*	6.00	5.50	5.00	3.00*	
		200	0.65	10.00	8.75	7.75	6.00	4.75*	7.50	7.00	6.00	3.75*	
		400	0.75	13.00	11.00	10.00	7.50	6.00	9.50	8.50	7.50	4.75	
		800	0.85	15.50	13.00	11.50	9.00	7.00	12.00	10.00	9.00	6.00	
AGFAPAN 400	135	100/200	0.52	8.00	6.50	5.75	4.50*	3.50*	6.50	5.50	4.50	3.50*	
		400	0.58	9.50	8.00	7.00	5.50	4.00*	8.00	6.50	5.50	4.00	
		800	0.65	12.00	9.75	8.50	6.50	5.00	9.50	7.75	6.50	5.00	
		1600	0.75	15.00	12.25	11.00	8.50	6.50	12.00	9.50	8.00	6.50	
		3200	0.85	19.00	14.50	13.50	10.50	8.00	15.00	12.00	10.00	8.00	
FUJI NEOPAN 400 Professional	135	100/200	0.52	9.00	7.50	6.50	5.00	3.75*	6.00	5.00	4.50	3.25*	
		400	0.58	10.00	8.25	7.25	5.75	4.50*	7.00	6.00	5.50	3.75*	
		800	0.65	11.50	9.75	8.75	6.50	5.00	8.50	7.25	6.50	4.50	
		1600	0.75	13.50	11.50	10.50	8.00	6.25	10.50	9.00	8.00	5.50	
		3200	0.85	16.00	13.50	12.00	9.50	7.50	12.50	11.00	10.00	7.00	

TABLE 1: Processing Roll Film with FRESH, FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Small Tanks					Rotary Tubes (with Continuous Agitation)			
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)
FUJI NEOPAN 1600 Professional	135	200	0.52	4.25*	4.00*	3.50*	3.00*	2.25*	3.50*	3.00*	2.75*	2.00*
		400	0.58	5.00	4.50*	4.00*	3.25*	2.50*	4.00	3.25*	3.00*	2.25*
		800	0.65	5.50	5.00	4.50*	3.50*	3.00*	4.50	3.75*	3.25*	2.50*
		1600	0.75	6.50	5.75	5.00	4.00*	3.50*	5.25	4.50	4.00	2.75*
		3200	0.85	7.50	6.50	5.50	4.75*	4.00*	6.00	5.25	4.75	3.25*
		6400	0.95	9.00	7.25	6.50	5.50	4.75*	7.00	6.00	5.50	4.00
ILFORD PAN F Plus	135	25	0.52	7.25	6.00	5.50	4.25*	3.25*	5.00	4.75	4.50	2.75*
		50	0.58	8.50	7.00	6.00	4.75*	3.75*	6.00	5.50	5.00	3.25*
		100	0.65	9.50	8.00	7.00	5.50	4.25*	7.00	6.50	6.00	3.75*
		200	0.75	11.00	9.00	8.00	6.25	4.75*	8.00	7.50	7.00	4.50
		400	0.85	12.50	10.00	9.00	7.00	5.50	9.50	8.75	8.00	5.25
ILFORD FP-4 Plus	135	32/64	0.52	8.00	6.50	5.50	4.50*	3.50*	6.00	5.25	4.50	3.00*
		125	0.58	9.50	8.00	6.50	5.25	4.00*	7.00	6.00	5.50	3.75*
		250	0.65	11.00	9.00	7.50	6.00	4.50*	8.50	7.50	6.50	4.50
		500	0.75	14.00	11.00	9.25	7.50	5.50	10.50	9.00	8.00	5.50
		1000	0.85	17.50	14.00	11.50	9.25	7.00	12.50	11.00	10.00	6.75
ILFORD HP-5 Plus	135	100/200	0.52	8.50	7.50	6.75	5.25	4.00*	6.00	5.00	4.50	3.50*
		400	0.58	10.00	8.50	8.00	6.25	4.75*	7.50	6.25	5.50	4.25
		800	0.65	12.00	10.50	9.50	7.50	5.75	9.00	7.50	6.50	5.00
		1600	0.75	16.00	13.00	12.00	9.00	7.00	11.00	9.50	8.50	6.25
		3200	0.85	NR	17.50	15.00	11.50	8.50	13.50	11.50	10.50	8.00
ILFORD DELTA 100 Professional	135	25/50	0.52	8.00	6.75	6.00	4.50*	3.50*	5.50	5.00	4.50	3.50*
		100	0.58	9.50	8.00	7.00	5.50	4.25*	7.00	6.00	5.50	4.25
		200	0.65	11.50	9.50	8.50	6.50	5.00	9.00	7.50	6.50	5.00
		400	0.75	14.50	11.50	10.50	8.00	6.25	11.50	9.25	8.00	6.25
		800	0.85	18.50	14.50	12.75	9.50	7.50	14.00	11.50	10.00	7.50
ILFORD DELTA 400 Professional	135	100/200	0.52	7.00	6.00	5.50	4.25*	3.25*	6.00	5.25	4.75	3.25*
		400	0.58	8.00	7.00	6.25	5.00	4.00*	7.00	6.25	5.50	3.75*
		800	0.65	9.50	8.00	7.50	5.75	4.50*	8.00	7.00	6.25	4.50
		1600	0.75	11.50	10.00	9.00	7.00	5.50	9.50	8.00	7.25	5.25
		3200	0.85	14.00	12.00	10.75	8.25	6.50	11.00	9.25	8.50	6.25

* Development times shorter than 5 minutes (4 minutes in rotary tubes) may produce unsatisfactory uniformity.
NR= Not recommended, as determined by testing.

**Important**

Development times shorter than 4 minutes may produce unsatisfactory uniformity.

TABLE 2: Processing Roll Film in Replenished Systems with FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Rotary Tubes (with Continuous Agitation and Seasoned Developer)				Large Tanks (with Seasoned Developer)				
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK PLUS-X Pan / PX / 5062 KODAK PLUS-X 125 Pro	135	32/64	0.52	6.00	4.75	4.00	3.00*	7.00	5.75	5.00	3.50*	2.50*
		125	0.58	7.00	5.50	5.00	3.50*	7.50	6.50	6.00	4.00	3.00*
		250	0.65	8.25	6.75	6.00	4.00	9.00	8.00	7.00	5.00	3.75*
		500	0.75	10.50	8.50	7.50	5.00	11.50	10.00	9.00	7.00	5.00
		1000	0.85	NR	11.50	10.00	7.00	16.50	13.00	11.00	8.50	6.75
KODAK PLUS-X Pan Professional / PXP / 6057 KODAK PLUS-X 125 Pro	120/220	32/64	0.52	6.00	4.75	4.00	3.00*	7.50	5.75	5.00	3.50*	2.50*
		125	0.58	7.00	5.75	5.00	3.50*	8.50	6.75	6.00	4.50	3.25*
		250	0.65	8.50	7.00	6.00	4.50	10.50	8.50	7.50	5.50	4.00
		500	0.75	11.00	9.00	8.00	6.00	13.00	10.75	10.00	7.25	5.25
		1000	0.85	14.00	11.50	10.50	8.00	NR	15.00	13.50	10.00	7.00
KODAK VERICHROME Pan / VP / 6041	120	32/64	0.52	6.00	5.00	4.25	3.00*	7.50	6.25	5.50	4.00	3.00*
		125	0.58	7.00	5.75	5.00	3.50*	8.50	7.00	6.00	4.50	3.50*
		250	0.65	8.50	6.75	6.00	4.50	10.00	8.00	7.00	5.25	4.00
		500	0.75	11.00	8.50	7.50	5.50	13.50	11.00	9.50	6.75	5.00
		1000	0.85	14.00	11.50	10.00	7.50	18.00	14.00	12.00	8.75	6.50
KODAK TRI-X Pan / TX / 5063 KODAK TRI-X 400 Pro	135	100/200	0.52	6.00	5.00	4.50	3.50*	8.50	7.00	6.25	5.00	3.50*
		400	0.58	7.00	5.75	5.25	4.00	9.50	8.00	7.50	5.50	4.00
		800	0.65	8.00	7.00	6.25	5.00	10.50	9.00	8.00	6.25	4.75
		1600	0.75	10.00	8.25	7.50	6.00	12.50	10.50	9.50	7.50	5.50
		3200	0.85	12.00	10.00	9.00	7.00	14.50	12.00	11.00	8.50	6.50
KODAK TRI-X Pan / TX / 6043 KODAK TRI-X 400 Pro	120	100/200	0.52	6.00	5.00	4.50	3.25*	8.00	6.50	5.50	4.00	3.00*
		400	0.58	7.00	6.00	5.25	4.00	9.00	7.50	6.50	4.75	3.75*
		800	0.65	8.00	6.75	6.00	4.75	10.50	8.75	7.75	5.75	4.50*
		1600	0.75	10.00	8.50	7.50	5.50	12.50	10.50	9.50	7.00	5.25
		3200	0.85	12.00	10.00	9.00	6.50	14.50	12.50	11.00	8.25	6.25

TABLE 2: Processing Roll Film in Replenished Systems with FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Rotary Tubes (with Continuous Agitation and Seasoned Developer)				Large Tanks (with Seasoned Developer)				
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK TRI-X Pan Professional / TXP / 6049	120/220	100/200	0.52	6.00	5.00	4.25	3.50*	7.50	6.25	5.50	4.25	3.50*
		400	0.58	7.00	5.75	5.00	4.25	9.50	7.50	6.50	5.25	4.25
		800	0.65	8.00	6.75	6.25	5.00	11.50	9.25	8.00	6.25	5.00
		1600	0.75	11.00	9.25	8.00	6.50	15.00	11.75	10.00	8.00	6.50
		3200	0.85	NR	11.50	10.00	8.00	18.50	15.00	13.00	10.50	7.75
KODAK T-MAX 100 Professional / TMX / 5052 KODAK T-MAX 100 Pro	135	25/50	0.52	7.50	6.50	6.00	4.00	9.50	8.00	7.25	5.50	4.25
		100	0.58	9.00	7.75	7.00	5.00	11.50	9.50	8.50	6.25	5.00
		200	0.65	11.00	9.00	8.00	6.00	13.50	11.25	9.75	7.50	5.75
		400	0.75	13.50	11.00	9.50	7.00	15.50	13.00	11.50	8.75	6.75
		800	0.85	17.50	13.50	11.00	8.00	18.00	15.25	13.50	10.00	7.50
KODAK T-MAX 100 Professional / TMX / 6052 KODAK T-MAX 100 Pro	120	25/50	0.52	8.00	6.00	5.00	3.75*	9.00	7.50	6.50	5.00	3.75*
		100	0.58	9.50	7.00	6.00	4.50	11.00	8.25	7.50	5.50	4.25
		200	0.65	11.00	8.25	7.00	5.25	11.25	9.50	8.50	6.25	5.00
		400	0.75	13.00	10.00	8.50	6.25	12.50	10.75	10.00	7.25	5.75
		800	0.85	15.50	12.00	10.00	7.50	15.00	12.50	11.50	8.50	6.75
KODAK T-MAX 400 Professional / TMY / 5053 KODAK T-MAX 400 Pro	135	100/200	0.52	7.00	6.00	5.50	4.00	8.00	6.75	6.00	5.00	3.50*
		400	0.58	8.00	6.75	6.00	4.50	9.00	7.75	7.00	5.50	4.00
		800	0.65	9.00	7.75	7.00	5.00	10.50	9.00	8.00	6.00	4.50
		1600	0.75	10.50	9.00	8.00	6.00	12.00	10.00	9.00	7.00	5.25
		3200	0.85	12.00	10.25	9.00	7.00	13.50	11.50	10.00	8.00	6.00
KODAK T-MAX 400 Professional / TMY / 6053 KODAK T-MAX 400 Pro	120	100/200	0.52	7.25	5.50	4.50	3.75*	8.50	7.25	6.00	4.75	3.50*
		400	0.58	8.25	6.50	5.50	4.25	9.25	7.75	6.75	5.25	4.00
		800	0.65	9.50	7.50	6.25	4.75	10.00	8.50	7.50	6.00	4.50
		1600	0.75	11.00	8.75	7.50	5.75	11.75	10.00	8.75	6.75	5.25
		3200	0.85	12.50	10.00	8.50	6.75	13.25	11.25	10.00	7.75	6.00
KODAK T-MAX P3200 Professional / TMZ / 5054	135	100/200	0.48	9.00	7.00	6.00	5.00	10.00	8.00	7.50	5.50	4.50
		400	0.52	10.00	8.00	7.00	5.50	11.00	9.00	8.00	6.25	5.00
		800	0.58	11.00	9.25	8.00	6.00	12.00	10.00	9.00	7.00	5.50
		1600	0.65	13.00	10.25	9.00	7.00	13.00	11.00	10.00	7.75	6.00
		3200	0.75	15.00	12.00	10.50	8.00	15.00	13.00	11.50	9.00	7.00
		6400	0.85	17.00	13.50	12.00	9.00	16.50	15.00	13.50	10.50	8.00
		12500	0.95	20.00	15.50	13.50	10.50	21.00	17.00	15.50	12.50	9.50
25000	1.05	24.00	18.00	16.00	13.00	NR	21.00	18.50	15.00	11.50		

TABLE 2:

Processing Roll Film in Replenished Systems with FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Rotary Tubes (with Continuous Agitation and Seasoned Developer)				Large Tanks (with Seasoned Developer)				
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK High Speed Infrared / HIE / 2481	135	See Pub No. F-13	0.52	6.50	5.75	5.25	4.00	8.50	6.75	6.00	4.75	4.00
			0.58	7.25	6.25	5.75	4.50	10.00	8.00	7.00	5.50	4.50
			0.65	8.00	7.00	6.50	5.00	11.50	9.00	8.00	6.25	5.00
			0.75	9.50	8.25	7.50	6.00	13.00	10.25	9.00	7.00	5.50
			0.85	11.00	9.25	8.50	7.00	14.50	11.50	10.00	7.75	6.00
AGFAPAN APX 25	135	12	0.52	4.00	3.00*	NR	NR	6.50	5.25	4.50	3.50*	3.00*
		25	0.58	6.00	5.00	4.50	3.00*	8.50	6.50	5.75	4.50	4.00
		50	0.65	10.00	7.50	6.50	4.50	12.50	10.00	8.50	6.50	5.00
		100	0.75	15.00	12.00	10.50	7.50	NR	16.00	14.00	11.00	8.00
		200	0.85	NR	NR	NR	NR	NR	NR	NR	NR	12.00
AGFAPAN APX 100	135	25/50	0.52	7.00	6.00	5.50	3.50*	9.00	7.00	6.50	5.00	4.00
		100	0.58	8.50	7.25	6.50	4.25	11.00	9.00	8.00	6.50	5.00
		200	0.65	10.50	9.00	8.00	5.25	13.50	11.00	10.00	8.00	6.00
		400	0.75	13.00	11.00	10.00	6.50	17.50	14.00	12.00	9.50	7.50
		800	0.85	17.00	14.50	13.00	8.00	NR	19.00	16.00	12.00	9.50
AGFAPAN 400	135	100/200	0.52	8.00	6.50	5.50	4.25	10.00	8.00	7.50	5.50	4.00
		400	0.58	9.50	7.50	6.50	5.00	12.00	10.00	9.00	6.50	5.00
		800	0.65	12.00	9.50	8.00	6.00	14.00	11.50	10.50	8.00	6.00
		1600	0.75	15.00	12.50	10.50	7.50	18.50	14.00	12.50	9.50	7.50
		3200	0.85	18.00	15.00	13.00	9.50	NR	20.00	16.50	11.50	9.00
FUJI NEOPAN 400 Professional	135	100/200	0.52	7.00	6.00	5.25	3.50*	9.00	7.50	6.75	5.00	4.00
		400	0.58	8.00	7.00	6.25	4.25	10.00	8.25	7.50	5.50	4.50
		800	0.65	9.50	8.00	7.25	5.00	11.50	9.50	8.50	6.50	5.00
		1600	0.75	11.50	9.75	8.50	6.00	13.50	11.50	10.00	8.00	6.00
		3200	0.85	13.50	11.50	10.00	7.50	16.00	13.50	12.00	9.50	7.00
FUJI NEOPAN 1600 Professional	135	200	0.52	4.25	3.50*	3.25*	2.50*	5.50	4.75	4.25	3.25*	2.50*
		400	0.58	4.75	4.00	3.50*	2.75*	6.00	5.25	4.75	3.75*	3.00*
		800	0.65	5.50	4.75	4.00	3.00*	6.75	6.00	5.50	4.25	3.50*
		1600	0.75	6.50	5.50	4.75	3.25*	8.00	7.00	6.25	5.00	4.00
		3200	0.85	7.50	6.25	5.50	4.00	9.00	8.00	7.00	5.50	4.50
		6400	0.95	8.50	7.50	6.50	4.75	10.50	9.00	8.00	6.25	5.00

TABLE 2: Processing Roll Film in Replenished Systems with FULL-STRENGTH DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	Rotary Tubes (with Continuous Agitation and Seasoned Developer)				Large Tanks (with Seasoned Developer)				
				65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
ILFORD PAN F Plus	135	25	0.52	7.00	6.25	5.50	3.25*	9.50	7.50	7.00	5.00	3.50*
		50	0.58	8.50	7.25	6.50	4.00	11.00	9.00	8.00	6.00	4.50
		100	0.65	10.00	8.50	7.50	5.00	13.00	11.00	9.50	7.00	5.00
		200	0.75	12.00	10.25	9.50	6.00	16.00	13.00	11.50	8.50	6.00
		400	0.85	14.50	12.50	11.00	7.00	19.00	16.00	14.00	10.50	7.50
ILFORD FP-4 Plus	135	32/64	0.52	9.50	7.75	6.50	4.50	11.50	9.00	8.00	6.00	4.50
		125	0.58	11.00	9.00	7.50	5.25	13.50	11.00	9.50	7.00	5.00
		250	0.65	13.00	10.75	9.50	6.25	16.00	12.50	11.00	8.00	6.00
		500	0.75	16.00	13.50	12.00	7.75	21.00	15.50	13.50	10.00	7.00
		1000	0.85	19.00	16.00	14.00	9.50	NR	NR	17.00	12.50	9.00
ILFORD HP-5 Plus	135	100/200	0.52	8.50	6.75	5.50	4.00	11.50	9.00	8.00	6.00	4.50
		400	0.58	9.50	7.75	6.50	5.00	13.25	10.50	9.50	7.00	5.50
		800	0.65	11.50	9.50	8.00	6.00	15.75	13.00	11.50	8.50	6.50
		1600	0.75	14.00	11.50	10.00	7.25	NR	15.50	13.50	10.00	8.00
		3200	0.85	17.00	14.25	12.50	9.00	NR	19.50	17.50	13.00	10.00
ILFORD DELTA 100 Professional	135	25/50	0.52	8.50	7.25	6.50	4.25	10.50	8.00	7.00	5.50	4.25
		100	0.58	10.50	8.50	7.50	5.25	12.50	10.00	8.50	6.50	5.00
		200	0.65	13.00	10.50	9.00	6.50	15.50	12.00	10.50	8.00	6.00
		400	0.75	16.50	13.50	11.50	8.00	NR	15.00	13.00	10.00	7.50
		800	0.85	20.00	16.50	14.50	10.00	NR	19.00	16.50	12.50	9.50
ILFORD DELTA 400 Professional	135	100/200	0.52	7.50	6.25	5.50	4.00	9.00	7.50	6.50	5.00	4.00
		400	0.58	8.50	7.00	6.25	4.50	10.50	8.50	8.00	6.00	4.50
		800	0.65	10.00	8.25	7.25	5.25	12.00	10.00	9.00	7.00	5.25
		1600	0.75	12.00	9.50	8.50	6.25	14.00	11.50	10.00	8.00	6.00
		3200	0.85	14.50	11.50	10.00	7.50	16.50	13.50	12.00	9.50	7.50

* Development times shorter than 4 minutes may produce unsatisfactory uniformity.
NR= Not recommended, as determined by testing.



Important

Development times shorter than 5 minutes (4 minutes in rotary tubes) may produce unsatisfactory uniformity.

TABLE 3: Processing Roll Film with FRESH, DILUTE DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	In Small-Tanks, DEVELOPER DILUTION												In Rotary-Tubes (with Continuous Agitation), DEVELOPER DILUTION											
				1:1				1:2				1:3				1:1				1:2				1:3			
				68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK PLUS-X Pan / PX / 5062 KODAK PLUS-X 125 Pro	135	32/64	0.52	6.50	6.00	5.00	4.00*	7.50	7.00	5.50	4.50*	9.50	8.50	6.50	5.25	4.50	4.00	3.00*	2.25*	5.50	5.00	3.50*	2.75*	6.00	5.50	4.25	3.25*
		125	0.58	7.50	7.00	5.50	4.50*	8.50	8.00	6.50	5.25	10.50	9.50	7.50	6.00	5.75	5.00	3.75*	2.75*	6.50	5.75	4.25	3.25*	7.00	6.50	5.00	4.00
		250	0.65	8.75	8.00	6.50	5.25	9.75	9.00	7.50	6.00	12.00	11.00	9.00	6.75	6.75	6.00	4.50	3.25*	7.50	6.50	5.00	4.00	8.25	7.50	6.00	5.00
		500	0.75	11.00	10.00	8.00	6.50	13.00	12.00	9.50	7.50	15.50	14.00	11.50	8.00	8.00	7.00	5.50	4.00	9.00	8.00	6.25	5.00	10.00	9.00	7.50	6.00
		1000	0.85	15.50	14.00	11.00	8.50	16.50	15.00	12.50	9.00	19.50	18.00	15.00	10.00	9.50	8.50	6.50	5.00	11.00	10.00	8.00	6.00	12.00	11.00	9.00	7.50
KODAK PLUS-X Pan Professional / PXP / 6057 KODAK PLUS-X 125 Pro	120/220	32/64	0.52	6.00	5.50	4.25*	3.00*	7.25	6.75	5.00	3.25*	8.75	8.25	6.50	4.50*	4.50	4.00	2.75*	2.00*	5.50	5.00	4.00	2.75*	6.75	6.00	4.50	3.50*
		125	0.58	7.25	6.50	5.00	3.50*	8.50	8.00	6.25	4.25*	10.25	9.50	7.50	5.50	5.75	5.00	3.50*	2.50*	6.75	6.00	4.50	3.25*	7.75	7.00	5.25	4.00
		250	0.65	8.75	8.00	6.00	4.25*	10.25	9.50	7.50	5.25	12.00	11.25	9.00	6.50	6.75	6.00	4.25	3.25*	7.75	7.00	5.25	4.00	8.75	8.00	6.25	5.00
		500	0.75	11.00	10.00	7.75	5.50	12.75	12.00	9.75	6.75	14.50	13.50	11.00	8.00	8.75	7.50	5.25	4.00	9.25	8.50	6.50	5.00	10.25	9.50	7.75	6.25
		1000	0.85	15.25	14.00	11.00	7.00	16.75	16.00	13.00	9.00	18.25	17.00	13.75	10.00	11.50	10.00	7.00	5.25	12.00	11.00	8.00	6.25	13.25	12.00	9.75	8.00
KODAK VERICHROME Pan / VP / 6041	120	32/64	0.52	6.75	6.00	4.50*	2.75*	7.50	7.00	5.25	3.50*	9.25	8.50	6.50	4.50*	4.50	4.00	3.00*	2.25*	5.75	5.00	3.75*	3.00*	6.75	6.00	4.50	3.50*
		125	0.58	7.50	7.00	5.25	3.25*	8.50	8.00	6.25	4.50*	10.25	9.50	7.50	5.50	5.75	5.00	3.75*	2.75*	6.75	6.00	4.50	3.50*	7.75	7.00	5.25	4.25
		250	0.65	8.75	8.00	6.25	4.25*	10.25	9.50	7.50	5.50	11.75	11.00	9.00	6.50	6.75	6.00	4.50	3.25*	8.00	7.00	5.50	4.25	8.75	8.00	6.25	5.00
		500	0.75	10.75	10.00	8.00	5.50	12.75	12.00	9.75	7.00	14.00	13.25	11.00	8.00	8.50	7.50	5.50	4.25	9.25	8.50	6.75	5.00	10.25	9.50	7.75	6.00
		1000	0.85	13.75	13.00	10.50	7.50	16.75	15.00	12.00	8.50	16.50	15.50	13.25	10.00	11.00	9.50	6.75	5.25	11.25	10.50	8.25	6.00	13.00	12.00	9.50	7.25
KODAK TRI-X Pan / TX / 5063 KODAK TRI-X 400 Pro	135	100/200	0.52	8.00	7.50	6.50	5.50	8.75	8.50	7.50	6.50	10.75	10.00	8.50	7.50	5.50	5.00	3.75*	3.00*	6.50	6.00	4.50	3.50*	7.50	7.00	5.75	4.50
		400	0.58	8.75	8.25	7.00	6.00	10.50	10.00	8.50	7.00	12.50	11.50	9.50	8.25	6.75	6.00	4.50	3.50*	7.50	7.00	5.50	4.00	9.00	8.00	6.50	5.00
		800	0.65	10.00	9.50	8.00	6.50	12.50	11.50	9.50	7.50	14.00	13.00	11.00	9.00	7.75	7.00	5.25	4.00	8.75	8.00	6.50	5.00	10.50	9.50	7.75	6.00
		1600	0.75	11.75	11.00	9.00	7.25	14.50	13.50	11.00	8.50	16.50	15.50	12.75	10.25	9.00	8.00	6.25	4.75	10.50	9.50	8.00	6.00	12.00	11.00	9.00	7.00
		3200	0.85	13.50	12.50	10.50	8.00	17.00	15.50	12.50	9.50	20.00	18.00	15.00	11.50	10.50	9.50	7.25	6.00	12.50	11.50	9.50	7.00	14.00	13.00	10.50	8.50
KODAK TRI-X Pan / TX / 6043 KODAK TRI-X 400 Pro	120	100/200	0.52	6.75	6.25	5.00	3.75*	8.50	8.00	6.25	4.50*	9.50	8.75	7.00	5.50	5.00	4.50	3.50*	3.00*	6.25	6.00	5.00	3.50*	8.25	7.50	5.75	4.25
		400	0.58	8.00	7.25	6.00	4.50*	10.25	9.50	7.50	5.50	11.00	10.50	8.50	6.50	6.25	5.50	4.25	3.50*	7.25	7.00	5.75	4.00	9.25	8.50	6.75	5.00
		800	0.65	9.25	8.50	7.00	5.50	12.00	11.00	9.00	6.50	13.50	12.50	10.00	7.50	7.25	6.50	5.00	4.00	8.50	8.00	6.75	4.75	11.00	10.00	7.75	5.75
		1600	0.75	11.00	10.50	8.50	6.50	14.50	13.50	10.75	7.75	16.25	15.25	12.50	9.00	9.00	8.00	6.00	4.75	10.50	10.00	8.25	5.75	13.00	12.00	9.25	7.00
		3200	0.85	13.50	12.50	10.25	7.75	17.00	16.00	13.00	9.50	19.75	18.50	15.00	11.00	11.50	10.00	7.25	5.75	12.75	12.00	9.75	6.75	15.25	14.00	10.75	8.25

TABLE 3: Processing Roll Film with FRESH, DILUTE DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	In Small-Tanks, DEVELOPER DILUTION												In Rotary-Tubes (with Continuous Agitation), DEVELOPER DILUTION											
				1:1				1:2				1:3				1:1				1:2				1:3			
				68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK TRI-X Pan Professional / TXP / 6049	120/220	80/160	0.52	7.75	7.00	5.50	4.00*	10.25	9.50	7.50	6.00	12.25	11.50	9.50	7.50	5.75	5.25	4.00	3.25*	6.75	6.50	5.75	4.25	9.00	8.50	7.00	5.25
		320	0.58	8.75	8.00	6.50	5.00	12.00	11.00	9.00	7.00	14.25	13.25	11.00	9.00	6.75	6.00	4.75	3.75*	7.75	7.50	6.75	5.00	10.50	10.00	8.00	6.25
		640	0.65	10.25	9.50	8.00	6.00	14.00	13.00	10.50	8.50	17.25	16.25	13.50	10.50	7.75	7.00	5.50	4.50	9.25	9.00	8.00	5.75	12.25	11.50	9.25	7.25
		1250	0.75	12.75	12.00	10.00	8.00	16.50	15.25	13.00	10.00	21.50	20.00	16.50	13.00	9.25	8.50	6.75	5.50	11.50	11.00	9.50	7.00	15.00	14.00	11.00	9.00
		2500	0.85	15.75	14.50	12.00	10.00	21.00	19.50	16.00	12.50	25.50	24.00	20.00	16.50	11.50	10.50	8.25	6.50	14.00	13.50	11.25	8.50	18.50	17.00	13.75	11.00
KODAK T-MAX 100 Professional / TMX / 5052 KODAK T-MAX 100 Pro	135	25/50	0.52	8.00	7.25	6.00	5.00	11.50	10.50	8.50	6.50	14.50	13.50	11.50	9.00	7.75	7.00	5.50	4.50	10.50	9.50	7.50	6.00	14.00	13.00	10.00	8.00
		100	0.58	9.25	8.50	7.00	5.50	12.50	11.50	9.50	7.25	16.00	15.00	12.50	10.00	8.75	8.00	6.25	5.00	12.00	11.00	8.50	7.00	15.50	14.50	11.50	9.00
		200	0.65	10.25	9.50	8.00	6.25	13.75	13.00	10.50	8.25	18.25	17.00	14.00	11.00	9.75	9.00	7.25	6.00	13.50	12.50	10.00	8.00	18.00	16.50	13.00	10.00
		400	0.75	12.25	11.50	9.00	7.00	15.75	14.50	12.00	9.50	20.50	19.00	15.50	12.50	11.50	10.50	8.50	7.00	15.50	14.00	11.50	9.00	21.00	19.50	15.00	11.50
		800	0.85	14.50	13.00	10.50	8.00	18.00	16.50	13.50	10.50	23.00	21.00	17.50	14.00	13.00	12.00	9.75	8.00	18.00	17.00	13.50	10.00	NR	23.00	17.50	13.00
KODAK T-MAX 100 Professional / TMX / 6052 KODAK T-MAX 100 Pro	120	25/50	0.52	8.75	8.00	6.00	4.50*	11.75	11.00	8.75	7.00	15.00	14.00	11.25	9.50	6.75	6.50	6.00	5.50	8.75	8.50	7.75	7.00	11.50	11.00	10.00	9.50
		100	0.58	10.00	9.00	6.75	5.25	13.00	12.00	10.00	8.00	16.75	15.50	12.75	10.50	7.75	7.50	6.75	6.00	10.00	9.50	8.50	8.00	13.00	12.50	11.50	10.50
		200	0.65	11.00	10.00	7.50	6.00	14.50	13.50	11.25	9.00	18.75	17.50	14.25	11.50	8.75	8.50	7.75	7.00	11.50	11.00	10.00	9.00	15.25	14.50	12.75	11.50
		400	0.75	12.75	11.50	8.75	6.75	16.75	15.50	12.50	10.00	21.00	19.50	16.00	12.50	10.25	9.75	8.75	8.00	13.50	13.00	11.50	10.00	18.50	17.50	15.00	12.50
		800	0.85	15.25	13.50	10.00	7.50	19.00	17.50	13.75	11.00	23.50	22.00	18.25	14.00	11.50	11.00	10.00	9.00	15.75	15.00	13.00	11.00	23.50	22.00	18.00	14.00
KODAK T-MAX 400 Professional / TMY / 5053 KODAK T-MAX 400 Pro	135	100/200	0.52	8.00	7.50	6.50	5.50	9.50	9.00	7.50	6.50	12.25	11.50	10.00	8.00	6.50	6.00	4.75	4.00	8.50	8.00	6.50	5.00	10.50	10.00	8.00	6.50
		400	0.58	8.75	8.00	7.00	6.00	10.50	10.00	8.50	7.00	13.50	13.00	11.00	8.75	7.75	7.00	5.50	4.50	9.50	9.00	7.50	5.75	12.00	11.50	9.25	7.50
		800	0.65	9.50	9.00	7.75	6.50	12.25	11.50	9.50	7.50	15.00	14.00	12.50	9.50	8.75	8.00	6.25	5.00	10.75	10.00	8.50	6.50	14.00	13.00	10.50	8.50
		1600	0.75	10.75	10.00	8.50	7.00	13.75	13.00	11.00	8.50	17.00	16.00	14.00	11.00	10.00	9.25	7.25	6.00	12.50	11.50	10.00	7.50	16.25	15.00	12.00	9.50
		3200	0.85	12.50	11.50	9.25	7.50	16.00	15.00	12.50	9.50	20.00	18.50	16.00	12.00	11.50	10.50	8.50	7.00	14.50	13.50	11.50	8.50	18.00	17.00	13.75	10.50
KODAK T-MAX 400 Professional / TMY / 6053 KODAK T-MAX 400 Pro	120	100/200	0.52	8.00	7.50	6.25	5.00	11.00	10.00	8.00	6.50	13.75	12.50	9.50	8.00	6.00	5.50	4.50	3.75*	8.00	7.50	6.50	5.00	10.50	10.00	8.00	6.50
		400	0.58	9.25	8.50	7.00	5.50	12.50	11.50	9.00	7.25	15.50	14.00	11.00	9.00	7.00	6.50	5.25	4.25	9.00	8.50	7.25	5.50	11.75	11.00	9.00	7.00
		800	0.65	10.75	10.00	8.00	6.00	14.25	13.00	10.25	8.00	17.25	15.50	12.50	10.00	8.25	7.50	6.00	4.75	10.50	9.50	8.00	6.00	13.00	12.00	10.00	7.75
		1600	0.75	12.50	11.50	9.25	7.00	16.50	15.00	11.75	9.25	19.50	18.00	14.00	11.50	9.75	9.00	7.00	5.50	12.00	11.00	9.00	7.00	15.00	14.00	11.50	8.75
		3200	0.85	14.25	13.00	10.50	8.00	19.25	17.50	13.50	10.50	22.75	20.50	16.00	13.00	11.25	10.50	8.25	6.25	14.00	13.00	10.50	8.00	17.25	16.00	13.00	10.00
KODAK T-MAX P3200 Professional / TMZ / 5054	135	100/200	0.48	10.50	9.50	7.50	6.50	14.25	13.00	10.00	8.00	17.25	16.00	12.50	10.50	9.25	8.50	6.75	5.50	12.00	11.00	8.50	7.00	15.50	14.00	10.50	8.50
		400	0.52	11.50	10.00	8.50	7.00	15.50	14.00	11.00	8.50	18.50	17.00	14.00	11.50	9.75	9.00	7.25	6.00	13.00	12.00	9.50	7.50	16.50	15.00	11.50	9.00
		800	0.58	12.50	11.50	9.00	7.50	16.50	15.00	12.00	9.50	20.50	19.00	15.50	12.50	10.75	10.00	8.00	6.50	14.25	13.00	10.50	8.25	18.00	16.50	13.00	10.00
		1600	0.65	14.00	13.00	10.00	8.00	19.00	17.00	13.50	10.50	23.00	21.50	17.00	14.00	12.00	11.00	9.00	7.00	15.50	14.50	11.50	9.00	19.50	18.00	14.50	11.00
		3200	0.75	16.50	15.00	11.50	9.00	22.00	20.00	15.50	12.50	27.00	24.00	20.00	16.00	13.50	12.50	10.00	8.00	17.50	16.00	13.00	10.50	22.00	20.50	16.50	12.50
		6400	0.85	19.50	17.50	14.00	10.50	26.50	23.00	18.50	14.50	NR	28.00	24.00	18.50	15.50	14.50	11.75	9.50	19.50	18.00	14.50	12.00	25.50	23.50	18.50	14.00
		12500	0.95	22.50	20.00	16.50	12.50	NR	26.00	22.00	17.00	NR	NR	28.00	21.00	17.50	16.50	13.50	11.00	22.00	20.00	16.50	13.50	28.50	26.00	20.50	16.00
		25000	1.05	26.00	22.50	20.00	15.00	NR	NR	NR	20.00	NR	NR	NR	23.50	21.00	19.50	16.00	13.00	25.00	23.00	18.50	15.00	NR	NR	23.00	18.00

TABLE 3:

Processing Roll Film with FRESH, DILUTE DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	In Small-Tanks, DEVELOPER DILUTION												In Rotary-Tubes (with Continuous Agitation), DEVELOPER DILUTION											
				1:1				1:2				1:3				1:1				1:2				1:3			
				68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK High Speed Infrared / HIE / 2481	135	See Pub No. F-13	0.52	8.00	7.50	6.25	5.00	11.50	10.50	8.50	7.00	15.25	14.00	11.25	9.00	6.50	6.00	5.00	4.00	9.25	8.50	7.00	5.50	12.00	11.00	9.00	7.00
			0.58	8.75	8.25	7.00	5.50	12.50	11.50	9.00	7.50	17.00	15.50	12.25	10.00	7.00	6.50	5.50	4.50	10.00	9.00	7.50	6.00	13.50	12.50	10.00	8.00
			0.65	9.75	9.00	7.50	6.00	13.75	12.75	10.00	8.25	18.50	17.00	13.75	11.00	8.00	7.25	6.00	5.00	11.00	10.00	8.00	6.50	15.00	13.50	11.00	9.00
			0.75	10.75	10.00	8.50	6.75	15.75	14.50	11.50	9.00	21.00	19.25	15.50	12.50	9.00	8.50	7.00	5.50	12.50	11.50	9.25	7.25	17.00	15.50	12.50	10.00
			0.85	12.50	11.50	9.25	7.50	18.00	16.50	13.00	10.50	24.00	22.00	17.50	14.50	10.00	9.50	8.00	6.50	14.50	13.00	10.50	8.50	19.00	17.50	14.00	11.50
AGFAPAN APX 25	135	12	0.52	5.00	4.50*	3.50*	2.75*	7.75	7.00	5.50	4.00*	10.25	9.50	7.75	6.00	4.00	3.50*	2.50*	1.75*	5.50	5.00	4.25	3.00*	7.00	6.50	5.50	4.00
		25	0.58	6.00	5.50	4.50*	3.50*	9.25	8.50	6.75	5.00	11.75	11.00	9.00	7.00	4.50	4.00	3.00*	2.00*	6.25	5.75	4.75	3.50*	8.00	7.50	6.00	4.50
		50	0.65	8.00	7.50	6.00	4.50*	11.00	10.00	8.00	6.00	14.00	13.00	10.50	8.50	5.50	5.00	3.75*	2.75*	7.00	6.50	5.50	4.00	9.00	8.50	7.00	5.25
		100	0.75	10.50	9.50	7.75	6.00	14.00	13.00	10.50	8.00	17.50	16.00	13.00	10.00	7.25	6.50	5.00	3.50*	9.00	8.50	6.75	5.00	11.25	10.25	8.50	6.25
		200	0.85	14.50	13.00	10.50	8.50	17.00	16.00	13.00	10.50	21.50	20.00	16.00	13.00	9.25	8.50	6.50	5.00	12.25	11.50	9.00	6.50	13.50	13.00	10.50	8.00
AGFAPAN APX 100	135	25/50	0.52	8.00	7.50	6.00	4.75*	12.00	11.00	8.50	7.00	15.25	14.00	11.50	10.00	5.75	5.25	4.25	3.00*	8.00	7.50	6.50	5.00	11.75	11.00	9.00	7.00
		100	0.58	9.75	9.00	7.00	5.50	13.75	12.50	9.75	8.00	17.25	16.00	13.00	11.50	6.50	6.00	5.00	3.75*	9.25	8.75	7.50	5.75	12.75	12.00	10.25	8.00
		200	0.65	12.00	11.00	8.25	6.50	15.25	14.00	11.00	9.00	19.50	18.00	15.00	13.00	7.50	7.00	5.75	4.50	11.25	10.50	8.50	6.50	14.25	13.50	11.50	9.50
		400	0.75	15.50	13.50	10.00	7.50	18.75	17.00	13.00	10.50	23.00	21.00	17.75	15.00	9.25	8.50	7.00	5.50	14.00	13.00	10.50	7.50	17.00	16.00	13.50	11.00
		800	0.85	22.00	18.50	13.00	9.00	23.00	20.50	16.00	12.50	29.00	25.00	21.00	17.00	12.00	11.00	9.00	7.00	17.00	16.00	12.50	9.00	19.75	19.00	16.00	13.50
AGFAPAN 400	135	100/200	0.52	10.50	9.00	6.50	5.00	13.50	12.00	8.50	6.50	16.50	15.00	11.50	8.50	7.25	6.50	5.00	4.00	9.25	8.50	7.00	5.00	11.25	10.50	8.00	6.50
		400	0.58	12.00	10.50	8.00	6.00	15.75	14.00	10.50	8.00	19.25	17.50	13.50	10.50	8.75	8.00	6.25	5.00	11.50	10.50	8.50	6.00	13.25	12.50	9.50	7.50
		800	0.65	14.50	13.00	9.50	7.50	19.00	17.00	12.50	9.50	22.50	20.50	16.00	12.50	11.00	10.00	7.75	6.00	13.50	12.50	10.00	7.00	16.00	15.00	11.50	9.00
		1600	0.75	18.00	16.50	12.50	9.50	23.00	21.00	16.00	12.00	28.50	26.00	20.00	15.50	14.25	13.00	9.75	7.00	16.50	15.50	12.50	9.00	20.00	18.50	14.00	11.00
		3200	0.85	21.00	20.00	16.00	12.00	NR	25.00	19.00	15.00	NR	NR	25.00	20.00	19.00	17.00	12.75	9.00	20.00	18.50	15.00	11.00	NR	22.50	17.00	14.00
FUJI NEOPAN 400 Professional	135	100/200	0.52	8.25	7.50	6.00	4.50*	11.00	10.00	7.75	6.50	13.50	12.50	10.00	8.00	6.50	5.50	4.00	3.50*	8.50	8.00	6.25	5.25	12.00	11.00	8.50	7.00
		400	0.58	9.75	9.00	7.00	5.25	12.50	11.50	9.00	7.50	15.75	14.50	11.50	9.00	7.50	6.50	4.75	4.00	9.75	9.00	7.25	5.75	13.50	12.50	9.75	7.75
		800	0.65	11.50	10.50	8.00	6.00	14.50	13.00	10.50	8.50	18.50	16.50	13.00	10.00	9.00	8.00	5.75	4.75	11.50	10.50	8.25	6.50	15.25	14.00	11.00	8.50
		1600	0.75	13.50	12.50	9.75	7.25	17.00	15.50	12.00	9.50	22.50	20.00	15.50	11.50	11.00	10.00	7.25	5.75	13.50	12.50	9.50	7.50	18.00	16.50	13.00	9.50
		3200	0.85	16.50	15.00	11.50	8.50	20.50	18.50	14.00	11.00	26.00	23.50	18.00	13.50	13.00	12.00	9.00	6.75	15.75	14.50	11.50	8.75	21.00	19.50	15.50	11.00
FUJI NEOPAN 1600 Professional	135	200	0.52	5.50	5.00	4.00*	3.50*	7.00	6.50	5.25	4.50*	9.25	8.50	7.00	5.50	4.50	3.75*	3.00*	2.50*	5.25	5.00	4.25	3.50*	7.00	6.50	5.25	4.25
		400	0.58	6.00	5.50	4.50*	3.75*	7.75	7.25	5.75	4.75*	10.25	9.50	7.50	6.00	5.00	4.25	3.25*	2.75*	5.75	5.50	4.50	3.75*	7.75	7.25	5.75	4.75
		800	0.65	6.75	6.25	5.00	4.25*	8.50	8.00	6.50	5.25	11.50	10.50	8.25	6.75	5.50	4.75	3.75*	3.00*	6.50	6.00	5.00	4.00	8.50	8.00	6.25	5.25
		1600	0.75	7.50	7.00	5.75	4.75*	10.00	9.25	7.50	6.00	13.00	12.00	9.50	7.50	6.25	5.50	4.25	3.50*	7.25	6.75	5.50	4.50	9.50	9.00	7.25	5.75
		3200	0.85	8.50	8.00	6.50	5.25	11.25	10.50	8.50	6.75	14.75	13.50	10.50	8.50	7.00	6.25	5.00	4.00	8.25	7.75	6.50	5.25	10.75	10.00	8.25	6.50
		6400	0.95	9.75	9.00	7.50	6.00	13.00	12.00	9.75	7.50	16.50	15.00	12.00	9.50	7.75	7.00	5.75	4.50	9.50	9.00	7.50	6.00	12.25	11.50	9.50	7.50

TABLE 3:

Processing Roll Film with FRESH, DILUTE DEVELOPER (Development Times in minutes)

ROLL FILM	FORMAT	EI	CI	In Small-Tanks, DEVELOPER DILUTION												In Rotary-Tubes (with Continuous Agitation), DEVELOPER DILUTION											
				1:1				1:2				1:3				1:1				1:2				1:3			
				68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
ILFORD PAN F Plus	135	25	0.52	6.75	6.00	4.50*	3.50*	8.75	8.00	6.00	4.50*	10.50	9.50	7.50	5.50	5.00	4.50	3.50*	3.00*	6.50	6.00	4.75	3.75*	8.25	7.50	5.50	4.50
		50	0.58	7.75	7.00	5.25	4.00*	10.00	9.00	7.00	5.00	12.00	11.00	8.50	6.25	5.75	5.25	4.00	3.25*	7.25	6.75	5.25	4.25	9.50	8.50	6.25	5.00
		100	0.65	9.50	8.50	6.25	4.50*	11.50	10.50	8.00	5.75	13.50	12.50	9.75	7.25	6.50	6.00	4.75	3.75*	8.25	7.50	6.00	4.75	10.50	9.50	7.00	5.50
		200	0.75	11.25	10.00	7.50	5.50	13.25	12.00	9.00	6.75	15.75	14.50	11.25	8.50	7.50	7.00	5.50	4.25	9.50	8.75	7.00	5.25	11.75	10.50	8.00	6.25
		400	0.85	13.00	11.50	8.50	6.50	15.50	14.00	10.50	8.00	18.50	16.75	13.00	10.00	8.50	8.00	6.25	4.75	11.50	10.50	8.00	5.75	13.50	12.00	9.00	7.00
ILFORD FP-4 Plus	135	32/64	0.52	8.50	7.50	5.50	4.00*	10.00	9.00	7.00	5.00	12.50	11.00	8.00	6.50	6.25	5.50	4.00	3.00*	7.25	6.50	5.00	3.50*	9.00	8.00	6.00	4.25
		125	0.58	10.00	9.00	6.50	5.00	11.50	10.50	8.00	6.00	14.75	13.00	9.50	7.50	7.25	6.50	4.75	3.50*	8.25	7.50	5.75	4.00	10.00	9.00	6.75	5.00
		250	0.65	12.00	10.75	8.00	6.00	13.75	12.50	9.50	7.00	17.00	15.00	11.00	9.00	8.25	7.50	5.50	4.00	9.50	9.00	6.75	4.75	11.50	10.50	7.75	5.75
		500	0.75	14.50	13.00	9.50	7.00	17.25	15.50	11.50	8.00	20.00	18.00	13.50	10.50	9.75	9.00	6.75	5.00	11.25	10.50	8.00	5.75	14.25	13.00	9.75	6.75
		1000	0.85	17.50	15.50	11.50	8.50	21.00	18.50	13.50	9.50	23.50	21.00	16.00	12.50	11.25	10.50	8.00	6.00	13.75	12.50	9.50	7.00	18.25	16.50	12.00	8.00
ILFORD HP-5 Plus	135	100/200	0.52	10.25	9.00	6.50	5.00	12.75	11.50	8.50	6.50	14.50	13.00	10.00	8.00	7.50	6.50	4.50	3.50*	8.50	8.00	6.25	4.25	10.50	9.50	7.00	5.25
		400	0.58	12.00	10.50	7.50	5.75	15.50	14.00	10.50	7.50	18.00	16.00	12.00	9.50	9.00	8.00	5.50	4.25	9.50	9.00	7.25	5.25	12.25	11.00	8.50	6.25
		800	0.65	14.25	12.50	8.75	6.50	18.00	16.50	12.50	9.00	23.00	20.00	15.00	11.00	10.50	9.50	7.00	5.25	11.75	11.00	9.00	6.50	14.25	13.00	10.00	7.50
		1600	0.75	18.00	16.00	11.50	8.00	21.00	19.00	15.00	11.00	27.50	25.00	18.75	13.50	12.50	11.50	9.00	6.50	14.50	13.50	11.00	8.00	17.50	16.00	12.50	9.50
		3200	0.85	22.50	20.00	14.00	10.00	NR	22.50	17.75	13.50	NR	NR	NR	16.50	15.00	14.00	11.00	8.25	17.50	16.50	13.50	10.00	21.50	19.50	15.00	11.50
ILFORD DELTA 100 Professional	135	25/50	0.52	9.00	8.00	6.00	4.75*	11.00	10.00	8.00	6.00	13.50	12.00	9.50	7.50	6.75	6.00	4.25	3.50*	8.25	7.50	5.75	4.25	9.75	9.00	7.00	5.25
		100	0.58	10.50	9.50	7.25	5.50	13.00	12.00	9.00	7.00	15.50	14.00	11.00	9.00	7.75	7.00	5.00	4.00	10.00	9.00	6.75	5.00	11.75	10.50	8.00	6.25
		200	0.65	12.00	11.00	8.50	6.50	15.00	14.00	10.50	8.00	17.50	16.50	12.75	10.50	8.75	8.00	6.00	5.00	11.50	10.50	8.00	6.00	13.25	12.00	9.50	7.25
		400	0.75	14.00	12.75	10.25	8.00	17.50	16.00	12.50	9.50	20.50	19.50	15.00	12.50	11.00	10.00	7.50	6.00	13.75	12.50	9.50	7.25	15.75	14.50	11.50	8.50
		800	0.85	16.75	15.50	12.50	9.50	21.50	19.50	14.50	11.50	24.25	22.50	18.00	14.50	13.50	12.00	9.00	7.00	17.00	15.00	11.00	8.50	19.25	17.50	13.50	10.00
ILFORD DELTA 400 Professional	135	100/200	0.52	9.00	8.00	6.00	4.75*	12.00	10.50	7.50	5.50	14.50	13.00	10.00	7.75	7.00	6.00	4.50	3.25*	8.25	7.50	5.75	4.25	10.50	9.50	7.00	5.25
		400	0.58	10.50	9.50	7.00	5.50	14.00	12.50	9.00	6.50	16.50	15.00	11.50	9.00	8.00	7.00	5.25	4.00	10.00	9.00	6.75	5.00	12.25	11.00	8.25	6.25
		800	0.65	12.25	11.00	8.50	6.50	16.25	14.50	10.50	7.75	19.50	17.50	13.50	10.50	9.00	8.00	6.00	5.00	11.50	10.50	8.25	6.00	14.25	13.00	10.00	7.75
		1600	0.75	14.50	13.00	10.00	8.00	19.50	17.50	13.00	9.50	23.00	21.00	16.50	13.00	11.00	10.00	7.50	6.00	14.25	13.00	10.25	7.50	17.50	16.00	12.50	9.50
		3200	0.85	17.00	15.50	12.00	9.50	23.50	21.50	16.00	11.50	NR	26.00	20.00	15.50	13.50	12.50	9.50	7.50	18.00	16.50	13.00	9.50	22.50	20.00	15.00	12.00

* Development times shorter than 5 minutes (4 minutes in rotary tubes) may produce unsatisfactory uniformity.
NR= Not recommended, as determined by testing.

TABLE 4: Processing KODAK Technical Pan Film / 2415 in Small Tanks
with FRESH, DILUTE DEVELOPER and Normal Agitation (Development Time in minutes)

ROLL FILM	FORMAT	EI	CI	DEVELOPER DILUTION			
				1:2	1:3	1:4	1:5
				70°F (21°C)	70°F (21°C)	70°F (21°C)	70°F (21°C)
KODAK Technical Pan / 2415	135	4	0.60	6.00			
		6	0.60		9.00		
		8	0.60			12.00	
		10	0.60				15* 16†

* Using 16 fluidounces of developer per roll
† Using 8 fluidounces of developer per roll

Sheet Films

**Important**

Development times shorter than 4 minutes may produce unsatisfactory uniformity.

**TABLE 5: Processing Sheet Film in Trays or Large Tanks with FULL-STRENGTH DEVELOPER
(Development Times in minutes)**

SHEET FILM	EI	CI	Fresh Developer in Trays					Seasoned Developer in Large Tanks				
			65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK PLUS-X Pan Professional / PXT / 4147	32/64	0.52	6.50	5.25	4.75	3.75*	3.00*	7.50	6.50	5.50	4.00	3.25*
	125	0.58	7.50	6.25	5.75	4.50	3.50*	8.50	7.25	6.50	4.75	3.75*
	250	0.65	9.25	7.75	7.00	5.50	4.50	10.50	8.75	7.75	6.00	4.50
	500	0.75	12.00	10.00	9.00	7.00	5.50	14.25	12.00	10.50	8.50	6.50
	1000	0.85	15.00	12.75	11.50	9.00	7.25	18.00	15.00	13.50	10.50	8.50
KODAK T-MAX 100 Professional / TMX / 4052	25/50	0.52	7.50	6.25	5.50	4.50	3.50*	9.50	8.00	6.75	5.50	4.00
	100	0.58	8.50	7.25	6.50	5.00	4.00	10.75	9.00	8.00	6.25	4.75
	200	0.65	9.50	8.25	7.50	5.50	4.50	12.00	10.25	9.00	7.25	5.50
	400	0.75	10.75	9.50	8.50	6.50	5.25	14.50	12.00	11.00	8.50	6.50
	800	0.85	12.00	11.00	10.00	7.50	6.00	16.50	14.00	12.50	9.75	7.50
KODAK TRI-X Pan Professional / TXT / 4164	80/160	0.52	6.25	5.25	4.25	3.75*	2.75*	7.00	6.00	5.00	4.00	2.75*
	320	0.58	7.50	6.50	5.75	4.50	3.50*	8.50	7.00	6.00	4.75	3.50*
	640	0.65	9.25	7.75	7.00	5.25	4.25	10.50	8.75	7.50	6.00	4.50
	1250	0.75	11.50	9.50	8.50	6.50	5.25	12.75	10.75	9.50	7.50	5.75
	2500	0.85	14.00	11.75	10.50	8.00	6.75	15.50	13.25	12.00	9.25	7.25
KODAK T-MAX 400 Professional / TMY / 4053	100/200	0.52	7.50	6.50	5.50	4.50	3.50*	9.25	7.75	6.50	5.25	4.00
	400	0.58	8.50	7.25	6.25	5.00	4.00	10.00	8.50	7.25	5.75	4.50
	800	0.65	9.25	8.00	7.00	5.50	4.50	11.25	9.50	8.25	6.50	5.00
	1600	0.75	10.75	9.25	8.00	6.50	5.00	13.00	11.00	9.75	7.75	6.00
	3200	0.85	12.50	10.50	9.00	7.50	5.75	14.75	12.50	11.00	8.75	6.75
KODAK EKTAPAN / PNT / 4162	25/50	0.52	6.75	5.50	4.75	3.75*	2.75*	7.50	6.25	5.25	4.25	3.00*
	100	0.58	8.50	7.25	6.25	5.00	3.75*	9.50	8.00	6.75	5.50	4.00
	200	0.65	10.50	9.00	7.75	6.00	4.75	12.00	10.00	9.00	7.00	5.25
	400	0.75	13.50	11.50	10.00	8.00	6.25	16.00	13.50	12.00	9.50	7.50
	800	0.85	17.50	15.00	13.00	10.00	8.00	NR	17.50	15.00	12.00	9.50

* Development times shorter than 4 minutes may produce unsatisfactory uniformity.
NR= Not recommended, as determined by testing.

**Important**

Development times shorter than 4 minutes may produce unsatisfactory uniformity.

**TABLE 6: Processing Sheet Film in Rotary Tubes with FULL-STRENGTH DEVELOPER
(Development Times in minutes)**

SHEET FILM	EI	CI	Fresh Developer				Replenished Developer			
			65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)
KODAK PLUS-X Pan Professional / PXT / 4147	32/64	0.52	4.50	3.75*	3.25*	2.75*	5.50	4.50	4.00	3.00*
	125	0.58	5.50	4.50	4.00	3.00*	7.00	5.75	5.00	3.75*
	250	0.65	7.00	5.75	5.00	4.00	9.00	7.25	6.00	4.75
	500	0.75	9.50	8.00	7.00	5.25	12.50	9.75	8.00	6.00
	1000	0.85	13.00	11.25	10.00	7.50	17.00	13.75	11.50	9.00
KODAK T-MAX 100 Professional / TMX / 4052	25/50	0.52	6.50	5.50	4.75	3.50*	8.50	6.75	5.50	4.25
	100	0.58	7.75	6.25	5.50	4.25	10.50	8.00	6.50	5.00
	200	0.65	9.00	7.25	6.25	5.00	12.50	9.75	7.75	6.00
	400	0.75	11.00	8.25	7.25	5.75	14.50	11.50	9.50	7.00
	800	0.85	13.50	10.00	8.50	6.75	17.00	13.75	11.50	8.50
KODAK TRI-X Pan Professional / TXT / 4164	80/160	0.52	4.25	3.75*	3.25*	2.50*	5.25	4.50	4.00	3.00*
	320	0.58	5.00	4.50	4.00	3.00*	6.50	5.50	4.75	3.50*
	640	0.65	6.25	5.50	5.00	3.75*	8.00	6.75	6.00	4.50
	1250	0.75	8.00	7.25	6.50	4.75	10.00	8.50	7.50	5.50
	2500	0.85	10.00	8.75	8.00	6.00	13.00	11.00	9.50	7.00
KODAK T-MAX 400 Professional / TMY / 4053	100/200	0.52	6.50	5.50	5.00	3.50*	8.25	6.50	5.50	4.25
	400	0.58	7.50	6.25	5.50	4.00	9.25	7.50	6.25	4.75
	800	0.65	8.50	7.00	6.25	4.50	10.50	8.50	7.00	5.25
	1600	0.75	9.75	8.00	7.00	5.25	12.00	9.50	8.00	6.00
	3200	0.85	11.25	9.00	8.00	6.00	13.50	11.00	9.50	7.00
KODAK EKTAPAN / PNT / 4162	25/50	0.52	4.50	3.50*	3.00*	2.00*	5.50	4.50	4.00	2.50*
	100	0.58	6.00	5.00	4.25	3.00*	8.00	6.50	5.50	4.00
	200	0.65	7.50	6.50	5.75	4.00	10.50	8.75	7.50	5.50
	400	0.75	10.00	8.50	7.50	5.50	14.00	12.00	10.50	7.50
	800	0.85	13.00	11.00	9.75	7.00	17.50	15.50	14.00	10.00

* Development times shorter than 4 minutes may produce unsatisfactory uniformity.



Important

Development times shorter than 4 minutes may produce unsatisfactory uniformity.

TABLE 7: Processing Sheet Film with FRESH, DILUTE DEVELOPER (Development Times in minutes)

SHEET FILM	EI	CI	In Trays, DEVELOPER DILUTION												In Rotary-Tubes (with Continuous Agitation), DEVELOPER DILUTION											
			1:1				1:2				1:3				1:1				1:2				1:3			
			68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)	68°F (20°C)	70°F (21°C)	75°F (24°C)	80°F (27°C)
KODAK PLUS-X Pan Professional / PXT / 4147	32/64	0.52	7.25	6.50	5.00	3.75*	8.75	8.00	6.00	5.00	10.50	9.50	7.50	6.00	5.00	4.50	3.25*	2.50*	6.00	5.50	4.25	3.50*	7.00	6.50	5.25	4.00
	125	0.58	8.25	7.50	6.00	4.75	10.25	9.50	7.50	6.00	12.50	11.50	9.00	7.00	6.25	5.50	4.00	3.25*	7.25	6.50	5.00	4.00	8.25	7.50	6.25	4.75
	250	0.65	10.25	9.50	7.50	6.00	13.00	12.00	9.50	7.25	15.25	14.00	11.00	8.50	7.50	6.75	5.00	4.00	8.50	7.75	6.25	5.00	10.00	9.25	7.50	5.75
	500	0.75	13.50	12.50	10.50	8.00	16.75	15.50	12.50	9.50	19.50	18.00	14.50	11.00	10.00	9.00	6.75	5.00	11.00	10.25	8.25	6.25	14.25	13.00	9.75	7.50
1000	0.85	19.00	17.00	13.00	10.50	21.75	20.00	16.00	12.00	24.75	23.00	19.00	15.00	12.50	11.50	9.00	7.00	14.00	13.00	10.50	8.00	19.25	17.00	12.50	10.00	
KODAK T-MAX 100 Professional / TMX / 4052	25/50	0.52	9.25	8.50	6.50	5.25	12.75	11.00	8.25	6.00	15.50	14.50	11.75	9.50	6.75	6.50	5.75	5.00	9.50	9.00	8.00	7.00	12.25	11.50	10.00	9.00
	100	0.58	10.50	9.50	7.50	6.00	13.75	12.50	9.75	7.25	17.25	16.00	13.00	10.50	7.75	7.50	6.75	6.00	10.50	10.00	9.00	8.00	13.75	13.00	11.50	10.50
	200	0.65	11.50	10.50	8.50	7.00	15.25	14.00	11.00	8.50	18.75	17.50	14.25	11.50	9.00	8.50	7.50	6.75	12.00	11.50	10.00	9.00	16.25	15.00	13.00	11.50
	400	0.75	13.25	12.00	9.75	8.00	17.25	16.00	12.75	9.75	21.50	20.00	16.25	13.00	10.50	9.75	8.50	7.50	14.25	13.50	11.50	10.00	20.00	18.50	15.25	13.00
800	0.85	15.25	14.00	11.25	9.00	19.25	18.00	14.50	11.50	24.25	22.50	18.25	14.50	12.00	11.50	10.00	8.50	17.00	16.00	13.50	11.00	24.00	22.00	17.75	14.50	
KODAK TRI-X Pan Professional / TXT / 4164	80/160	0.52	7.75	7.00	5.00	3.75*	9.25	8.50	6.75	5.00	12.00	11.00	8.50	6.00	5.75	5.00	3.75*	2.75*	7.50	6.50	4.75	3.75*	8.25	7.50	5.50	4.50
	320	0.58	9.00	8.00	6.00	4.50	11.50	10.50	8.00	5.75	14.25	13.00	10.00	7.00	6.75	6.00	4.50	3.25*	8.25	7.50	5.75	4.25	10.00	9.00	6.50	5.25
	640	0.65	10.50	9.50	7.00	5.50	13.50	12.50	9.50	7.00	16.50	15.00	12.00	8.25	7.75	7.00	5.50	3.75*	9.50	8.50	6.50	5.00	11.50	10.50	7.75	6.25
	1250	0.75	13.50	12.00	8.50	6.75	17.00	15.50	12.00	8.75	21.00	19.00	14.50	10.25	9.75	9.00	6.75	4.50	12.00	11.00	8.00	6.00	13.75	12.50	9.50	7.75
2500	0.85	17.00	15.00	10.50	8.00	21.00	19.00	14.50	10.50	26.50	24.00	17.50	12.50	12.00	11.00	8.25	5.50	14.75	13.50	10.25	7.25	17.50	16.00	12.00	9.25	
KODAK T-MAX 400 Professional / TMY / 4053	100/200	0.52	9.50	8.50	6.50	5.50	11.25	10.50	8.50	7.25	14.75	13.50	10.50	8.75	7.25	6.50	5.25	4.25	9.50	8.50	6.75	5.25	12.50	11.00	8.75	7.00
	400	0.58	10.50	9.50	7.25	6.00	13.00	12.00	9.50	8.00	16.25	15.00	11.50	9.75	8.25	7.25	5.75	4.75	10.50	9.50	7.50	5.75	14.00	12.25	9.75	7.75
	800	0.65	11.75	10.50	8.25	6.75	14.75	13.50	10.50	8.75	17.75	16.50	13.00	10.75	9.25	8.25	6.75	5.25	11.75	10.75	8.50	6.50	15.50	13.50	11.00	8.50
	1600	0.75	13.25	12.00	9.25	7.50	17.00	15.50	12.25	10.00	20.00	19.00	15.00	12.25	10.75	9.50	7.75	6.00	13.75	12.50	10.00	7.50	17.75	15.50	12.50	9.75
3200	0.85	15.00	13.50	10.50	8.50	19.00	17.50	13.75	11.25	23.50	21.50	17.00	14.00	12.50	11.00	9.00	7.00	16.00	14.50	12.00	8.75	20.50	18.00	14.50	11.00	
KODAK EKTAPAN / PNT / 4162	25/50	0.52	8.00	7.00	4.50	2.50*	10.00	9.00	6.50	4.75	12.25	11.00	8.50	6.75	5.25	4.50	3.50*	2.75*	6.25	5.50	4.25	3.50*	8.00	7.00	4.75	4.00
	100	0.58	9.50	8.50	6.00	3.75*	12.00	11.00	8.50	6.00	14.25	13.00	10.50	8.50	7.25	6.00	4.50	3.25*	7.75	7.00	5.00	4.00	10.00	8.50	6.00	4.50
	200	0.65	12.25	11.00	8.00	5.50	15.50	14.00	10.50	7.75	18.00	16.50	13.00	10.50	9.00	7.75	5.50	3.75*	9.75	8.75	6.50	4.75	12.00	10.50	7.50	5.50
	400	0.75	15.50	14.00	10.50	7.50	19.75	18.00	14.00	10.50	23.50	21.50	17.00	13.75	12.00	10.00	7.00	5.00	12.50	11.25	8.50	6.00	15.00	13.50	10.00	7.25
800	0.85	19.50	18.00	14.25	10.50	24.00	22.00	18.00	13.75	28.50	26.00	21.00	17.00	14.75	12.50	9.00	6.50	15.00	13.75	11.00	8.00	18.25	16.50	12.50	9.50	

* Development times shorter than 4 minutes may produce unsatisfactory uniformity.

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. and Canada faxback system.

The following publications are available from Kodak Customer Service and from dealers who sell Kodak products, or you can contact Kodak in your country for more information.

If you have environmental or safety questions about Kodak products or services, contact Kodak Environmental Services at 1-716-477-3194, between 8 a.m. and 5 p.m. (Eastern time).

Kodak also maintains a 24-hour health hotline to answer questions about the safe handling of photographic chemicals. If you need health-related information about Kodak products, call 1-716-722-5151.

- J-106 *KODAK XTOL Developer for Replenished Processing Systems*
- J-107 *KODAK XTOL Developer for Small Tank and Tray Processing*
- J-108 *KODAK XTOL Developer for Rotary-Tube Processors*
- E103CF *Chemicals for KODAK Black-and-White Films (Matrix)*
- F-7 *KODAK VERICHROME Pan Film*
- F-8 *KODAK PLUS-X Pan and PLUS-X Pan Professional Films*
- F-9 *KODAK TRI-X Pan and TRI-X Pan Professional Films*
- F-10 *KODAK EKTAPAN Film*
- F-13* *KODAK High Speed Infrared Film*
- F-32 *KODAK T-MAX Professional Films*
- P-255 *KODAK Technical Pan Film*

For assistance in controlling processes, the following are available:

- Z-133E *Monitoring and Troubleshooting KODAK Black-and-White Film Processes*
and
KODAK Black-and-White Film Process Control Strips (CAT 180 2990)
-
- Y-30 *KODAK Plotting Form for Black-and-White Film Processing (20-sheet packages, CAT 176 9314)*

* Available via Faxback and on the worldwide web only.

Kodak Information Center's Faxback System

—Available 24 hours a day, 7 days a week—

Many technical support publications for Kodak products can be sent to your fax machine from the Kodak Information Center. Call:

U.S.A. 1-800-242-2424, Ext. 33
Canada 1-800-295-5531

If you have questions about Kodak products, contact 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
8:30 a.m. – 5 p.m. (Eastern time)*

Or contact Kodak on-line at:

<http://www.kodak.com/go/professional>

Note: The products described in this publication may not be available in all countries. In countries other than the U.S., contact your local Kodak representative, or your usual supplier of Kodak products.

KODAK XTOL Developer



Kodak Professional Division
EASTMAN KODAK COMPANY

Kodak Professional

KODAK XTOL Developer
KODAK Publication No. **J-109**
CAT 147 6399

Kodak, Kodak Professional, Ektachrome, Ektapan, Photo-Flo, Plus-X,
T-Max, Tri-X, Verichrome, and Xtol are trademarks.

New 4-98
Printed in U.S.A.