

KODAK PROFESSIONAL Chemicals, Process E-6



KODAK PROFESSIONAL Chemicals, Process E-6, provide consistent, high-quality results with a variety of processing methods and equipment. They are ideal for processing KODAK EKTACHROME, KODAK PROFESSIONAL EKTACHROME, and KODAK ELITE Chrome Films.

This publication describes KODAK PROFESSIONAL Chemicals, Process E-6, in sizes designed for all types of processing operations. Smaller sizes, such as the KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6, are ideal for small-tank or rotary-tube applications. Larger sizes are appropriate for mixing the volumes used in professional finishing labs and photofinishing operations. The chemicals are supplied as liquid concentrates for ease of handling and mixing. KODAK PROFESSIONAL Chemicals, Process E-6AR, are formulated for replenishment systems with in-line dilution.

This publication also includes the recommended process cycles for sink-line and batch processing; rotary-tube processors; small tanks; and rack-and-tank, continuous, and roller-transport processors.

Use the cycles in this publication as guides. You may have to modify a cycle slightly to suit the design of your processor and your processing requirements. The recommended replenishment rates for each cycle are intended for a typical mix of Kodak color reversal films. For more detailed information, see KODAK Publication No. Z-119, *Using KODAK PROFESSIONAL Chemicals, Process E-6*.

THE RIGHT CHEMICALS FOR YOUR COLOR REVERSAL FILM PROCESS

For decades, Kodak has been the leader in providing safer products to meet the needs of photoprocessing labs. It has also been continuously designing and manufacturing films, papers, and chemicals that reduce the impact of photoprocessing on the environment. For example, in processors with normal to high utilization, KODAK PROFESSIONAL Color Developer Replenisher LORR, Process E-6AR, offers lower replenishment rates and reduced effluent.

The introduction of KODAK Pre-Bleach and Replenisher and KODAK Final Rinse and Replenisher in 1991 greatly reduced the possibility of coming into contact with formaldehyde in the processing area. Eliminating KODAK Stabilizer and Replenisher and adding a pre-bleach that contains a patented stabilizing agent reduced formaldehyde to only a trace amount.

Now KODAK PROFESSIONAL Pre-Bleach and Replenisher has replaced KODAK Pre-Bleach and Replenisher in all package sizes except the one-gallon size. This chemical reduces the tendency toward crystal formation in the bleach, and reduces by 50 percent the need to purchase, store, and dispose of pre-bleach packaging.

This publication also provides information on using the KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6. Each Single-Use Chemistry Kit makes 5 litres of each of the seven processing solutions, assuring reliable sensitometric and physical performance. The kit offers a number of advantages:

- solutions optimized for processing in rotary tubes, small tanks, and other single-use processes
- easy preparation
- no need to store and keep track of partially used solutions
- lower price than for separate components
- color developer reformulated to give optimum color balance without the need to add sodium hydroxide
- no need for special dilution of reversal bath in rotary-tube processing

Choosing the chemicals recommended in this publication ensures that you are using chemicals that provide optimum results with the smallest possible impact on the environment and users.

KODAK PROFESSIONAL FILMS FOR PROCESS E-6

Use KODAK PROFESSIONAL Chemicals, Process E-6, to process the following Kodak films:

KODAK EKTACHROME 64 Professional Film
KODAK EKTACHROME 64T Professional Film
KODAK EKTACHROME 100 Professional Film
KODAK EKTACHROME 100 Plus Professional Film
KODAK EKTACHROME 160T Professional Film
KODAK EKTACHROME 200 Professional Film
KODAK EKTACHROME 320T Professional Film
KODAK EKTACHROME 400X Professional Film
KODAK EKTACHROME P1600 Professional Film
KODAK PROFESSIONAL EKTACHROME Duplicating Film EDUPE
KODAK EKTACHROME Electronic Output Film 64T
KODAK EKTACHROME Electronic Output Film 100
KODAK EKTACHROME Professional Infrared EIR Film
KODAK EKTACHROME 100D Color Reversal Film / 5285
KODAK PROFESSIONAL EKTACHROME Film E100G
KODAK PROFESSIONAL EKTACHROME Film E100GX
KODAK PROFESSIONAL EKTACHROME Film E100VS
KODAK PROFESSIONAL EKTACHROME Film E200
KODAK ELITE Chrome 100 Film
KODAK ELITE Chrome Extra Color 100 Film
KODAK ELITE Chrome 160T Film
KODAK ELITE Chrome 200 Film
KODAK ELITE Chrome 400 Film
KODAK Control Strips, Process E-6

Note: Do not use the chemicals described in this publication to process aerial films.

KODAK PROFESSIONAL CHEMICALS, PROCESS E-6

Process E-6 requires each of the following chemicals: first developer, reversal bath, color developer, pre-bleach, bleach, fixer, and final rinse. The following tables will help you determine which chemicals are best suited for the type of processor you are using.

For Non-Replenished Small-Volume Processing

This five-litre kit is ideal for use with small-volume tanks, unreplenished sink lines, and rotary-tube processors.

Processing Kit

CAT No.	Description
107 7643	KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6 To make 5 litres

Accessory

CAT No.	Description
867 3220	KODAK Storage Bottles, 5 litre (case of 8)

To Make 1 Gallon

CAT No.	Description
156 4632	KODAK PROFESSIONAL First Developer, Process E-6
156 6850	KODAK PROFESSIONAL Reversal Bath, Process E-6
116 2510	KODAK PROFESSIONAL Color Developer, Process E-6
164 6058	KODAK PROFESSIONAL Pre-Bleach, Process E-6
156 2461	KODAK PROFESSIONAL Bleach, Process E-6
156 6082	KODAK PROFESSIONAL Fixer, Process E-6
195 1128	KODAK PROFESSIONAL Final Rinse, Process E-6

For Replenished Small- and Medium-Volume Processing

These sizes are appropriate for large sink lines or rotary tubes, minilabs, and low-volume automatic processors. To prepare first developer, color developer, and bleach working solutions, add the appropriate starter according to the mixing instructions on the package.

To Make 10 Litres

	CAT No.	Description
	831 3611	KODAK PROFESSIONAL First Developer Replenisher, Process E-6
	167 1577	KODAK PROFESSIONAL First Developer Starter, Process E-6 To make 26 gal
	112 3611	KODAK PROFESSIONAL Reversal Bath and Replenisher, Process E-6
<i>New!</i>	182 7872	KODAK PROFESSIONAL Color Developer Replenisher, Process E-6
<i>Replaces</i>	857 8734	KODAK Color Developer Replenisher, Process E-6
<i>New!</i>	156 4012	KODAK PROFESSIONAL Color Developer Starter II, Process E-6 To make 25 gal (1-pt concentrate)
<i>Replaces</i>	156 4012	KODAK Color Developer Starter, Process E-6 To make 25 gal (1-pt concentrate)
	128 6228	KODAK PROFESSIONAL Pre-Bleach and Replenisher, Process E-6
	819 2395	KODAK PROFESSIONAL Bleach Replenisher, Process E-6 (two 5-litre bottles)
	177 9792	KODAK PROFESSIONAL Bleach Starter, Process E-6 To make 25 gal (1/2-gal concentrate)
	154 5466	KODAK PROFESSIONAL Fixer and Replenisher, Process E-6
	814 0279	KODAK PROFESSIONAL Final Rinse and Replenisher, Process E-6

To Make 5 Gallons

	CAT No.	Description
	100 7608	KODAK PROFESSIONAL First Developer Replenisher, Process E-6
	167 1577	KODAK PROFESSIONAL First Developer Starter, Process E-6 To make 26 gal
	113 1580	KODAK PROFESSIONAL Reversal Bath and Replenisher, Process E-6
<i>New!</i>	837 2542	KODAK PROFESSIONAL Color Developer Replenisher, Process E-6
<i>Replaces</i>	887 8324	KODAK Color Developer Replenisher, Process E-6
<i>New!</i>	185 8158	KODAK Color Developer Starter II, Process E-6 To make 25 gal (1-pt concentrate)
<i>Replaces</i>	156 4012	KODAK Color Developer Starter, Process E-6 To make 25 gal (1-pt concentrate)
	802 6569	KODAK PROFESSIONAL Pre-Bleach and Replenisher, Process E-6
	196 5623	KODAK PROFESSIONAL Bleach Replenisher, Process E-6AR
	177 9792	KODAK PROFESSIONAL Bleach Starter, Process E-6 To make 25 gal (1/2-gal concentrate)
	127 8019	KODAK PROFESSIONAL Fixer and Replenisher, Process E-6
	890 9590	KODAK PROFESSIONAL Final Rinse and Replenisher, Process E-6
	125 3566	KODAK PROFESSIONAL Defoamer, Process E-6 (4-oz bottle)*

* Use with first and color developers in machines with nitrogen agitation.

For Replenished Medium- and Large-Volume Automatic Processors

These sizes are appropriate for rack-and-tank, continuous, and roller-transport processors. For in-line dilution replenishment systems, use the chemicals that contain the E-6AR (automatic replenishment) designation. Concentrates are generally packaged in 5-gallon flexible containers.

To make first developer, color developer, and bleach working solutions, add the appropriate starter according to the mixing instructions on the package.

To Make 25 Gallons (unless otherwise noted)

CAT No.	Description
800 8401	KODAK PROFESSIONAL First Developer Replenisher, Process E-6AR
167 1577	KODAK PROFESSIONAL First Developer Starter, Process E-6 (to make 26 gal)
118 7889	KODAK PROFESSIONAL Reversal Bath and Replenisher, Process E-6
158 3566	KODAK PROFESSIONAL Reversal Bath and Replenisher, Process E-6AR To make 100 gal
840 2224	KODAK PROFESSIONAL Color Developer Replenisher, Process E-6AR, Part A
100 7509	KODAK PROFESSIONAL Color Developer Replenisher, Process E-6AR, Part B
– OR –	
842 3584	KODAK PROFESSIONAL Color Developer Replenisher LORR, Process E-6AR, Part A*
111 5013	KODAK PROFESSIONAL Color Developer Replenisher LORR, Process E-6AR, Part B*
<i>New!</i> 185 8158	KODAK PROFESSIONAL Color Developer Starter II, Process E-6 (1-pt concentrate)
<i>Replaces</i> 156 4012	KODAK Color Developer Starter, Process E-6 (1-pt concentrate)

CAT No. Description

103 8660	KODAK PROFESSIONAL Pre-Bleach and Replenisher, Process E-6AR (to make 50 gal)
196 5623	KODAK PROFESSIONAL Bleach Replenisher, Process E-6AR (to make 5 gal)
177 9792	KODAK PROFESSIONAL Bleach Starter, Process E-6 (1/2-gal concentrate)
123 7619	KODAK PROFESSIONAL Fixer and Replenisher, Process E-6
121 3677	KODAK PROFESSIONAL Fixer and Replenisher, Process E-6AR (to make 50 gal)
151 8893	KODAK PROFESSIONAL ELECTROSILVER Fixer and Replenisher, Process E-6 (to make 33.3 gal)
198 9649	KODAK PROFESSIONAL Fixer and Replenisher LORR, Process E-6AR (to make 32.5 or 35 gal)
101 1063	KODAK PROFESSIONAL Final Rinse and Replenisher, Process E-6
115 2156	KODAK PROFESSIONAL Final Rinse and Replenisher, Process E-6 (to make 500 gal)

* Intended for processors with normal (one tank turnover in three weeks) to high (one tank turnover in one week) utilization.

Accessories

CAT No. Description

156 7403	KODAK Process Hydrometer Siphon Set/ for Process E-6 First Developer
123 7353	KODAK Process Hydrometer Siphon Set/ for Process E-6 Color Developer
125 3566	KODAK PROFESSIONAL Defoamer, Process E-6 (4-oz bottle)*

* Use with first and color developers in machines with nitrogen agitation.

STORAGE OF MIXED SOLUTIONS

Store mixed solutions, unused or partially used, at 4.5 to 29.5°C (40 to 85°F) in full stoppered bottles or in tanks with floating lids to minimize evaporation and oxidation. Store unused concentrates in full containers.

Do not use solutions that have been stored for longer than the following times:

Storage Times for Mixed KODAK PROFESSIONAL Chemicals, Process E-6		
Tank or Replenisher Solution	In Tanks with Floating Lids	
	Unused Solution	Used or Seasoned Solution
First Developer, Reversal Bath, Color Developer, Pre-Bleach	8 weeks	4 weeks
Bleach, Fixer, Final Rinse	24 weeks	24 weeks

Storage Times for Mixed Solutions from KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6		
Solution	In Full Bottles	In Partially Filled Bottles
All Solutions	4 weeks	1 week

Note: For rotary-tube and manual processing in a small tank, do **not** reuse solutions prepared from the KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6.

CAPACITY OF UNREPLENISHED SOLUTIONS

For low-volume processing applications where replenishment isn't practical, you can choose the KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6, or the individual chemicals available in a one-gallon size.

KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6

To process small amounts of film in small tanks and rotary-tube processors, we recommend that you use this kit. It contains concentrates to prepare 5 litres of each of the processing solutions, which you discard after a single use.

You can use the chemicals from this kit in a sink line **provided that you do not exceed the capacity of the solutions.** You can also use them to start up a replenished sink line, but you cannot use them for replenishment. For replenished sink lines, the 10-litre-size chemicals are the most convenient.

Solution Capacity. You can process approximately 0.3 to 1.1 square metres (10 to 12 square feet) of film (about twenty 135-36 rolls) in a batch mode with the 5-litre solutions prepared from the kit. After processing this amount of film, you can increase the first-developer time by 20 to 30 seconds and increase the bleach time to 10 minutes to process another 0.14 to 0.17 square metres (5 to 6 square feet) of film (ten 135-36 rolls) with satisfactory results. Processing more film requires even longer first-developer times, and will produce high-contrast images. This may be acceptable for some applications (e.g., graphics or text for presentations), but not for general photographic images. Do not process more than fifty 135-36 rolls in a 5-litre mix of chemicals from the Single-Use Chemistry Kit.

KODAK PROFESSIONAL Chemicals, Process E-6 (One-Gallon Size)

You can use the one-gallon-size individual chemical components to prepare your solutions and then reuse them up to their capacity. The capacity of the first developer and color developer without replenishment is approximately 1.7 square metres (18 square feet) of film per 3.8 litres (1 gallon). The capacity of the other solutions is 5 square metres (54 square feet) per 3.8 litres (1 gallon).

Keep the number of individual processes low by processing as much film as possible in each batch. After you have processed 1.1 square metres (12 square feet) of film, increase the first-developer time by 30 seconds. If you process only one size of film in a batch, you can use the following table to determine the capacity of the solutions.

Capacity of Unreplenished Developers			
Film Size	Rolls or Sheets per 3.8 Litres (1 Gallon) with First-Developer Time of 6 Minutes*	Rolls or Sheets per 3.8 Litres (1 Gallon) with First-Developer Time Increased by 30 Seconds	Discard Both Developers After Processing This Many Rolls or Sheets
135-24	1 to 30	31 to 46	46
136-36	1 to 22	23 to 33	33
120	1 to 23	24 to 34	34
220	1 to 12	13 to 17	17
4 x 5 in.	1 to 90	91 to 134	134
5 x 7 in.	1 to 46	47 to 74	74
8 x 10 in.	1 to 22	23 to 33	33

* Six minutes or whatever time you use for a normal process (from 5 to 7 minutes). See *Time and Temperature*.

Be sure that the solution completely covers the film during processing. (You may need to add solution to maintain the solution level of the first developer.) Discard solutions that have been stored beyond the recommended storage time regardless of unused capacity.

TIME AND TEMPERATURE

Adjust the time and temperature of the first and color developers until the densities of your KODAK Control Strips, Process E-6, plot within control limits. Do not exceed the ranges given below and in the process cycles on the following pages. If you do not need to adjust the temperature, use the midpoint of the range, i.e., 6 minutes at 38°C (100.4°F) for both developers. When you have established the times and temperatures, keep them within the following tolerances:

First Developer	Color Developer
Time: ±5 seconds	Time: ±5 seconds
Temperature: ±0.2°C (0.3°F)	Temperature: ±0.3°C (0.5°F)

STEPS AND CONDITIONS FOR SINK-LINE PROCESSING

Process E-6 Cycle—Sink-Line Processing With or Without Replenishment

Solution/Step	Time* (min:sec)	Temperature °C (°F)	Comment
Perform these steps in total darkness.			
First Developer†	6:00‡	38.0 ± 0.3 (100.4 ± 0.5)	<i>Sheet Film:</i> Use initial manual agitation§ followed by nitrogen-burst agitation.¶ <i>Roll Film:</i> Use <i>only</i> manual agitation.§
First Wash	2:00	38.0 ± 1.0 (100.4 ± 1.8)	Manual agitation with running water; one cycle every 30 seconds.
Reversal Bath	2:00	38.0 ± 1.0 (100.4 ± 1.8)	Tap to dislodge air bubbles. No further agitation.
Remaining steps can be done in room light.			
Color Developer	6:00	38.0 ± 1.0 (100.4 ± 1.8)	Initial manual agitation followed by nitrogen-burst agitation.
Pre-Bleach	2:00	35 to 40 (95 to 104)	Tap to dislodge air bubbles. No further agitation.
Bleach	6:00**	35 to 40 (95 to 104)	Air agitation.
Fixer	4:00	35 to 40 (95 to 104)	Air agitation.
Wash	4:00	35 to 40 (95 to 104)	Manual agitation with running water; one cycle every 30 seconds.
Final Rinse	1:00	Ambient	Tap to dislodge air bubbles. No further agitation.
Dry	As needed	Not above 60 (140)	—

* All times include a 10-second drain time.

† Increase the first-developer time by 15 seconds when you process roll films on reels with manual agitation.

‡ You can vary this time from 5 to 7 minutes to produce an in-control process at a temperature within a range of 36 to 40°C (97 to 104°F). When you have established a time and temperature, control the time within ± 5 seconds and the temperature within ± 0.2°C (± 0.3°F).

§ Lower film hangers into the solution and tap them sharply against the tank to dislodge air bubbles. Then agitate continuously for 15 seconds by lifting the hangers three-quarters out of the solution and reimmersing them (approximately eight lifts). For roll films on reels, or if you use only manual agitation for sheet films, provide initial agitation. Then every 20 seconds, lift the hangers or reels out of the solution and reimmerse them. Repeat to complete two lift cycles in approximately 5 seconds.

¶ One 2-second burst at 10-second intervals. Provide humidified nitrogen with enough pressure to raise the solution level 15 mm (5/8 inch).

** If you use the Single-Use Chemistry Kit, increase the bleach time to 10 minutes after processing twenty 135-36 rolls. Some films may be harder to bleach and require an increase in time before 20 rolls are processed.

Starting-Point Replenishment Rates—Replenished Sink-Line Processing

Film Size	Area per Roll or Sheet (ft ²)	First and Color Developers	Bleach	Other Solutions
		2153 mL/m ² (200 ml/ft ²)	215 mL/m ² (20 mL/ft ²)	1076 mL/m ² (100 mL/ft ²)
mL of Replenisher per Roll or Sheet				
135-24	0.395	79.0	7.9	39.5
136-36	0.556	111.0	11.1	55.6
120	0.550	110.0	11.0	55.0
220	1.090	218.0	21.8	109.0
4 x 5 in.	0.134	27.0	2.7	13.4
5 x 7 in.	0.238	48.0	4.8	23.8
8 x 10 in.	0.549	110.0	11.0	54.9
11 x 14 in.	1.064	213.0	21.3	106.4

Wash Rates. Provide a flow rate of 7.5 L/min (2 gal/min).

STEPS AND CONDITIONS FOR ROTARY-TUBE PROCESSING

The KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6, is ideal for rotary-tube processing. Simply mix the concentrates with water to prepare the volume you need according to the instructions packaged with the kit. Then discard the used solutions after each processing run.

Note: For best sensitometric results with the Single-Use Chemistry Kit, Process E-6, use no less than 250 mL of each solution per square foot of film (278 mL for two 135-36 rolls). Some film holders or tubes may require more solution for good uniformity. Check your processor manual.

Using KODAK PROFESSIONAL Chemicals, Process E-6, Supplied as Separate Components

If you use the one-gallon-size chemicals, mix the solutions for rotary-tube processors according to the instructions packaged with the chemicals. No starter is required for the first developer, color developer, or bleach. Use the reversal

bath at 60 percent of the normal concentration (i.e., dilute the concentrate to make 1.6 gallons).

For sizes larger than one gallon, mix as follows:

Pre-bleach, fixer, and final rinse: Prepare replenisher solutions according to the instructions, and use the replenishers as mixed.

First and color developers: Mix replenisher solutions, and then add developer starter according to the instructions for preparing a tank solution.

Reversal bath: Use the replenisher at 60 percent of the normal concentration (i.e., if the label instructions indicate 62 mL/L of concentrate, use 37 mL/L).

Bleach: Mix a replenisher solution. Then dilute the replenisher with water and add bleach starter.

Note: After each process, thoroughly rinse all inner surfaces of the processor to remove all chemicals, especially fixer. If you plan to run another process immediately, you may need to maintain the post-cycle temperature at approximately 24°C (75°F). If you dry the processor with a hot-air dryer, allow it to cool to room temperature. With some processors, the tube, tray, and processor cabinet should be at the same temperature before each run.

Process E-6 Cycle—Rotary-Tube Processing

Solution/Step	Time* (min:sec)	Temperature °C (°F)	Comments
Processor Warm-up	6:00†	38.0 ± 1.0 (100.4 ± 1.8)	Use running warm water, warm air, or water jacketing, depending on processor manufacturer's instructions.
Perform these steps in total darkness.			
Film Warm-up	4:00	38.0 (100.4)	Load tube with film and insert into processor.
Note: We do not recommend a pre-wet, even with processors that specify one.‡			
First Developer	6:00 to 7:00§	38.0 ± 0.3 (100.4 ± 0.5)	—
First Wash	2:00	38.0 ± 1.0 (100.4 ± 1.8)	Use processor's wash mode that most resembles continuous wash.
Reversal Bath	2:00	38.0 ± 1.0 (100.4 ± 1.8)	—
Remaining steps can be done in room light.¶			
Color Developer	4:00	38.0 ± 1.0 (100.4 ± 1.8)	—
Pre-Bleach	2:00	35 to 40 (95 to 104)	—
Bleach	6:00	35 to 40 (95 to 104)	—
Fixer	4:00	35 to 40 (95 to 104)	—
Wash	4:00	35 to 40 (95 to 104)	Use two 1-minute running-water washes followed by 2-minute wash.
Final Rinse	1:00	Ambient	Perform step in tube or in separate tank outside processor.
Dry	As needed	Not above 60 (140)	—

* All times include a 10- to 20-second drain time.

† Determine the exact time and temperature for your processor.

‡ A pre-wet can cause sensitometric effects with some emulsions. If your processor instructions include a pre-wet, contact the manufacturer to find out how to disable it.

§ You can vary this time from 5 to 8½ minutes to produce an in-control process at a selected temperature between 36 and 40°C (97 and 104°F). When you have determined the time, control it within ±5 seconds. Control the temperature within ±0.2°C (±0.3°F).

¶ You can open the processor after the reversal bath; however, we recommend leaving it closed to avoid heat loss.

STEPS AND CONDITIONS FOR SMALL-TANK PROCESSING

The KODAK PROFESSIONAL Single-Use Chemistry Kit, Process E-6, is ideal for manual processing in a small tank. Simply mix the concentrates with water to prepare the volume you need. (See the instructions packaged with the kit.) Then discard the solutions after a single use.

If you use the one-gallon-size chemicals, mix the solutions according to the instructions packaged with the chemicals. No starter is required for the first developer, color developer, or bleach.

Process E-6 Cycle—Small-Tank Processing

Solution/Step	Time* (min:sec)	Temperature °C (°F)†	Comments
Perform these steps in total darkness.			
First Developer	6:00 to 7:00‡	38.0 ± 0.3 (100.4 ± 0.5)	Initial and subsequent agitation.
Wash	2:00	35.0 to 40 (95 to 104)	If no flowing wash is available, use 3 or 4 short washes over 2 minutes. Use initial and subsequent agitation.
Reversal Bath	2:00	35.0 to 40 (95 to 104)	Initial agitation only.
Remaining steps can be done in room light.§			
Color Developer	6:00	38.0 ± 1.0 (100.4 ± 1.8)	Initial and subsequent agitation.
Pre-Bleach	2:00	35 to 40 (95 to 104)	Initial agitation only.
Bleach	6:00	35 to 40 (95 to 104)	Initial and subsequent agitation.
Fixer	4:00	35 to 40 (95 to 104)	Initial and subsequent agitation.
Wash	4:00	35 to 40 (95 to 104)	If no flowing wash is available, use 3 or 4 short washes over 6 minutes. Use initial and subsequent agitation.
Final Rinse	1:00	Ambient	Initial agitation only.
Dry	As needed	Not above 60 (140)	—

* All times include a 10- to 20-second drain time.

† Use a temperature-controlled water bath to maintain the temperature of the solutions.

‡ You can vary this time from 5 to 8½ minutes to produce an in-control process at a selected temperature between 36 and 40°C (97 and 104°F). When you have determined the time, control it within ±5 seconds. Control the temperature within ±0.3°C (±0.5°F).

§ You can open tank after reversal bath; however, we recommend leaving it closed to avoid heat loss.

Agitation Procedures for Small-Tank Processing

Proper manual agitation is very important for film uniformity. Follow the procedures in the table below for the type of tank you are using:

Type of Agitation	Type of Tank	
	Invertible	Non-Invertible
Initial Agitation	Tap tank on work surface to dislodge air bubbles. Turn tank over 7 or 8 times in 15 seconds. Return tank to water bath.	Tap tank on work surface to dislodge air bubbles. Return tank to water bath. Rotate film reel 4 or 5 times during first 5 to 10 seconds.
Subsequent Agitation	At 30-second intervals, remove tank from water bath. Quickly turn tank over 2 or 3 times. Return tank to water bath.	At 30-second intervals, rotate film reel 4 or 5 times.

STEPS AND CONDITIONS FOR RACK-AND-TANK PROCESSORS

Process E-6 Cycle—Rack-and-Tank Processors

Solution/Step	Time* (min:sec)			Temperature °C (°F)	Comments
	Lower Limit	Aim	Upper Limit		
Perform these steps in total darkness.					
First Developer†	5:00	6:00	7:00	36.7 to 39.4 (98 to 103)	Recirculate and filter. Nitrogen agitation.‡
First Wash	1:00	2:00	4:00	33.3 to 39.4 (92 to 103)	Air agitation.‡
Reversal Bath	1:00	2:00	4:00	24 to 39.4 (75 to 103)	Recirculate and filter at startup.§ No agitation.
Remaining steps can be done in room light.					
Color Developer	5:00	6:00	7:00	36.7 to 39.4 (98 to 103)	Recirculate and filter. Nitrogen agitation.‡
Pre-Bleach	2:00	2:00	4:00	2 to 39.4 (75 to 103)	Recirculate and filter at startup.§ No agitation.
Bleach	6:00	6:00	8:00	33.3 to 39.4 (92 to 103)	Recirculate and filter. Air agitation.‡
Fixer	4:00	4:00	6:00	33.3 to 39.4 (92 to 103)	Recirculate and filter. Air agitation.‡
Wash¶	2:00	2:00	4:00	33.3 to 39.4 (92 to 103)	Air agitation.‡
Wash¶	2:00	2:00	4:00	33.3 to 39.4 (92 to 103)	Air agitation.‡
Final Rinse	0:30	1:00	4:00	Ambient	No agitation.
Dry	As needed			Not above 63 (145)	—

* Immersion time plus crossover time to the next tank.

† Adjust the time and/or temperature to achieve good control. Then maintain the first-developer time within ± 5 seconds and the temperature within $\pm 0.2^{\circ}\text{C}$ ($\pm 0.3^{\circ}\text{F}$). Use KODAK PROFESSIONAL Defoamer, Process E-6, to control foaming if necessary.

‡ One 2-second burst at 10-second intervals. Use humidified nitrogen in both developers. The purity of the nitrogen should be at least 99.9%. Use air for agitation in the bleach, fixer, and washes. The bubble size should be 3 to 5 mm (0.1 to 0.2 in.). Use enough pressure to raise the solution level 10 to 17 mm (0.4 to 0.7 inch). Use oil-free air for bleach agitation. To minimize oxidation in the fixer, agitate only while film is in the fixer.

§ If possible, recirculate and filter for 10 to 20 minutes at startup. We do not recommend continuous recirculation for long periods.

¶ Use two countercurrent-flow washes after the fixer. You can use a single 4-minute wash if it is well-agitated and has an adequate flow rate (see *Wash Rates*).

Starting-Point Replenishment Rates—Rack-and-Tank Processors

Film Size	Area per Roll or Sheet		First and Color Developers	Bleach	Color Developer LORR and Other Solutions
	m ²	ft ²	2153 mL/m ² (200 mL/ft ²)	215 mL/m ² (20 mL/ft ²)	1076 mL/m ² (100 mL/ft ²)
			mL of Replenisher per Roll or Sheet		
135-24	0.0367	0.395	79.0	7.9	39.5
136-36	0.0517	0.556	111.0	11.1	55.6
120	0.0511	0.550	110.0	11.0	55.0
220	0.1013	1.090	218.0	21.8	109.0
4 x 5 in.	0.0124	0.134	27.0	2.7	13.4
5 x 7 in.	0.0221	0.238	48.0	4.8	23.8
8 x 10 in.	0.0510	0.549	110.0	11.0	54.9
11 x 14 in.	0.0988	1.064	213.0	21.3	106.4

Wash Rates. The flow rate should be at least 1 L/min/135 roll during maximum processing. For example, if a processor holds six rolls on a rack, the wash flow rate should be at least 6 L/min. If a processor holds three rolls on a rack, the flow rate should be at least 3 L/min. The water flow

should turn off when no film is being processed. Do not direct the flow of water toward the film surface. Direct it toward the bottom of the tank to prevent streaking.

STEPS AND CONDITIONS FOR CONTINUOUS PROCESSORS

Process E-6 Cycle—Continuous Processors

Solution/Step	Time* (min:sec)			Temperature °C (°F)	Comments
	Lower Limit	Aim	Upper Limit		
Perform these steps in total darkness.					
First Developer†	5:00	6:00	7:00	36.7 to 39.4 (98 to 103)	Recirculate and filter. Install squeegees at exit.
First Wash	1:00	2:00	4:00	33.3 to 39.4 (92 to 103)	Install squeegees at exit.
Reversal Bath	1:00	2:00	4:00	24 to 39.4 (75 to 103)	Recirculate and filter at startup.‡ Install squeegees at exit.
Remaining steps can be done in room light.					
Color Developer	5:00	6:00	7:00	36.7 to 39.4 (98 to 103)	Recirculate and filter. Install squeegees at exit.
Pre-Bleach	2:00	2:00	4:00	24 to 39.4 (75 to 103)	Recirculate and filter at startup.‡ Install squeegees at exit.
Bleach	6:00	6:00	8:00	33.3 to 39.4 (92 to 103)	Recirculate and filter. Air agitation.§ Install squeegees at exit.
Fixer	4:00	4:00	6:00	33.3 to 39.4 (92 to 103)	Recirculate and filter. Air agitation.§ Install squeegees at exit.
Wash¶	2:00	2:00	4:00	33.3 to 39.4 (92 to 103)	—
Wash¶	2:00	2:00	4:00	33.3 to 39.4 (92 to 103)	Install squeegees at exit.
Final Rinse	0:30	1:00	4:00	Ambient	Install squeegees at exit.
Dry	As needed			Not above 63 (145)	—

* Immersion time plus crossover time to the next tank.

† Adjust the time and/or temperature to achieve good control. Then maintain the first-developer time within ± 5 seconds and the temperature within $\pm 0.2^{\circ}\text{C}$ ($\pm 0.3^{\circ}\text{F}$).

‡ If possible, recirculate and filter for 10 to 20 minutes at startup. We do not recommend continuous recirculation for long periods.

§ In sinusoidal or helical-path processors with top rollers submerged, supply air to the bleach and the fixer at $0.06 \text{ m}^3/\text{m}^2$ ($1 \text{ ft}^3/6 \text{ ft}^2$) of film processed or $0.23 \text{ m}^3/\text{hour}$ (8 standard ft^3/hour), whichever is greater. Agitate only while film is being processed. Continuous processors in which the top rollers are above the solution may not require air agitation in the bleach and the fixer.

¶ Use two countercurrent-flow washes after the fixer. You can use a single 4-minute wash if it is well-agitated and has a flow rate of $80 \text{ L}/\text{m}^2$ ($2 \text{ gal}/\text{ft}^2$).

Starting-Point Replenishment Rates—Continuous Processors

Step	Replenishment Rate mL/m^2 (mL/ft^2)	Replenishment Rate ($\text{mL}/\text{linear foot of film}$)			
		Film Size			
		135	120	70 mm (unperforated)	70 mm (perforated)
First and Color Developers	2153 (200)	21.4	40.7	45.9	44.5
Bleach	215 (20)	2.1	4.1	4.6	4.5
Other Solutions and Color Developer LORR	1076 (100)	10.7	20.3	23.0	22.3

The replenishment rate for film leader is $1.25 \text{ mL}/\text{linear foot}$.

Wash Rates. For the first wash, the rate for film and leader is $40 \text{ L}/\text{m}^2$ ($1 \text{ gal}/\text{ft}^2$) or $400 \text{ mL}/\text{ft}$ for 135 film and $800 \text{ mL}/\text{ft}$ for 120 and 70 mm sizes.

For the final wash, the rate for film and leader is $80 \text{ L}/\text{m}^2$ ($2 \text{ gal}/\text{ft}^2$) or $800 \text{ mL}/\text{ft}$ for 135 film and $1600 \text{ mL}/\text{ft}$ for 120 and 70 mm sizes.

STEPS AND CONDITIONS FOR ROLLER-TRANSPORT PROCESSORS

Process E-6 Cycle—Roller-Transport Processors

Solution/Step	Time* (min:sec)			Temperature °C (°F)	Comments
	Lower Limit	Aim	Upper Limit		
Perform these steps in total darkness.					
First Developer†	5:00	6:00	7:00	36.7 to 39.4 (98 to 103)	Recirculate and filter.
First Wash	1:00	2:00	4:00	33.3 to 39.4 (92 to 103)	—
Reversal Bath	1:00	2:00	4:00	24 to 39.4 (75 to 103)	—
Remaining steps can be done in room light.					
Color Developer	5:00	6:00	7:00	36.7 to 39.4 (98 to 103)	Recirculate and filter.
Pre-Bleach	2:00	2:00	4:00	24 to 39.4 (75 to 103)	—
Bleach	6:00	6:00	8:00	33.3 to 39.4 (92 to 103)	Recirculate and filter. Air agitation.‡
Fixer	4:00	4:00	6:00	33.3 to 39.4 (92 to 103)	Recirculate and filter.
Wash§	2:00	2:00	4:00	33.3 to 39.4 (92 to 103)	—
Wash§	2:00	2:00	4:00	33.3 to 39.4 (92 to 103)	—
Final Rinse	0:30	1:00	4:00	Ambient	—
Dry	As needed			Not above 63 (145)	—

* Immersion time plus crossover time to the next tank.

† Adjust the time and/or temperature to achieve good control. Then maintain the first-developer time within ± 5 seconds and the temperature within $\pm 0.2^{\circ}\text{C}$ ($\pm 0.3^{\circ}\text{F}$).

‡ We strongly recommend that you provide air agitation in the bleach. The rollers in some roller-transport processors do not provide adequate agitation and aeration of the bleach.

§ Use two countercurrent-flow washes after the fixer. You can use a single 4-minute wash if it is well-agitated and has a flow rate of 80 L/m² (2 gal/ft²).

Starting-Point Replenishment Rates—Roller-Transport Processors

Film Size	Area per Roll or Sheet		First and Color Developers	Bleach	Other Solutions
			2153 mL/m ² (200 ml/ft ²)	215 mL/m ² (20 mL/ft ²)	1076 mL/m ² (100 mL/ft ²)
	m ²	ft ²	mL of Replenisher per Roll or Sheet		
135-24	0.0367	0.395	79.0	7.9	39.5
136-36	0.0517	0.556	111.0	11.1	55.6
120	0.0511	0.550	110.0	11.0	55.0
220	0.1013	1.090	218.0	21.8	109.0
4 x 5 in.	0.0124	0.134	27.0	2.7	13.4
5 x 7 in.	0.0221	0.238	48.0	4.8	23.8
8 x 10 in.	0.0510	0.549	110.0	11.0	54.9
11 x 14 in.	0.0988	1.064	213.0	21.3	106.4

Wash Rates. The flow rate should be at least 1 L/min/135 roll during maximum processing. For example, if a processor holds six rolls on a rack, the wash flow rate should be at least 6 L/min. If a processor holds three rolls on a rack, the flow rate should be at least 3 L/min. The water flow

should turn off when no film is being processed. Do not direct the flow of water toward the film surface. Direct it toward the bottom of the tank to prevent streaking.

PUSH/PULL PROCESSING

To obtain the best quality from KODAK EKTACHROME, PROFESSIONAL EKTACHROME, and ELITE Chrome Films, expose the films at their rated speed and process them normally. You can modify the first-developer time or temperature to compensate for underexposure by up to 3 stops or overexposure by up to 2 stops.

Compensating for underexposure will result in higher film contrast and lower D-max, and a color-balance shift is possible. Time and temperature adjustments give comparable results.

Compensating for overexposure will result in lower contrast and a possible shift in color balance, especially in highlights. Time adjustments tend to produce less degradation of highlights than temperature adjustments at all levels of overexposure.

The table below gives general guidelines for pushing and pulling films:

Camera Exposure (Change in Exposure Index)	First Developer		
	Change in Time*	OR	Change in Temperature*
3 stops under (Increase of 3 stops)	+10 minutes		+8.9°C (16°F)
2 stops under (Increase of 2 stops)	+5 minutes		+6.7°C (12°F)
1 stop under (Increase of stop)	+2 minutes		+4.4°C (8°F)
None	None		None
1 stop over (Decrease of 1 stop)	-2 minutes		-3.3°C (6°F)
2 stops over (Decrease of 2 stops)	-3 minutes		-7.2°C (13°F)

* These are general recommendations. Some films may require more or less time or temperature change. See the technical data sheets for push/pull recommendations for individual films.

Adjusting Replenishment for Push Processing

During push processing, more of the silver halide in the film emulsion is developed by the first developer. This consumes more of the chemical components and requires an increase in the first-developer replenishment rate.

Films that are pushed by one stop require a 25-percent increase in the replenishment rate. If an average of 40 percent of all films receive push processing by 1/2 to 1 1/2 stops, increase the first-developer replenishment rate by 10 percent, i.e., from 2153 mL/square meter to 2366 mL/square meter.

Note: In a small-volume processor, push-processing a single large order of film may require a greater increase in first-developer replenishment. If the capacity of the first-developer tank is less than 25 litres, and a large order (e.g., 200 sheets of 8 x 10-inch film) requires 1-stop push processing, increase the first-developer replenishment rate by an *additional* 25 percent.

When you push-process small amounts of film (less than 10 percent of the processor's total film volume), you may not need to increase the replenishment rate.

Replenishment-Rate Increases for Push Processing			
Push (No. of Stops)	Percent Rate Increase	New Rate mL/m ²	New Rate mL/ft ²
0	0	2153	200
1/3	8	2325	216
1/2	12	2411	224
1	25	2691	250
2	50	3229	300
3	75	3767	350

PREPARING SMALLER-THAN-PACKAGE-SIZE AMOUNTS OF CHEMICALS

You will get the best, most consistent results from KODAK PROFESSIONAL Chemicals, Process E-6, by mixing them to produce the full volume marked on the package.

However, you may occasionally need to mix chemicals in smaller amounts. Although we do not recommend mixing smaller volumes, we provide this information to simplify

calculations. If you measure the chemicals and follow the mixing directions carefully, you should obtain the same results produced by a mix made with the entire package.

The tables below apply to chemicals supplied as individual components. For splitting instructions for the KODAK PROFESSIONAL Single-Use Chemistry Kit, see the inner flap of the package. For more information, see TI 2443, *KODAK PROFESSIONAL Single-Use Chemistry Kit*.

Preparing Replenisher Solutions from Concentrates

KODAK PROFESSIONAL Chemical	Package Size	Mixing Temperature °C (°F)	Starting Water (mL)	Part A (mL)	Part B (mL)	Add Water to Make
First Developer Replenisher	10 L 5 gal, 25 gal AR	20–40 (68–104)	700 500	283.9 200.0	—	1 L
Reversal Bath and Replenisher	10 L, 5 gal, 25 gal, 100 gal AR	20–40 (68–104)	750	50.0	—	1 L
Color Developer Replenisher	10 L 5 gal	20–40 (68–104)	500 500	200.0 200.0	71.0 50.0	1 L
Color Developer Replenisher	25 gal AR	20–40 (68–104)	600	200.0	200.0	1 L
Color Developer Replenisher LORR	25 gal AR	20–40 (68–104)	500	200.0	200.0	1 L
Pre-Bleach and Replenisher	10 L, 5 gal, 50 gal AR	20–40 (68–104)	750	100.0	—	1 L
Bleach Replenisher	10 L, 5 gal AR	20–40 (68–104)	—	1000.0	—	1 L
Fixer and Replenisher (4-minute)	10 L, 5 gal, 25 gal, 50 gal AR	20–40 (68–104)	750	100.0	—	1 L
Final Rinse and Replenisher	10 L, 5 gal, 25 gal, 500 gal AR	20–40 (68–104)	750	10	—	1 L

Preparing Tank Solutions from Replenisher Solutions

KODAK PROFESSIONAL Chemical	Start with This Amount of Replenisher (mL)	Add This Amount of Water (mL)	Add This Amount of Starter (mL)	To Prepare This Amount of Tank Solution
First Developer	950	50	5.0*	1 L
Reversal Bath	800	200	—	1 L
Color Developer	850	150	5.0†	1 L
Color Developer Replenisher LORR	750	250	9.0†	1 L
Pre-Bleach	Use mixed replenisher as tank or replenisher solution.			
Bleach (6-min)	500	480	20.0‡	1 L
Fixer	Use mixed replenisher as tank or replenisher solution.			
Final Rinse	Use mixed replenisher as tank or replenisher solution.			

* Use 5.0 mL of First Developer Starter, Process E-6, CAT No. 167 1577.

† Color Developer Starter II, Process E-6, CAT No. 185 8158

‡ Bleach Starter, Process E-6, CAT No. 177 9792

MAINTAINING CHEMICAL BALANCE IN REPLENISHED PROCESSES DURING PERIODS OF LOW UTILIZATION

If your processor utilization is low, oxidation and evaporation will affect the activity of your processing solutions. The simplest way to determine your processor utilization is to measure “tank turnovers” of your developer tank solutions. One tank turnover is the point at which the volume of replenisher added to the tank equals the volume of the processor tank.

If your processor is up to process temperature for 8 to 10 hours per day and is processing enough film to provide a complete tank turnover of the developer tanks within 3 weeks, you should not need to make adjustments to maintain optimum speed, contrast, and color balance (other than any you might have made while setting up and optimizing your process). However, if your processor is up to process temperature for 8 to 10 hours per day but is *not* processing enough film to provide a tank turnover in three weeks, you should compensate for low utilization by following one of the procedures below:

Before starting this procedure, be sure that your replenishment rates and wash rates are set according to the specifications for your processor type. (You can use this procedure for any replenished process.)

1. First determine your minimum daily square footage requirement. Multiply the first-developer tank volume (in litres) by 5. Then divide the result by the number of days the processor operates during a three-week period. For example, a processor with a tank volume of 70 litres that operates for 15 days over three weeks would have a minimum daily square footage requirement of 23 ($[70 \text{ L} \times 5] \div 15 \text{ days} = 23$).
2. Throughout the day, record the amount of film processed.

3. At the end of each day, compare the amount of film processed (in square feet) to the minimum daily square footage requirement.

If the amount of film processed *meets or exceeds* the requirement, *no* additional replenishment is needed.

If the amount of film is *less* than the requirement, replenish all tank solutions for the difference in square footage between the requirement and the actual amount processed. Multiply the replenishment rate or cycle rate by the difference to determine the amount of replenisher to add. For example, a processor with a minimum requirement of 23 square feet has processed only 18 square feet of film. The difference is 5 square feet ($23 - 18 = 5$). Replenish all process solutions for an additional 5 square feet of film.

You will also need to add 1 mL of first developer starter to the first-developer tank solution for every square foot of film below the daily requirement. In this case, you would add 5 mL of starter to the first-developer tank solution. Do *not* add color developer starter to the color-developer tank.

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.

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

- E-27 *KODAK EKTACHROME 100 Professional Film*
- E-28 *KODAK PROFESSIONAL EKTACHROME Film E200*
- E-113 *KODAK EKTACHROME 100 Plus Professional Film*
- E-130 *KODAK EKTACHROME 64T Professional Film*
- E-144 *KODAK EKTACHROME 160T Professional Film*
- E-147 *KODAK EKTACHROME P1600 Professional Film*
- E-163 *KODAK PROFESSIONAL EKTACHROME Film E100VS*
- E-4024 *KODAK PROFESSIONAL EKTACHROME Films E100G and E100GX*
- TI2323 *KODAK EKTACHROME Professional Infrared EIR Film*
- CIS-188 *KODAK EKTACHROME Professional Infrared EIR Film*
- Z-119 *Using KODAK PROFESSIONAL Chemicals, Process E-6*

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

If you have questions about KODAK PROFESSIONAL Products, call Kodak.

In the U.S.A.:

1-800-242-2424, Ext. 60, 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: For more information on processing chemicals, visit **www.kodak.com/go/photochemicals**.

Kodak Professional