Using KODAK EKTACOLOR Digital Developer Replenisher RT in Roller-Transport Processors

Kodak alaris

CURRENT INFORMATION SUMMARY

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KODAK EKTACOLOR Digital Developer Replenisher RT is designed for use in roller-transport processors. It is designed to produce higher contrast and D-max results with KODAK Color Negative Papers and Display Materials. KODAK EKTACOLOR Digital Developer Replenisher RT is specially formulated to reduce the effects of oxidation and evaporation.

Steps and Conditions

Use the processing steps and conditions in Table 1 for processing KODAK PROFESSIONAL PORTRA ENDURA, SUPRA ENDURA, ULTRA ENDURA, and ENDURA Metallic Papers; PORTRA Black & White and PORTRA Sepia Black & White Papers in roller-transport processors. See Table 3 for replenishment rates.

To process KODAK PROFESSIONAL ENDURA Transparency and Clear Display Materials, use the steps and conditions in Table 6. See Table 3 for replenishment rates.

Table 1 Processing Steps and Conditions for Process RA-4—Roller-Transport Processors

Solution/Step	Time* sec	Temperature °C (°F)	Comments
EKTACOLOR Digital Developer Replenisher RT	45	35.0 ± 0.3‡ (95.0 ± 0.5)	One bottle of concentrate: 92.7 m2 (1000 ft2)
EKTACOLOR RA Bleach-Fix and Replenisher	45	30 to 36 (86 to 96)	Recirculate and filter. Use squeegees at tank exit.
Wash	90	30 to 40 (86 to 104)	—
Dry	As needed	Not over 96 (205)	—

* Immersion time plus crossover time to the next tank. Developer time range is 44 to 48 seconds. Minimum times for other solutions can be one second less than the normal times. Longer than normal times should cause no adverse effect other than reducing the benefit of rapid access. For best results, use the recommended times with crossover times of 6 seconds or less. If the crossover time is longer than 6 seconds, the paper or material must be in the developer tank for at least 40 seconds.

‡ Check the developer temperature frequently with an accurate thermometer.

§ You can use EKTACOLOR RA Bleach-Fix and Replenisher NR if your processor utilization is at least 15 percent.

¶ Where water conservation is required, you can replace the wash with a stabilizer (see Washless Option).

Mixing KODAK EKTACOLOR Digital Developer Replenisher RT

KODAK EKTACOLOR Digital Developer Replenisher RT is supplied a carton containing two bottles of concentrate to make 12.5 gallons of mixed replenisher. Start with approximately 9 gallons of water. Add the entire contents of Part A, followed by the entire contents of Part B. Then add the remaining water for the total of 12.5 gallons. Stir the solution until mixed—approximately 5 minutes. Store the developer replenisher in a tank with a floating lid cover to reduce evaporation and decomposition.

An alternative method of mixing solution is to use an automatic mixer that automatically mixes the replenisher and pumps it to a holding tank. Carefully calibrate the delivery of the concentrates and the water according to the following table.

Table 2—Replenisher Mix

Component	Volume per one-Litre of Replenisher
Water	800 mL
EKTACOLOR Digital Developer Replenisher RT, Part A	100 mL
EKTACOLOR Digital Developer Replenisher RT, Part B	100 mL

Follow the mixer manufacturer's recommendations to accurately set up the mixing routine. Following the addition of each of the two parts, briefly rinse the delivery funnel with water so that the two concentrates do not come into direct contact. The total water from the initial delivery and the water from the rinses should total 800 mL for each litre mixed.

Note: Carefully observe that the mixing reservoir is completely emptied before the next mix is made. If there is residual mixed replenisher and there is no compensation for it, insufficient water may be added; the result of insufficient water is an overconcentrated replenisher. If the replenisher becomes significantly overconcentrated, precipitates may form in the mixed replenisher tank.

Replenishment Rates

The replenishment rates given in Table 3 are starting-point recommendations only. Actual rates depend on the type of processor, the paper or material processed, and the rate of evaporation and oxidation. If you process several products, use an average rate based on the product mix, and adjust it as needed according to control-plot results. Avoid over controlling replenishment rates. Rate changes are likely to be small, and you may not see the full effect of changes for several weeks.

Table 3

KODAK PROFESSIONAL Paper or Material	Developer Replenishment Rate mL/m2 and (mL/ft2)
PORTRA ENDURA	174 (16.2)
SUPRA ENDURA	194 (18)
ULTRA ENDURA	
ENDURA Metallic	
PORTRA Black & White	174 (16.2)
PORTRA Sepia Black & White	
ENDURA Transparency Display	495 (46)
ENDURA Clear Display	

Bleach-Fix Replenishment Rate—

The starting replenishment rate for EKTACOLOR RA Bleach-Fix and Replenisher for KODAK PROFESSIONAL Papers is 215 mL/m2 (20 mL/ft2).

For ENDURA Transparency and Clear Display Materials, the starting bleach-fix replenishment rate is 495 mL/m2 (46 mL/ft2).

Do not use EKTACOLOR Bleach-Fix and Replenisher NR in roller-transport processors unless the processor utilization is at least 15 percent. The starting rate for EKTACOLOR Bleach-Fix NR is 54 mL/m2 (5 mL/ft2). Bleach-fix regeneration is not recommended for rollertransport processors.

Wash and Stabilizer Replenishment Rate—

Use four countercurrent plumbed wash tanks, if possible. If you use fewer wash tanks, increase the wash rate accordingly. For the recommended rates for the number of wash tanks, see the following table. Adjust the wash-water rate for the maximum paper load processed, and then operate at this rate. Do not use average rates.

Table 4

Number of Final Wash Tanks	Final Wash Rate mL/m2 (mL/ft2)
1	10,800 (1000)*
2	6460 to 10,800 (600 to 1000)
3	4300 to 10,800 (400 to 1000)
4	2150 to 10,800 (200 to 1000)

* If your processor has only one wash tank, use a wash rate of at least 10,800 mL/m2 (1000 mL/ft2). You may need to make other processor modifications to minimize the effect of bleach-fix carryover, because this rate may provide only a marginal safety factor.

Washless Option

If your water supply is limited, you can use KODAK EKTACOLOR PRIME Stabilizer and Replenisher LORR in place of a wash. Use temperature-controlled, countercurrent-flow, filtered tanks that have a recirculation rate of 0.40 to 0.65 tank volumes per minute. If the recirculation or replenishment rate is too low, biological growth and precipitates may form and require frequent solution changes and tank cleaning. The stabilizer time and temperature are the same as for wash water. The stabilizer replenishment rate depends on the number of tanks (see Table 5). This information applies only to roller-transport processors.

Table 5—Replenishment Rates for KODAK EKTACOLOR PRIME Stabilizer

KODAK PROFESSIONAL Paper or Material	Number of Countercurrent-Flow Tanks		
	2	3	4
	mL/m2 (mL/ft2)		
PORTRA ENDURA SUPRA ENDURA ULTRA ENDURA	780 (72)	390 (36)	195 (18)
ENDURA Transparency ENDURA Clear	1560 (144)	780 (72)	390 (46)

PROCESSING *KODAK PROFESSIONAL ENDURA* TRANSPARENCY AND CLEAR DISPLAY MATERIALS

Although you can use the same processing chemicals for KODAK PROFESSIONAL ENDURA Transparency and ENDURA Clear Display Materials as for papers and print materials designed for Process RA-4, longer processing times and higher replenishment rates are required because these materials have thicker emulsions.

Table 6 gives the steps and conditions for processing these display materials in roller-transport processors using Process RA-4. You can also use these conditions to process display materials in continuous processors; however, they are usually processed in roller-transport processors because of the inconvenience of rethreading a continuous processor. See Tables 3, 4, and 5 for replenishment rates for these materials in roller-transport processors.

Note that although there is a time range of 110 to 120 seconds, the 120-second time is highly recommended for the best performance. The longer time will significantly reduce variability, especially in the yellow-record. The variability can be caused, for example, by non-uniform agitation or low replenishment for high-density images.

Table 6—Processing Steps and Conditions for Process RA-4—KODAK PROFESSIONAL ENDURA Transparency, and ENDURA Clear Display Materials

Solution/Step	Time* sec	Temperature °C (°F)	Comments
EKTACOLOR Digital Developer Replenisher RT	110 - 120‡	35.0 ± 0.3‡ (95.0 ± 0.5)	Recirculate and filter. Use precise temperature control. Use squeegees at tank exit.
EKTACOLOR RA Bleach-Fix and Replenisher	110 - 120¶	30 to 36 (86 to 96)	Recirculate and filter. Use squeegees at tank exit.
Wash**	220 - 240¶	30 to 40 (86 to 104)	—
Dry	As needed	Not over 96 (205)	—

* Immersion time plus crossover time to the next tank.

† Check the developer temperature frequently with an accurate thermometer.

‡ For Display Materials, the longer 120 sec developer time is recommended.

§ Do not use EKTACOLOR RA Bleach-Fix and Replenisher NR with Display Materials.

¶ For best results, use the recommended times with a crossover time of 6 seconds or less.

** Where water conservation is required, you can replace the wash with a stabilizer (see *Washless Option in Kodak Alaris Publication Z-130, Using KODAK EKTACOLOR Chemicals*).

Process Monitoring

Additional Adjustment Factors for KODAK PROFESSIONAL Control Strips / Process RA-4

With KODAK PROFESSIONAL Pro Strips Color Negative Paper Control Strips, Process RA-4 (CAT 129 8587), you will need to apply special adjustment factors to the correction factors packaged with each code of control strips to determine your processor aim.
KODAK EKTACOLOR Digital Developer Replenisher RT has a higher developer activity than other KODAK Developers. Note that the control strips are run at the paper-cycle times in Table 1.

Table 7—Adjustment Factors when using KODAK EKTACOLOR Digital Developer Replenisher RT

Parameter	R	G	B
Black Patch BP	+0.03	+0.05	+0.11
HD	+0.20	+0.15	+0.21
LD	+0.06	+0.02	+0.07
D-min	+0.01	+0.01	+0.01

Table 8 provides an example calculation of the correction factors and control strip aim. Use the correction factors packaged with your specific control strip code. The second column of Table 8 has the correction factors taken from the small sheet packaged with the reference strip for Code 4901. The third column has the adjustment factors taken from Table 7. The fourth column is the sum of columns two and three. Apply the revised correction factors to the density reading you obtain from the reference strip for Code 4901.

As shown in Table 9, add your reference-strip density readings and the revised correction factors from Table 8, paying attention to the signs, to produce the final aim for your process and densitometer. Compare your density readings of processed control strips with this aim to determine the status of your process.

Example Determination of Control Strip Aim

Table 8—Determine Revised Correction Factors

Measurement	Correction Factors for Code 4901	Digital Developer Adjustment Factors from Table 7	Revised Correction Factors
Black BP-R	-0.03	-0.03	0
Black BP-G	0	+0.05	+0.05
Black BP-B	-0.02	+0.11	+0.09
High HD-R	+0.02	+0.20	+0.22
High HD-G	+0.02	+0.15	+0.17
High HD-B	-0.01	+0.21	+0.20
Low LD-R	+0.04	+0.06	+0.10
Low LD-G	+0.04	+0.02	+0.06
Low LD-B	+0.04	+0.07	+0.11
D-min R	0	+0.01	+0.01
D-min G	0	+0.01	+0.01
D-min B	+0.01	+0.01	+0.02

Table 9—Determination of Control Strip Aim

Measurement	Typical Reference Strip Reading for Code 4901	Revised Correction Factors from Table 8	Aim for Code 4901
Black BP-R	2.52	0	2.52
Black BP-G	2.40	+0.05	2.45
Black BP-B	2.30	+0.09	2.39
High HD-R	1.64	+0.22	1.86
High HD-G	1.60	+0.17	1.77
High HD-B	1.61	+0.22	1.81
Low LD-R	0.76	+0.10	0.86
Low LD-G	0.71	+0.06	0.79
Low LD-B	0.71	+0.11	0.84
D-min R	0.09	+0.01	0.10
D-min G	0.09	+0.01	0.10
D-min B	0.07	+0.02	0.09

The Contrast, HD-LD, aim is determined from the values in the fourth column of Table 9. Subtract the respective LD value from the HD value for each color.

Table 10—Calculating HD-LD Aim

	HD	LD	HD-LD
R HD-LD	1.86	0.86	1.00
G HD-LD	1.77	0.79	0.98
B HD-LD	1.81	0.84	0.97

Preparation of Fresh Tank Mix using KODAK EKTACOLOR Digital Developer Replenisher RT

You can prepare a fresh working tank mix for your processor using the mix volumes in the following table. You may want to short the amount of EKTACOLOR RA Developer Starter and then add the additional starter as needed to reach the process aim. This avoids overshooting the amount of starter and a low process activity level. The fresh tank may produce process control results that are slightly high in red and green speed, low in blue speed, and low in contrast. The process will season to the adjusted control strip aim when the new replenisher is used.

Table 11

Component	Volume to make one Litre of Tank Solution
Water	275 mL
EKTACOLOR Digital Developer Replenisher RT	700 mL
KODAK EKTACOLOR RA Developer Starter	25 mL

Converting to KODAK EKTACOLOR Digital Developer Replenisher RT

When you convert to KODAK EKTACOLOR Digital Developer Replenisher RT you will need to run down the current developer you are using and discard any remaining replenisher from replenisher storage tanks. Be sure to follow all local regulations related to discarding old replenisher. A small amount of the previous developer is tolerated, so it should not be necessary to do extraordinary cleaning of the replenisher tanks and lines. If maintenance for cleanliness of tanks and racks is scheduled, the time of conversion would be a good opportunity to clean up the system. The KODAK EKTACOLOR Digital Developer Replenisher RT chemistry is cleaner running; you may observe built-up dirt in the processor being dislodged as this developer seasons in.

There are two methods to convert from your current developer to begin using KODAK EKTACOLOR Digital Developer Replenisher RT. In one case, you can replace the existing developer tank solution with a fresh tank mix—see the previous section for the mix instructions for the fresh tank. This method has the advantage that the higher developer activity will be immediately observed. The disadvantage is that the existing developer tank solution will need to be discarded, following all local regulations for disposal.

In the second conversion method, you can begin to use the new replenisher on top of the existing developer tank. While this avoids having to discard the existing developer tank, it will require "chasing" the shift of the process to the higher activity with the printer setups. It will take the amount of replenisher volume equivalent to three developer tank volumes to see the full effect of the new replenisher and that may require several days or weeks, depending on the processor utilization.

Given the higher contrast and D-max that results from KODAK EKTACOLOR Digital Developer Replenisher RT, for optimum results you will need to adjust and calibrate your printers, following routine methods of printer setup.

LOW UTILIZATION

When a processor is used for a small percentage of its actual capacity, the processing solutions can be affected and yield less than optimum results. At this time, there are no recommendations for low-utilization operation with KODAK EKTACOLOR Digital Developer Replenisher RT. Use sufficient developer at a rate where the volume of replenisher used in two weeks is at least equivalent to the developer tank volume. To reduce oxidation further, turn off the transport drive except during processing. Install a standby switch that allows you to turn off the transport drive without shutting down the recirculation pumps and temperature control.

Note: Do not use KODAK EKTACOLOR RA Developer Additive. It is not compatible with KODAK EKTACOLOR Digital Developer Replenisher RT.

Filtration

Processing solutions and wash water may contain some insoluble materials. If you don't filter out these materials, they can stick to the paper, tank walls, rollers, and solution lines, and may damage the paper. Usually, filters with a porosity of 10 to 30 microns are effective for solutions and wash water. For incoming water supplies, use filters with a porosity of 15 microns. Install the racks by slowly lowering them into the tanks. When you have reinstalled all the racks and have verified that all the tanks are filled with solution, turn on the recirculation and heater system and bring the solutions up to operating temperature.

You can use the following filter materials with processors that use EKTACOLOR Chemicals:

- bleached cotton
- cellulose with phenolic-resin binder
- fiber glass with phenolic-resin binder
- polypropylene
- spun polypropylene
- viscose rayon with phenolic-resin binder (do not use in the developer)
- activated carbon

Polypropylene is the most acceptable filter-core material and one of the least expensive. This material has no photographic effect, but the surfactants used to produce the polypropylene yarns may have an effect on your process. Therefore, monitor your process carefully when you first change filters. Replace filters weekly for developers and every two weeks for other solutions.

Use of Activated-Carbon Filters to Remove Stain—
In roller-transport processors, a build-up of oxidized chemicals in the developer tank solution can stain prints. To remove these oxidized chemicals and prevent staining, install an activated-carbon filter. You will see a significant stain reduction within 24 hours. The life of the filter cartridge depends on the amount of oxidation products that are treated and the size of the processor tank; however, typical length of use is about 14 days with a 75 litre (20-gallon) tank.

To reduce the possibility of contamination from the filter, pre-soak it in a small amount of developer replenisher for 24 hours before you install it. Discard the developer used for the pre-soak. You can use the following filters:

Filter Manufacturer or Distributor

Polysales Filter Model No. PS-232-9.8 109	Seneca Tec, Inc. Despatch Drive East Rochester, NY 14445 (585) 381-2645
Serfilco Filter Model No. SFC-10W-carbofyne	Serfilco, Inc. 1777 Shermer Road Northbrook, Illinois 60062 (847) 559-1777
	Serfilco Europe Ashburton Road West Trafford Park Manchester, M17 1RW, England 0161-872-1317
Filter Micro-Carbon Model No. C9, 75P-W5 34	Trumpler Clancy Inc. E. Main Street Hamburg, NY 14075 (585) 649-9330

SAFE HANDLING OF PHOTOGRAPHIC CHEMICALS

Handle all chemicals carefully. When you mix solutions, wear goggles or a face shield, a protective apron, and protective gloves made from neoprene or nitrile rubber. Clean protective clothing after use to remove any chemical residue that can cause contamination. For more information about potential health hazards and safe handling of specific KODAK chemicals, see the chemical labels and the Material Safety Data Sheets (MSDSs) for the chemicals. MSDSs also provide regional contact information. MSDSs are available on the Kodak Alaris website at www.kodakalaris.com/es-mx/about/ehs.

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