

RD-90 Developer-Replenisher F-Fix Fixer-Replenisher

I. SYSTEM DESCRIPTION

RD-90, a 3-part liquid concentrate is formulated for use in all automatic processing machines for all standard cycle times.

RD-90 Developer Replenisher is used to prepare both tank solution (using **RD-90 Developer Starter**) and replenisher solution.

F-Fix Fixer & Replenisher, a 2-part hardening fixer, is the companion of **RD-90 Developer Replenisher**.

II. GENERAL PROCESS SPECIFICATIONS

A. Temperature

RD-90 Developer and **F-Fix Fixer** may be utilised over a wide temperature range to suit different machine time cycles to obtain optimum results.

Machine time cycle (sec.)	Operating temperature (°C)
60	36 - 38
90	34 - 36
120	32 - 34
150	30 - 33

B. Replenishment rates

Developer ^(*)	Fixer	Fixer (with continuous electrolytic desilvering)
400 ml/m ²	600 ml/m ²	300 ml/m ²

^(*) These rates may vary depending on :

1. The amount of film processed daily - low use rates produce high oxidation rates.
2. The operating temperature chosen - oxidation increases with temperature increase.
3. The size of film being used - small sheets usually cause higher aerial oxidation.
4. The machine tank size - surface to volume ratio affects aerial oxidation rate.

If the processor is subject to low film usage or long periods of inactivity, aerial oxidation will occur. It will be necessary to increase developer replenishment rates to maintain an adequate activity.

III. MIXING INSTRUCTIONS

A. RD-90 Developer

1. RD-90 Developer Replenisher

Table 1 Mixing instructions Developer Replenisher

Water	Part A	Part B	Part C	Add water to make
Kit for 10x2.5L Cat# 942094				
1500 ml	+ 691 ml = 1 bottle	+ 73 ml = 1 bottle	+ 62 ml = 1 bottle	2.5 L
Kit for 2x20L Cat# 933762				
12 L	+ 5,526 L = 1 bottle	+ 0.579 L = 1 bottle	+ 0.500L = 1 bottle	20 L

2. RD-90 Developer (To fill processor developer tank)

To prepare developer tank solution, fill the processor developer tank $\frac{3}{4}$ full with Developer Replenisher. Add 20 ml of Developer Starter (Cat# 933788) for each litre of tank solution volume. Then top up to the overflow with Developer Replenisher.

B. F-Fix Fixer (Processor tank and replenisher)

Table 2 Mixing instructions Fixer

Water	Part A	Part B	Add water to make
Kit for 10x2.5L Cat# 942102			
1500 ml	+ 658 ml = 1 bottle	+ 106 ml = 1 bottle	2.5 L
Kit for 2x20L Cat# 933770			
12 L	+ 5,263 L = 1 bottle	+ 0.842 L = 1 bottle	20 L

pH AND DENSITY SPECIFICATIONS

Table 3 pH & Density specifications

	pH (25 °C)	Density (20 °C) g/cm ³
Developer	10.00 ± 0.05	1.083 ± 0.003
Developer Replenisher	10.30 ± 0.05	1.083 ± 0.003
Fixer	4.30 ± 0.10	1.105 ± 0.003

IV. CONTINUOUS ELECTROLYTIC FIXER DESILVERING

In order to substantially reduce the fixer replenishment rate and to reduce silver carry-over into the processor wash tank FUJIFILM recommends the use of a suitable fixer desilvering unit.

The silver content of the processor fixing bath should be maintained at 0.3 - 1.0 of silver/L.

V. PROCESSOR TANK CLEANLINESS

If the processor shows signs of dirt or crystals built up on rollers, tank or cross-overs the machine should be emptied, thoroughly washed out and then filled with FUJIFILM **Unicleaner PD** solution. Read instructions packed with the cleaner before use to avoid damage to machine or chemical reactions. Remember to carefully clean off any deposit on the cross-over mechanism; otherwise scratching of the emulsion may occur.

VI. FILM WASHING

Ensure adequate washing of films is achieved by adhering to processor manufacturer's recommendations. If an electrolytic fixer desilvering unit is used in a continuous mode with the processor's fixer tank solution the carry-over of silver into the wash tank will be substantially reduced. This has the benefit of reducing the amount of silver complex in the processor wash water effluent. Normally a reduction to about 1/10th of the normal concentration can be achieved.

VII. BIOLOGICAL GROWTH IN WASH TANK

Open wash system

It is not usual for biological growth to be found in well-maintained processors with open wash systems and adequate wash water flow rates (1 - 3 litres/minute). If problems are experienced it is best to first have an examination of the water quality and supply system, carried out by a specialist company.

Various biocides compatible with photographic processors are available. FUJIFILM **Algstop LR** is very effective in preventing algae growth during shutdown periods. It is only necessary to add 1 ml of **Algstop LR** concentrate for each litre of wash water capacity to the wash tank at the end of a processing session.

An automatic **Algstop Dosing Unit** is available from FUJIFILM.

Closed, recirculated wash systems

In the low wash water usage and high temperature conditions resulting from recirculation of washwater, it has proven to be difficult to keep bio-growth under control.

For full details on the usage of **Algstop LR**, please ask for the separate FUJIFILM Technical Info Sheets "**AlgStop**".

Use biocides safely. Always read the label and product information before use !

VIII. TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action to be taken
Light Image.	<ol style="list-style-type: none"> 1. Developer temperature too low. 2. Under replenishment of developer. 3. Exhausted developer. 4. Developer contaminated by fixer. 5. Over diluted developer. 6. Mixing error. 7. Weak or insufficient exposure. 8. Processing time too short. 9. Too much starter. 	<ol style="list-style-type: none"> 1. Check the temperature with a thermometer and adjust setting. 2. Check replenishment pumps & settings and adjust accordingly. 3. Make new fresh solution. 4. Check mixing procedures – if needed make new fresh solution. 5. Check mixing procedures – if needed make new fresh solution. 6. Check mixing procedures – if needed make new fresh solution. 7. Check equipment used for exposure. 8. Check speed of processor and adjust it if required. 9. Check mixing procedures – make new solution.
Light Image (sudden effect).	Developer contamination* by fixer.	Check mixing procedures – make new developer solution.
Image too dense.	<ol style="list-style-type: none"> 1. Developer temperature too high. 2. Over replenishment of developer. 3. Processing time too long. 4. Overexposed film. 5. Insufficient amount of starter. 	<ol style="list-style-type: none"> 1. Check the temperature with a thermometer and adjust settings. 2. Check replenishment rates, pumps & settings and adjust accordingly. 3. Check speed of processor and adjust accordingly. 4. Check equipment used for exposure. 5. Check mixing procedures – make new solution.
Fogged film.	<ol style="list-style-type: none"> 1. Unsuitable darkroom light. 2. Light leak into darkroom. 3. Unsuitable darkroom light. 4. Light leak into darkroom. 	<ol style="list-style-type: none"> 1. Follow film manufacturer's recommendations. Safety light must be at distance of 1,2 m min. Check if light bulb is of the correct type. 2. Examine darkroom for light leaks. 3. Follow film manufacturer's recommendations. Safety light must be at distance of 1.2 m min. Check if light bulb is of the correct type. 4. Examine darkroom for light leaks.
Mottles.	Developer rollers are excessively worn or damaged.	Change rollers if thorough cleaning proves to be insufficient.
Film does not dry.	<ol style="list-style-type: none"> 1. Drying temperature too low. 2. Wash-water flow too low. 3. Ineffective fixer. 4. Relative humidity too high. 	<ol style="list-style-type: none"> 1. Check temperature and raise if necessary. 2. Check flow rate & temperature and adjust to standard. 3. Check replenishment rate and adjust accordingly. 4. Dry the air in working area.
White spots on light areas of film.	<ol style="list-style-type: none"> 1. Fixer temperature too low. 2. Under replenished fixer. 3. Mixing error for fixer. 4. Insufficient wash. 	<ol style="list-style-type: none"> 1. Check with reliable thermometer and adjust accordingly. 2. Check rate of replenishment and adjust as necessary. 3. Check mixing procedure and mixing tank calibration. 4. Check wash flow rate and increase as required.

Problem	Possible Cause	Action to be taken
Small particles on film.	Dirt in solution.	Check solution circulation, filter and pump.
White transparent spots on films.	<ol style="list-style-type: none"> 1. Spilling or splashing of fixer before processing. 2. Soiled screen. 3. Particles of emulsion lifting from film. 4. Air bubbles between roller and film in developer. 	<ol style="list-style-type: none"> 1. Handle films with care and clean hands. 2. Clean screen. 3. Clean rollers. Check that fixer replenishment rate is sufficient.** 4. Check solution circulation, pump and filter.
White or dark halfmoon shaped marks on film.	Film has been folded or bent before processing.	Handle film with care, do not bend.
Parallel black & transparent stripes.	Uneven pressure from distorted rollers in the developer section of the processor.	Clean machine thoroughly - have machine manufacturer check rollers.
Parallel black & transparent stripes.	Uneven pressure from distorted rollers in the developer section of the processor.	Clean machine thoroughly - have machine manufacturer check rollers.
Dark black marks.	<ol style="list-style-type: none"> 1. Electrostatic discharge. 2. Pressure applied during handling. 	<ol style="list-style-type: none"> 1. Check relative humidity. 2. Handle films smoothly and with care.
Dark or light spots on film (comet shaped).	Splashing of chemicals (fixer or detergents) before processing.	Clean up working & loading areas.
Soiled film after drying.	Drying temperature too high.	Check temperature and adjust it to recommended value.
White layer on film.	<ol style="list-style-type: none"> 1. Wash flow rate too low. 2. Soiled/exhausted fixer bath. 	<ol style="list-style-type: none"> 1. Check flow rate & temperature of wash water - adjust if needed. 2. Check mixing procedure - prepare new fix solution. Check fix replenishment rate.
Yellow stain on film after storage.	Insufficient fixation.	Ensure fixer** replenishment rate is correct.
Scratches on film.	<ol style="list-style-type: none"> 1. Along the entire length of the film. 2. Along the direction of feed of film into processor (often with round areas of higher density). 	<ol style="list-style-type: none"> 1. Guide rails scratching film. Process another film with its long axis at right angles to the direction in which the previous film was processed. This will show whether the scratches occur before loading into processor or during processing. 2. Excessive pressure applied to film by fingers when inserted into feed slot of processor.

* : When filling a processor with developer and fixer solution always mix and install fixer before developer to avoid fixer splashing into developer. Always rinse developer tank and rollers thoroughly with water after installing fixer before installing developer. Use separate mixing tanks.

** : The condition of a fixer can be judged by its silver content. Normally the silver concentration should not exceed 4 g/litre. If it is too high this indicates too low a rate of replenishment. Silver concentration can be measured by silver test strips available from various laboratory chemical suppliers or from Merck.

IX. STORAGE

Liquid developer and fixer concentrates should be stored above 5°C to prevent crystallisation. Storage temperature above 25°C will cause premature ageing.

X. HANDLING PROCESSING SOLUTIONS

All photographic processing solutions can exert harmful effects when brought into contact with human tissue to a greater or lesser extent depending on the nature of the solution and its concentration. All users of such solutions should exercise the greatest care to avoid the chemicals contacting the skin, eyes or other parts of the body. Always wear resistant gloves and effective eye protection.

In case of accidental contact with processing solutions wash the affected part with plenty of clean cold running water. Wash with an acidic soap and rinse thoroughly with water. Consult a medical doctor. Some photographic solutions produce irritating vapours therefore thorough ventilation is essential. Do not inhale air above processing solutions. Always read the hazard information on the packs of solution concentrate before attempting to handle the solutions