

TECHNICAL INFORMATION

REVERSAL PROCESSING

USING ILFORD BLACK & WHITE FILMS TO MAKE MONOCHROME TRANSPARENCIES

REVERSAL PROCESSING OF ILFORD BLACK & WHITE FILMS

Reversal processing enables black and white transparencies to be produced directly from high quality film materials such as PAN F Plus, FP4 Plus and DELTA 100 PROFESSIONAL. This information sheet outlines the method and materials needed for the reversal processing of these ILFORD films.

The reversal process starts with the development of the negative image, this leaves the unused silver halide untouched, but it is not fixed out, as it will later be used to form the positive image.

After the negative image has been developed, it is totally bleached away using an acid bleach. This leaves the remaining silver which is light-fogged and then re-developed to produce the positive image.

Between the various stages of processing, washes are used to prevent contamination of each new processing solution by the previous one.

Since we do not provide all the chemicals for this process, we are providing these instructions on an information only basis and we cannot guarantee final results or offer detailed technical support. We have however tested this process and obtained good results.

IMPORTANT - HEALTH AND SAFETY INFORMATION

The processes mentioned in this document suggest the use of chemical substances and/or proprietary chemical preparations. The bleach is strongly acidic, containing sulphuric acid. Concentrated sulphuric acid is highly corrosive. Do not get it into eyes, or onto skin and clothing as it causes severe burns. It may be fatal if swallowed. In case of external contact immediately flush the affected area with water containing sodium bicarbonate. For internal contact get medical attention at once. Always pour the acid into the water, never add water into the acid. Before using these substances, please obtain and study the manufacturers Materials Safety Data Sheets relevant to them. These data sheets are available from the supplier of the chemicals.

Please read the Material Safety Data Sheets carefully and observe the safety precautions written in them. In the absence of any specific safety precautions, you should always remember to:

- work in a well-ventilated area
- wear safety spectacles, gloves and an apron or overall when handling chemicals
- wash your hands thoroughly after handling chemicals
- seek medical advice if you feel unwell or if you have come into contact with the chemicals: if seeking medical advice take the chemical container and/or Material Safety Data Sheet with you
- never eat, drink or smoke whilst handling the chemicals
- store chemicals in cool, dry conditions in appropriate containers away from children, pets and foodstuffs.

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RECOMMENDED FILMS

The suitability of a negative film for reversal processing depends largely on its inherent contrast. Little can be done to change the contrast appreciably by changes in processing, so choose a film for reversal processing according to the ultimate contrast required in the final positive image.

PAN F Plus gives bright, high contrast positives and is particularly recommended, FP4 Plus and Delta 100 Professional can also be used. Some trial and error is to be expected in all cases.

We do not recommend reversal processing HP5 Plus or DELTA 400 PROFESSIONAL film stock as results are likely to exhibit unacceptably low contrast.

EXPOSURE

When exposing films for print generation, exposure is not that critical because any variation in negative density can usually be compensated for in printing. When a film is to be reversal processed, exposure must be accurate if good quality transparencies are to be produced. For general indoor/outdoor use, first adopt the published ISO setting and vary this, by trial and error, to determine the best exposure for your particular taste. 1 stop over exposed, was in our tests, found to be a good starting point.

CHEMICALS REQUIRED

The following chemicals are required for reversal processing:

ILFORD PQ UNIVERSAL DEVELOPER

Sodium thiosulphate

Potassium permanganate

Sulphuric acid

Sodium or potassium metabisulphite

ILFORD RAPID FIXER or

ILFORD HYPAM

ILFOTOL

Water

SOLUTION PREPARATION

First Developer

Use ILFORD PQ UNIVERSAL developer diluted 1+5.

To the working strength developer add sodium thiosulphate crystals (Hypo) – as a guide, for PAN F Plus add 8g/l, and for FP4 Plus and 100 DELTA Professional add 12g/l.

Bleach

Two solutions, A and B are mixed as follows:

For solution A add 2g of potassium permanganate to 500ml water

For solution B add 10ml of concentrated sulphuric acid to 490ml water

If concentrated sulphuric acid cannot be obtained use dilute acid. This can be a 10% solution. If 10% sulphuric acid is used add 100ml to 400ml of water to make the part B bleach solution.

These stock solutions will keep for a long period of time before they are mixed together. For use, mix equal parts of A and B, making a fresh working solution for each film, and discard after use.

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Clearing solution

Add 25g sodium or potassium metabisulphite to 800ml water. When the sodium or potassium metabisulphite is dissolved make up to 1 litre.

Second developer

ILFORD PQ UNIVERSAL diluted 1+9.

Fixer

ILFORD RAPID FIXER 1+4 or ILFORD HYPAM 1+4.

A hardening fix bath may be beneficial in some circumstances as the bleach bath may soften the film emulsion more than usual. If using a fix hardener then use HYPAM 1+4 with the hardener added.

PROCESSING NOTES

First Development

The first development time, nominally given as twelve minutes, may be adjusted to determine the optimum developing time for a particular ISO rating. A longer development time will give a lighter image and vice versa.

Here the exposed image is developed to a negative. An ordinary spiral reel and tank is recommended for the first development. Adjust the temperature of the developer to 20°C/68°F. Load the exposed film into the spiral reel and place it into the tank. Fill the tank with the recommended quantity of developer. Invert the tank four times in 10 seconds and tap it on a counter to dislodge any air bubbles from the film. If necessary, place the tank in a water-bath to maintain a constant temperature. Agitate during development by giving a 10 second inversion to the tank every minute followed by a couple of taps on a counter.

A development time of 12 minutes at 20°C/68°F is recommended as a starting point for all the ILFORD films listed. It is important that the time and temperature be closely monitored if consistent results are to be obtained. After the required development time, remove the cover from the tank and pour the developer away. Go immediately to the First Wash step described below.

First wash

Wash the film in running water for five minutes. Discard the water and go to the Bleach step.

Bleach

Pour in the bleaching solution at 20°C/68°F, the bleach, being strongly acid, stops development almost instantly. Bleaching should be continued for 5 minutes with continuous agitation, or as long as it takes to remove the silver image. This vigorous agitation is necessary to ensure complete bleaching. When all the silver has been removed, the film will be a creamy-yellow colour.

After bleaching has stopped it is possible to carry out the remaining steps in room lighting.

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Second wash

Wash film in running water for one minute. Discard the water and go to the Clearing Bath step.

Clearing Bath

The clearing solution removes any yellow staining caused by bleaching.

This is to clear away all traces of the powerful bleaching bath, and the slight stain it leaves behind. Pour the clearing solution into the tank. Treat the film for 2 minutes in the solution, using continuous gentle inversions.

Third wash

Wash film in running water for one minute. Discard water and go to Second Exposure.

Second Exposure

This is a total fogging exposure to make the remaining silver halide develop readily. Open the tank and remove the film from the spiral reel. Expose both sides of the film for the equivalent of 30-60 seconds at 46cm/18in from a 100-watt tungsten lamp or 30cm/12in from a fluorescent light tube. Insufficient second exposure will result in a reduction in density when the film is finally fixed. Two to four times the specified exposure may safely be given, but over exposure beyond this extent may lead to slightly foggy highlights.

Do not expose to sunlight as the film may start to print-out, thus affecting maximum density.

Re-development and fixing

Finally, the film should be developed and fixed according to the instructions below.

Second development

In this step, all the residual silver halide is developed fully, to form the positive image. If the spiral reel employed permits, re-insert the film onto the reel (it may help if this operation is carried out under water). However, if re-insertion of the film onto the reel is not possible, the second development and subsequent operations may be carried out in a dish/tray by using a 'see-saw method'.

Appropriate protective gloves must be worn while performing the 'see-saw' method.

Using a freshly mixed developer solution, develop the film for 6 minutes at 20°C/68°F. Development time is not critical – it should simply be continued until maximum density is achieved. After development, discard the used developer.

Fourth wash

Wash film in running water for one minute. Discard water and go to Fixing.

Fixing

This is an optional stage which removes any last traces of silver halide that did not develop and leaves the image clean and fully transparent in the clear parts. Pour in the fixing bath and fix for 5 minutes with intermittent agitation. This removes any insensitive silver halide in the highlights.

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Fifth wash

Wash film in running water for ten minutes. Discard water.

Rinse and Drying transparencies

After washing, give the film a final rinse in water containing an ILFORD ILFOTOL Wetting Agent (1+200). The film should then be hung to dry.

MOUNTING AND PROJECTION OF TRANSPARENCIES

The film is ready for projection when dry and may be mounted in cardboard mounts or between glass.

THE REVERSAL PROCESS AT A GLANCE

Processing Steps	Time (min:sec)	Comments
First Development	12:00	May be adjusted to give optimum time for particular ISO rating. A longer development time will give a lighter image and a shorter development time will give darker image.
1 st Wash	5:00	Preferably running water
Bleach	5:00	Strong acid and therefore stops development immediately: extend time if necessary, for full bleaching: continuous agitation
2 nd Wash / Rinse	1:00	
Clearing Bath	2:00	Clearing solution removes any yellow staining caused by bleaching
3 rd Wash / Rinse	1:00	
Second Exposure	1:00 per side	See Processing Notes
Second Development	6:00	Development as for normal black and white processing
4 th Wash / Rinse	1:00	
Fix	5:00	Fixing as for normal black and white processing
5 th Wash	10:00	Running water
Rinse and Dry		

A wide range of information sheets are available which describe and give guidance on using ILFORD PHOTO products. Some product information sheets might not be available in your country.

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