TECHNICAL INFORMATION

HYPAM FIXER

A LIQUID RAPID FIXER FOR BLACK & WHITE FILM & PAPER PRODUCTS

ILFORD HYPAM is a non-hardening rapid fixer supplied as a liquid concentrate that is diluted with water for use. It is easy and convenient to use. Without the addition of a hardener it is suitable for all black and white film and paper, manual and machine processing applications in the temperature range of 18–40°C (66–104°F). It can also be used for fixing other specialist, X-ray, scientific products and graphic arts materials. The fixing agent in HYPAM is ammonium thiosulphate, it contains no sodium thiosulphate (hypo).

The addition of a fixer hardener can be used to turn working strength solutions of ILFORD HYPAM into a hardening fixer for Black & White films, however for most applications modern camera films are sufficiently hardened when manufactured for most processing circumstances so the general use of a fix hardening agent is no longer recommended. The use of a fix hardener is only recommended if:-

- the film process temperature is above 30°C (86°F)
- poor film drying performance is being experienced
- shorter film drying times are needed
- there is a risk of physical damage to the film, e.g. if a roller transport processor is used.

For paper processing applications using a fix hardener is not recommended.

Mixing instructions
Working strength ILFORD HYPAM solution can be mixed either manually or by using automatic solution mixing equipment. If automatic mixing equipment is used follow the equipment manufacturer's recommendations and advice.

Note Photographic chemicals are not hazardous when used correctly. It is recommended that gloves, eye protection and an apron or overall are worn when handling and mixing all chemicals. Always follow the specific health and safety recommendations on the chemical packaging. Photochemical material safety data sheets containing full details for the safe handling, disposal and transportation of ILFORD chemicals are available from ILFORD agents or directly from the ILFORD PHOTO web site at;
www.ilfordphoto.com

For all film fixing applications ILFORD HYPAM is diluted 1+4 with water. If needed a hardener can be added to the diluted fixer, never mix hardener with concentrated fixer. See the hardener manufacturers specific instructions.

For use as a fixer in paper processing machines ILFORD HYPAM is diluted 1+4 with water but for manual fixing applications it can be diluted either 1+4 or 1+9.

Fixer concentrates do not readily mix with water, to ensure a working strength solution performs correctly it is very important to stir it thoroughly during mixing. When making solutions make sure that the mixing vessel is large enough for the volume of solution to be mixed and stirred. Measure out the required amount of fixer concentrate and water accurately. Pour the concentrate into the mixing vessel and gradually add the water while stirring.

Ensure that all utensils, processing tanks or dishes/trays and mixing vessels are thoroughly rinsed and cleaned before mixing fresh batches of ILFORD HYPAM particularly if it is being used for the first time. Wash out the mixing vessels thoroughly after use.

After filling a processor with fresh ILFORD HYPAM tank solution, switch it on and allow it to get up to temperature and circulate the solutions. After the working temperature is reached leave it re-circulating for at least 10 minutes to ensure the fresh chemicals are thoroughly mixed before attempting to process any film or paper. Always replace the tank covers used on the process and replenishment solutions.

pH and specific gravity

The following table gives the pH and specific gravity (SG) for fresh, working strength ILFORD HYPAM. These figures were obtained under carefully controlled laboratory conditions and may differ slightly from measurements made by users in their own working areas. Users should make their own control measurements from their own accurately mixed fresh solutions for later comparison. Ideally a pH meter should be used to measure solution pH but if one is not available pH measurement sticks can be used. These are available in various pH ranges and those covering a range from pH 4 to pH 6 are sufficient. SG can be measured by using a hydrometer and one covering the range from 1.000 to 1.200 is useful for a wide range of photographic process solutions.

HYPAM dilution	pH without hardener	SG at 20°C/68°F
1+4	5.0–5.5	1.080–1.090
1+9	5.0–5.5	1.040–1.050

Fixing times

For best results it is recommended that all process solutions are kept at the same temperature or at least within 5°C (9°F) of the developer temperature.

Below are the average minimum fixing times at 20°C (68°F) for materials manually processed using fresh fixer with and without hardener. The range of times for film takes into account different film types. The agitation for film is the same as that used for spiral tank development, i.e. 4 inversions during the first 10 seconds of fixing repeated during the first 10 seconds of each subsequent minute. The agitation for paper is the same as that used for the dish/tray development of paper, i.e. intermittent rocking of the dish/tray.

Material	Dilution	Time without hardener (minutes)	Time with hardener (minutes)
General purpose film	1+4	2–5	4–10
Other specialist, X-ray and graphic art materials	1+4	2–5	4–10
RC paper	1+4	½	n/a
RC paper	1+9	1	n/a
FB paper	1+4	1	n/a
FB paper	1+9	2	n/a

For more information about fixing other specialist, X-ray and graphic art materials consult the information supplied by their manufacturers.

Due to the configuration of some film processing machines a longer fixing time may be automatically given but this should not cause any process problems provided it is not excessive.

The configuration of most RC paper processing machines will usually give much shorter fixing times however this should not cause any process problems as the fixer bath will usually be working at a much higher temperature 25–40°C (77–104°F).

Washing films
After fixing films are washed to remove the residual thiosulphate and other by-products of the process. When a non-hardening fixer has been used wash the films in running water for 5–10 minutes at a temperature within 5°C (9°F) of the process temperature.

For spiral tank use, when a non-hardening fixer has been used, the following method of washing is recommended. This method of washing is faster, uses less water yet still gives negatives suitable for long term storage.

After fixing, fill the spiral tank with water at the same temperature, +/-5°C (9°F), as the processing solutions and invert it five times. Drain the water away and refill. Invert the tank ten times. Once more drain the water away and refill.

Finally invert the tank twenty times and drain the water away.

Washing RC paper
Wash RC papers for 2 minutes in fresh running water at a temperature above 5°C (41°F).

When it is important to obtain a print in the shortest possible time, vigorously wash RC papers for 30 seconds in running water.

Washing FB paper
Wash FB papers for 60 minutes in fresh running water at a temperature above 5°C (41°F).

Using ILFORD WASHAID reduces the washing time thus saving time and water. Wash the prints for 5 minutes in running water above 5°C (41°F), drain off the excess water and immerse the prints for 10 minutes in a dish/tray of 1 + 4 WASHAID at18–24°C (64–75°F). Finally, wash the prints for 5 minutes in running water above 5°C (41°F).

The use of a fix hardener and its effect on film fix and wash times
Do not use a fix hardener when processing ILFORD photographic papers.

ILFORD PHOTO no longer produces a fix hardener, however other manufacturers do. If a fix hardener is used during film processing the recommended fix and wash times will need to be extended. Depending on the film and processing conditions the fix plus hardener time will be between 4 and 10 minutes and the subsequent wash time 10–20 minutes. Please consult the manufacturer of the hardener for specific information.

Generally for most applications modern camera films are sufficiently hardened at manufacture. Additional hardening from a fixer hardener is not usually needed or recommended for dish (tray), spiral tank, deep tanks, rotary processors, dip and dunk (hanger) processors and short leader processors, unless the processing temperature is above 30°C (86°F) or poor drying performance is being experienced or shorter drying times are needed. A fixer hardener may be needed when using a roller transport film processor to minimise the risk of physical damage.

Capacity without replenishment An unreplenished fixer bath is eventually exhausted by the build up of silver and halides in it and the action of solutions carried over from the preceding baths that can cause some dilution and the pH to be raised.

Material	Dilution	Capacity/litre of working strength fixer
General purpose film	1+4	24x135–36
Other specialist, X-ray and graphic art materials	1+4	1m² (11ft²)
RC paper	1+4 1+9	80 sheets of 20.3x25.4cm (8x10in) 4m² (44ft²)
FB paper	1+4 1+9	40 sheets of 20.3x25.4cm (8x10in) 2m² (22ft²)

The figures for paper may be exceeded whenever print stability is not critically important.

Replenishment
The activity of a fixer bath can be maintained by the regular addition of fresh working strength fixer. A properly replenished fixer bath can be used for a very long period of time

Material	Dilution	Replenishment ml of working strength fixer
General purpose film	1+4	45ml/135–36 855ml/m² (78ml/ft²)
Other specialist, X-ray and graphic art materials	1+4	855ml/m² (78ml/ft²)
RC paper	1+4 1+9	250ml/m² (23ml/ft²)
FB paper	1+4 1+9	500ml/m² (46ml/ft²)

Higher replenishment rates may be needed with some process systems that have inefficient replenishment systems. The suggested replenishment rate for machine processing RC papers is 300–450 ml/m² (27–41 ml/ft²). Lower replenishment rates, up to 50–75% less, can be used when a properly set up silver recovery system is in use.

To give adequate replenishment to deep tanks, it may be necessary to remove some of the used fixer from the tank so that the appropriate amount of fresh replenisher can be added. Calculate the amount of replenisher to be added. Remove more fixer from the tank than the amount of replenisher required. Add the replenisher to the tank and top up the solution to the correct level using some of the removed fixer while stirring thoroughly.

Two bath fixing
An extremely efficient method of fixing film or paper is to use the two bath fixing technique. Make up two separate fixing baths of the same solution volume. Fix the film or paper in the first bath for half the recommended fixing time and then transfer them to the second bath for the remainder of the time. Continue to work this way until the capacity of the first bath is reached, then discarded it and replace it with the second fixer bath. Prepare and use a completely fresh second bath. Repeat this process as required with the result that the film or paper is always thoroughly fixed by the relatively fresh fixer in the second bath.

CHECKING AND MAINTAINING FIXER ACTIVITY

Stop Bath

After development and before fixing we recommend that films and papers are rinsed in an acid stop bath such as ILFORD ILFOSTOP (with indicator dye). When tanks of process solutions are in use a stop bath immediately stops development and reduces carry over of excess developer into the fixer bath. This helps to maintain the activity and prolong the life of the fixer solution.

ILFOSTOP is also recommended for all machine processing applications.

The indicator dye in ILFOSTOP turns from yellow to purple when the bath is exhausted, this can be useful when dish/tray processing paper, but can be ignored for replenished machine processors.

ILFORD Stop Bath	ILFOSTOP	ILFOSTOP PRO
Dilution	1+19	1+19
Temperature range	18–24°C (64–75°F)	18–24°C (64–75°F)
Time(s) at 2020°C (68°F)	10	10
Capacity – films/litre (unreplenished)	15 x 135–36	22 x 135–36
Other specialist, X-ray and graphic art materials	0.75m² (8 ft²)	1m² (11 ft²)
Capacity – sheets of 20.3x25.4cm (8x10in) RC paper/litre (unreplenished)	60	90
Capacity - sheets of 20.3x25.4cm (8x10in) FB paper/litre (unreplenished)	30	45

The process time given is the minimum required. Due to the configuration of some processing machines a longer stop bath time may be given automatically but should not cause any process problems provided it is not excessive. The design of some processing machines means that a stop bath cannot be included, provided the fixer activity is monitored and adequate fixer replenishment rates are used there should be no process problems.

Adjusting fixer pH

If a stop bath is not used and the pH of the fixer bath is found to be to high when measured, i.e.. more alkali than it should be, then a few drops of a 50% acetic acid solution may be added to lower the pH value. This addition should be done gradually and with thorough stirring. Do not lower the pH of the fixer bath too far, the limits are given above.

Adjusting specific gravity SG

If the solution concentration of a fixer bath is too high or too low efficiency is reduced and poor fixing can be experienced.

If the SG of the working strength fixer bath is too low, i.e. the solution is too dilute, it can be restored by adding fresh fixer concentrate, however any addition of fixer concentrate must be stirred in thoroughly.

In high temperature processors the SG of the working strength fixer bath may become too high, it concentrates due to water evaporation. This can be restored by topping up the tank with water. In some situations stirring may not be possible, e.g. in a roller transport processor, here the action of the processor's moving parts and re-circulation system should be enough to give sufficient stirring.

Film clearing time

In order to avoid the risk of insufficient fixing. film should remain in the fixer for twice the time it takes the emulsion to clear. Fixer should be discarded when the clearing time in used fixer exceeds twice the clearing time in fresh fixer.

The clearing time of a film and fixer combination can be found by the following method. It can be carried out in normal lighting.

Take a piece of scrap unprocessed film and place a drop of the working strength fixer on to a small part of the emulsion side. Leave it until the emulsion under the drop is a clear spot, this should take around 30 to 60 seconds. Immerse the piece of film in the fixer bath and using a stop clock time how long it takes for the rest of the film to clear. Clearing can be judged by comparing the surrounding film area with the clear central spot. The time taken for the rest of the film to clear is the clearing time. The fixing time needed is double the clearing time.

Silver concentration

The level of silver in a film fixing bath can be allowed to rise to 8–10g/l without serious effect.

The level of silver that can be tolerated in a paper fixing bath depends on the type of paper being processed and the degree of image permanence required.

If a high level of image permanence is required for commercial use the silver concentration in the fixer should be kept below 2 g/l when fixing FB papers. This approximates to 40 20.3x25.4 cm (8x10 in) FB prints. Above this level compounds may remain in the paper base after washing and over time possibly contribute to print staining. For prints that need maximum stability for long term storage a the maximum silver level in the fixer should not rise above 0.5 g/l i.e.. approximately 10, 20.3x25.4cm (8x10in) prints.

However, print throughput can only be a guide to silver concentration as it depends on the proportion of exposed to unexposed areas on the prints being processed. Silver estimator papers are usually not sensitive enough to test the very low silver levels suitable for optimum permanence. For important prints it is recommended that paper is tested in the following way to ensure adequate fixing.

Prepare the testing solution by dissolving 2g of sodium sulphide in 125ml of water.

NB Take care to follow the health and safety information supplied by the sodium sulphide manufacturer.

For use, dilute the testing solution 1+9 with water.

To establish a permanent reference for a particular type of paper, place a drop of the diluted testing solution on a white area of a print that is known to be well fixed and thoroughly washed. (Use the two bath fixing method). Remove any excess solution with clean blotting paper or absorbent tissue and a barely visible cream tint should be left. This is the reference colour for a well fixed and washed print on this type of paper.

Any subsequent prints that show a yellowing of the test spot when tested are not properly fixed. Soak the prints in water for 5 minutes, then repeat the recommended fixing and washing sequence, using fresh fixer.

Prints must be well washed before using the test, it is not effective on prints direct from the fixer bath. RC papers can be processed in fixers containing higher levels of silver, 4–6g/l as the paper base is protected on both sides by an impervious polythene coating.

Silver recovery

Any method of silver recovery can be used with ILFORD HYPAM fixer but for maximum efficiency the electrolytic method is recommended as the treated fixer can be recycled or reused. The electrolytic silver recovery units can be either an off-line remote unit, or an on-line unit in a processor's re-circulation system. When collecting silver by electrolytic methods care must be taken not to pass too large a current through the solution as this may cause the fixers active ingredients to breakdown when the silver concentration becomes too low. Silver sulphide may be formed and deposited on the units cathode, this is called sulphiding, the efficiency of the fixer and the silver recovery process are both reduced by sulphiding. Vigorous electrolysis may also lead to hazardous hydrogen sulphide gas (bad eggs smell) being released.

Properly set up an electrolytic silver recovery system can considerably reduce the silver in a fixer solution and thereby increase its efficiency and capacity and so allow lower replenishment rates to be used. Silver concentrations of around 50–100 ppm can be commonly achieved.

In conjunction with primary electrolytic silver recovery systems, a processor's fix and wash overflows can be further treated by secondary and tertiary units using ion exchange and metal exchange. Properly maintained these can reduce silver in the overflow to very low levels, around 3ppm, allowing processing waste discharges to meet to most demanding of effluent controls

To use silver recovery units for best results consult the information provided by the relevant silver recovery equipment and processor suppliers. More general information about silver recovery and other waste treatment, disposal and recycling is available from our web site at **www.ilfordphoto.com**

WORKING SOLUTION LIFE

The life of a solution in a replenished system is dependent on film throughput, replenishment rates, processing temperature and film types. The only sure way of always knowing that the activity of a fixer is adequate is to use the techniques given above. Properly replenished HYPAM fixer in regular use should have a very long life, but as a general guide it is advisable to replace it after 12 months in the process tank.

Unreplenished HYPAM working strength solutions should last for up to:-

6 months in full tightly capped bottles
2 months in a tank or dish/tray with a floating lid
1 month in a half full tightly capped bottle.
7 days in an open dish/tray.

STORAGE

Full, unopened bottles of HYPAM concentrate stored in cool conditions, 5–20°C (41–68°F), will keep for two years. Once opened use completely within six months and keep all bottles tightly sealed until used.

AVAILABILITY AND CAPACITY

HYPAM fixer is available in 5 litre bottles.

A 5 litre bottle of HYPAM concentrate makes enough working strength fixer solution to fix 600 135–36 films or 2000 20.3x25.4cm (8x10in) RC prints or 1000 20.3x25.4cm (8x10in) FB prints.

Depending on the replenishment rates used a 5 litre bottle of HYPAM concentrate makes enough working strength fixer solution to replenish for 550 135–36 films or 1000–2000 20.3x25.4cm (8x10in) RC prints or 1000 20.3x25.4cm (8x10in) FB prints.

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