

## TECHNICAL INFORMATION

# ILFOSOL 3 FILM DEVELOPER

**LIQUID CONCENTRATE DEVELOPER FOR LOW VOLUME BLACK AND WHITE FILM PROCESSING IN SPIRAL TANKS, DISHES, TRAYS AND ROTARY PROCESSORS WITHOUT REPLENISHMENT**

ILFORD ILFOSOL 3 is a liquid concentrate black and white film developer formulated to exploit the full potential of conventional black and white film emulsions in all formats. It enables professionals and amateurs to economically develop small quantities of ILFORD and other films with ease and convenience.

ILFOSOL 3 is particularly suited to developing medium speed films such as FP4 Plus and DELTA 100 PROFESSIONAL. It gives fine grain and good sharpness with full film speed.

ILFOSOL 3 is supplied as a liquid concentrate normally diluted 1+9 for one-shot use. Dilute it immediately before use and discard directly after development. For greater economy it can be used with many films at a higher dilution of 1+14 with only a small trade off in image quality.

ILFOSOL 3 is not recommended when using re-use techniques or replenishment systems.

**Mixing instructions**

**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 web site at :-

**[www.ilfordphoto.com](http://www.ilfordphoto.com).**

Determine first either the tank size being used or the number of films to be processed and measure out the appropriate quantity of concentrate.

Always use the smallest measuring cylinder available : it is easier to measure 10ml accurately in a 50ml cylinder than in a 500ml cylinder.

Add the concentrate to the mixing vessel. A large measuring jug is a good mixing vessel as it provides a check on the total quantity of solution mixed. Rinse out the measuring cylinder used for the concentrate into the mixing vessel.

Finally add hot and cold water to make up the final volume at the desired temperature and stir thoroughly.

As most water drawn from pressure mains is highly aerated, we advise that users draw off the water they need and leave it to stand for a few minutes before using it to make up developers.

Thoroughly wash all utensils, measuring and mixing vessels after use. Do not contaminate developer solutions with either stop bath or fixer solutions.

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### Table of dilutions

The following table gives a list of common spiral tank sizes - cross referenced with the amount of liquid concentrate and water required to fill the tank.

	Dilution 1 + 9 concentrate / water	Dilution 1 + 14 concentrate / water
Tank size ml		
100	10 / 90	7 / 93
150	15 / 135	10 / 140
200	20 / 180	13 / 187
250	25 / 225	17 / 233
300	30 / 270	20 / 280
350	35 / 315	23 / 327
400	40 / 360	27 / 373
450	45 / 405	30 / 420
500	50 / 450	33 / 467
600	60 / 540	40 / 560
700	70 / 630	47 / 653
800	80 / 720	53 / 747
900	90 / 810	60 / 840
1,000	100 / 900	67 / 933
2,000	200 / 1800	133 / 1867

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1 litre = 33.81 US fluid ounces.

3.8 litre = 1 US gallon.

29.6 ml = 1 US fluid ounce.

### Note

We advise not to use amounts of concentrate less than 10ml when mixing working strength solutions as it is difficult to measure accurately such small quantities with a measuring cylinder. If it is necessary to measure out very small quantities, use a graduated pipette.

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### pH and specific gravity

The following table gives the pH and specific gravity (SG) for a fresh solution of ILFOSOL 3 developer. 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 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 pH7 to pH10 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.

Developer	dilution	pH	SG at 20°C/68°F
ILFOSOL 3	1 + 9	9.75 – 9.85	1.005
ILFOSOL 3	1 + 14	9.75 – 9.85	1.002

### PROCESS SYSTEMS

#### Manual processing

##### Spiral tanks

ILFOSOL 3 developer can be used to process films in spiral tanks using the recommended dilutions.

The recommended developing temperature is 20°C (68°F).

It can be used in the temperature range of 20° - 24°C (68° - 75°C), but the recommended development times must be reduced if higher temperatures are used.

Care must be taken with the choice of dilution and temperature as very short development times with some films may lead to uneven processing.

Before starting to process, prepare the appropriate volume of all the required solutions according to tank size and number of films to be processed together. The solution volume must be enough to cover all the spirals used. Check the temperature of all the processing solutions and adjust them to be +/- 1°C (2°F) of the temperature being used.

Add the developer to the processing tank. Tap the tank firmly on the work bench to dislodge any air bubbles which may be trapped in the processing spiral.

The following agitation is recommended for spiral tank processing with ILFORD chemicals. Invert the tank four times during the first 10 seconds. Repeat these four inversions during the first 10 seconds of each subsequent minute of development. At the end of each agitation sequence, tap the tank firmly on the work bench to dislodge any air bubbles which may be trapped in the processing spiral. This method of agitation should also be used with the fixer.

Drain off the developer 10 seconds before the end of the development time and then immediately fill the tank with the next process solution.

### Dish (tray) processing - Sheet film format only

ILFOSOL 3 developer can be used to process sheet film in dishes(trays) at the recommended temperature of 20°C (68°F)±1°C(2°F). Higher temperatures are not recommended as the development times may become too short and lead to uneven processing.

Before starting to process, prepare the required volume of solutions according to dish (tray) size used and number of films to be processed. The solution volume must be enough to cover the sheet film completely during processing. Check the temperatures of all the process solutions and adjust them to be ±1°C(2°F) of the temperature being used.

When dish / tray processing continuous agitation is used, immerse the film completely in the developer and gently rock the dish from side to side taking care to avoid any spillage. This method of agitation is used for all subsequent processing steps. Continuous agitation reduces the recommended development times by about 15%.

Remove the film from the dish /tray 10 seconds before the end of the development time and allow developer to drain from its surface before placing it in the stop bath.

### Rotary tube processors

Rotary tube processors have very similar processing conditions to spiral tank processing by hand, except they process with small amounts of solution using continuous agitation and can be pre-programmed. ILFOSOL 3 developer can be used to process films in rotary processors using recommended dilutions at 20°C (68°F).

Follow any guidance given by the processor manufacturer when adjusting process times for these types of processors. However, generally we do not recommend using a pre-rinse as it can lead to uneven development.

Without using a pre-rinse, the given development times will need to be reduced by around 15% to compensate for the continuous agitation.

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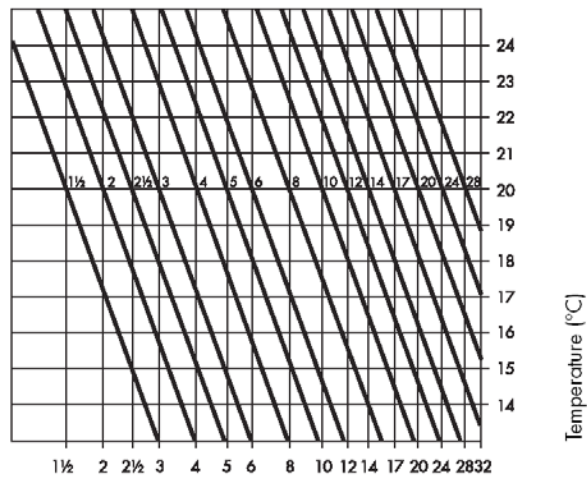
## DEVELOPMENT TIMES

The table of development times shown below gives an appropriate starting point for ILFOSOL 3 developer when general purpose black and white camera films are being developed in spiral tanks with intermittent agitation.

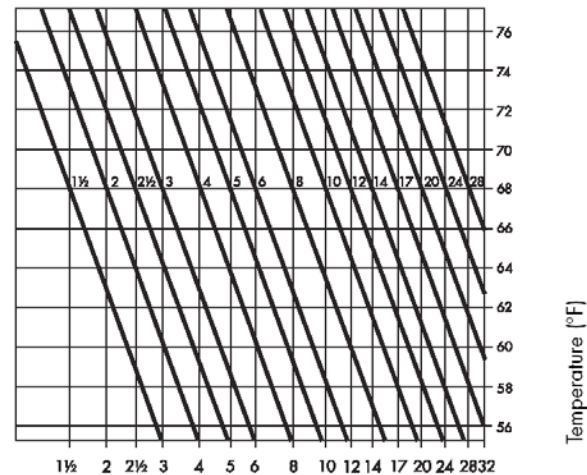
The development times are for films rated at an appropriate EI rating for each developer and they should produce negatives of normal contrast, typically around a Gbar of 0.62. However, they are only a guide and may need to be adjusted to suit individual processing systems, working practices and preferences.

Higher or lower contrast negatives may be preferred by some to suit their individual requirements - adjust the recommended development times until the desired contrast level is obtained.

ILFOSOL 3 developer can be used in the temperature range of 20°-24°C (68° - 75°F). For processing at other temperatures, increase the given times by 10% for each 1°C drop in temperature and decrease the given development times by 10% for each 1°C rise in temperature. Alternatively use the time temperature graphs below. For example, if 4 minutes at 20°C/68°F is recommended :- the time at 23°C / 73°F will be 3 minutes, and the time at 16°C / 61°F will be 6 minutes.



New development time (min)



New development time (min)

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### ILFORD films

		<b>1+9</b>	<b>1+14</b>	<b>1+9</b>	<b>1+14</b>
	<b>EI</b>	<b>20°C/68°F</b>	<b>20°C/68°F</b>	<b>24°C/75°F</b>	<b>24°C/75°F</b>
<b>Delta 100 Professional</b>	EI 50 / 18	-	-	-	-
	EI 100 / 21	5.00	7.30	4.00	6.00
	EI 200 / 24	-	-	-	-
<b>Delta 400 Professional</b>	EI 200 / 24	5.30	8.00	4.30	6.00
	EI 400 / 27	7.00	12.00	6.00	8.30
	EI 800 / 30	14.00	20.30	10.30	15.30
<b>Delta 3200 Professional</b>	EI 400 / 27	6.00	11.00	5.30	7.00
	EI 800 / 30	7.30	13.00	7.00	8.00
	EI 1600 / 33	10.00	15.30	8.00	10.00
	EI 3200 / 36	11.00	17.00	9.00	11.00
	EI 6400 / 39	18.00	23.00	15.30	19.00
<b>Pan F Plus</b>	EI 50 / 18	-	4.30	-	-
<b>FP4 Plus</b>	EI 100 / 21	4.00	7.00	-	-
	EI 125 / 22	-	-	4.00	5.00
<b>HP5 Plus</b>	EI 200 / 24	5.00	7.00	4.00	5.30
	EI 400 / 27	6.30	11.00	5.30	7.00
	EI 800 / 30	13.30	19.30	10.00	14.00
<b>SFX200</b>	EI 200 / 24	6.00	9.00	5.00	7.00
	EI 400 / 27	8.30	13.30	5.30	9.30
<b>Ortho Plus</b>	EI 80 / 20 daylight	-	-	-	-
	Ei 40 / 17 tungsten	-	-	-	-

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### Non ILFORD films

		1+9	1+14	1+9	1+14
	EI	20°C/68°F	20°C/68°F	24°C/75°F	24°C/75°F
<b>Kodak 100 TMax</b>	EI 80 / 20	5.30	9.00	4.30	7.00
<b>Kodak 400 TMax</b>	EI 200 / 24	5.30	7.30	4.00	5.30
	EI 400 / 27	6.00	10.00	5.00	7.30
	EI 800 / 30	8.30	14.00	6.30	10.00
<b>Kodak 3200 TMax</b>	EI 800 / 30	6.30	11.00	5.00	8.00
	EI 1600 / 33	8.00	13.00	6.00	9.00
	EI 3200 / 36	10.00	15.00	7.00	11.30
	EI 6400 / 39	13.00	18.30	10.00	15.00
<b>Kodak 125 TX</b>	EI 125 / 22	5.00	8.30	4.30	6.30
<b>Kodak 400 TX</b>	EI 200 / 24	5.30	8.30	4.30	6.30
	EI 400 / 27	7.30	12.00	6.30	9.00
	EI 800 / 30	10.30	18.30	8.30	13.30
<b>Fuji Acros 100</b>	EI 80 / 20	5.00	7.00	-	6.00
<b>Fuji Neopan 400</b>	EI 100 / 21	4.30	-	-	-
	EI 250 / 25	-	8.00	4.30	6.00
	EI 400 / 27	6.30	9.30	5.00	7.00
<b>Fuji Neopan 1600</b>	EI 800 / 30	5.00	7.00	-	5.30
	EI 1600 / 33	7.30	10.00	5.00	8.00
<b>Agfapan 100</b>	EI 80 / 20	6.00	8.30	-	-
	EI 100 / 21	-	-	5.00	7.00
<b>Agfapan 400</b>	EI 320 / 26	9.00	14.30	6.30	-
	EI 400 / 27	-	-	-	12.00

The development times for other manufacturers' films are a general guide. The specification of these products may have changed over time and as a result, these development times may need to be adjusted.

They can be adjusted until the result required is achieved.

## ILFOSOL 3

### STOP, FIX, WASH and RINSE

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.

#### Stop Bath

When using "one shot" processing in small spiral tanks a water rinse can substitute for a stop bath.

After development, film can be rinsed in water but we recommend that an acid stop bath is used such as ILFORD ILFOSTOP (contains an indicator dye).

When deep tanks or dishes (trays) 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.

Stop Bath	ILFOSTOP
Dilution	1+19
Temperature Range	18° - 24°C (64° - 75°F)
Time (seconds) at 20°C (68°F)	10
Capacity films/litre (unreplenished)	15 x 135-36

The process time given for the stop bath is the minimum required. If necessary a longer time may be used, and should not cause any process problems provided it is not excessive.

#### Fix

The recommended fixers are ILFORD RAPID FIXER or ILFORD HYPAM liquid fixers.

Note, both are non-hardening fixers.

ILFORD Fixer	ILFORD HYPAM & ILFORD RAPID FIXER
Dilution	1+4
Temperature Range	18° - 24°C (64° - 75°F)
Time (minutes) at 20°C (68°F)	2-5
Capacity films/litre (unreplenished)	24 x 135-36

#### Wash

When a non-hardening fixer has been used, wash the films in running water for 5-10 minutes at a temperature of within 5°C (9°F) of the process.

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

#### Non hardener fixer washing method

After fixing, fill the spiral tank with water at the same temperature, +/- 5°C (9°F), as the processing solutions and invert it 5 times. Drain the water away and refill. Invert the tank 10 times. Once more, drain the water away and refill.

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

#### Rinse

For a final rinse, ILFORD ILFOTOL wetting agent is recommended as it helps films to dry evenly. Start by using 5ml per litre of rinse water (1 + 200), however the amount of ILFOTOL used may need some adjustment depending on the local water quality and drying method. Too little or too much wetting agent can lead to uneven drying. Remove excess rinse solution from the film before drying.

#### Reusing developer without replenishment

Working strength solutions of ILFOSOL 3 1+9 and 1+14 are described as one shot developers. They should be used only once and then discarded. We do not recommend reusing them to process more than one film.

Reusing some stock developer solutions can make more economical use of them, but it is not without its drawbacks.

"One-shot" processing using ILFOSOL 3 1+9 and 1+14 eliminates or greatly reduces the problems.

One-shot processing is recommended when image quality, reliability and consistency are more important than economy.

#### WORKING SOLUTION LIFE

ILFOSOL 3 working strength solutions should not be kept for more than 24 hours. Make up fresh developer each time it is needed and discard it after the processing session.

## **ILFOSOL 3**

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### **STORAGE**

Always store chemicals in their original containers and away from unsupervised children and pets. In cool conditions, 4° - 20°C (44° - 68°), ILFOSOL 3 developer concentrate should keep in good condition for:-

24 months in fully tight capped bottles.

4 months in half tight capped bottles.

ILFOSOL 3 is available in 500ml bottles.

500ml at :-

1+9 will process 16 135/36 films

and at :-

1+14 will process 24 135 / 36 films.

A wide range of fact sheets is available which describe and give guidance on using ILFORD products. Note - some products in this fact sheet may not be available in your country.