

TECHNICAL INFORMATION

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# FILM CHEMICALS— LOW VOLUME

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CHEMICALS FORMULATED FOR CONVENIENT, HIGH QUALITY PROCESSING OF BLACK AND WHITE FILMS IN SPIRAL TANKS, TRAYS AND ROTARY PROCESSORS WITHOUT REPLENISHMENT



*Photo By Jonathan Lovekin*

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# ILFORD

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## 1 INTRODUCTION

The range of ILFORD chemicals for film processing is both wide and of high quality. ILFORD developers complement the features of ILFORD films and also ensure excellent results when used with quality black and white films from other manufacturers.

This Technical Information guide describes the ILFORD range of chemicals designed for low volume processing of black and white films without replenishment. This includes processing in spiral tanks (the most common manner of processing in low volume), large volume spiral tanks, trays and rotary processors.

For information about high volume processing of black and white films with replenishment, please refer to the ILFORD Technical Information guide on ILFORD chemicals for high volume processing. It can be obtained by contacting ILFORD Technical Service in Paramus, NJ (1-201-265-6000).

ILFORD makes every effort to comply with the recommendations of governmental authorities as regards to consumer safety and environmental protection.

Photographic chemicals are not hazardous when used correctly and the basic rules of common sense are observed. Health and safety recommendations are always found on each bottle or packet of ILFORD photographic chemicals and are a reliable guide to safe handling and use. Further details on handling are also found in section 8 of this guide. Also, Material Safety Data Sheets (MSDS), which give full details on handling, disposal and transportation on all ILFORD chemicals are available from ILFORD Technical Service in Paramus, NJ (1-201-265-6000).

## 2 DESCRIPTION AND USE

As there is a wide range of ILFORD chemicals, use the following two tables as a guide to choosing the best ILFORD developer for the job. However, most ILFORD developers are designed to be general purpose, and so will be suitable for most applications.

### 2.1

#### FILM DEVELOPER APPLICATIONS

Developer	Spiral Tanks	Trays	Rotary Processors
<b>Liquids</b>			
ILFOTEC HC	+	+	+
ILFOTEC HC-D	++	++	++
ILFOSOL-S	++	++	++
<b>Powders</b>			
ID-11	++	++	++
MICROPHEN	++	++	++
PERCEPTOL	++	++	++

+ Good combination  
++ Excellent combination

2.2

FILM DEVELOPER FEATURES

	General Purpose	Fine Grain	High Sharpness	Push Process	Economy	Ease of Use	Shelf Life
<b>Liquids</b>							
ILFOTEC HC	++	+	+	++	++	+	++
ILFOTEC HC-D	++	+	+	++	++	++	+
ILFOSOL-S	++	+	++	—	+	++	+
<b>Powders</b>							
ID-11	++	+	++	+	++	+	++
MICROPHEN	+	—	++	++	++	+	++
PERCEPTOL	—	++	+	—	++	+	++

+ Good  
 ++ Excellent  
 — Not recommended

2.3 FILM DEVELOPERS—LIQUID CONCENTRATES

Chemicals supplied as liquid concentrates are the most convenient to use.

ILFOTEC HC

ILFORD ILFOTEC HC is a highly concentrated developer, suitable for use in a wide range of black and white processing applications, including graphic arts films. It is particularly suited for developing fast films such as ILFORD HP5 Plus film, and is especially recommended when working on tight deadlines as in press work, where short development times and maximum ease of use are essential. ILFOTEC HC concentrate is supplied as a thick liquid which is diluted further, depending on the desired final working strength. ILFOTEC HC is clean working and robust—it will tolerate less than ideal processing conditions. The developer gives high quality, sharp results with moderate grain.

ILFOTEC HC is provided in 28 ounce (828 ml) containers. ILFOTEC HC Replenisher is also available. For details on ILFOTEC HC Replenisher, please refer to the ILFORD Film Chemicals—High Volume Technical Information sheet, which can be obtained by contacting ILFORD Technical Service.

ILFOTEC HC-D

ILFORD ILFOTEC HC-D is a highly concentrated black and white film developer which has been designed to process all of today's modern continuous tone films. Based on the professional developer ILFOTEC HC, it has a degree of flexibility not usually found in a liquid concentrate developer, including extremely easy mixing capability. Such flexibility and economy are not gained at the expense of quality, though; ILFOTEC HC-D gives fine grain negatives with good sharpness characteristics, which ensure excellent image quality. With ILFOTEC HC-D, there is a choice of dilutions—1+9, 1+19, and 1+29 (see section 4 for information on dilute development). There is also the option to one-shot process film, or to reuse the diluted developer solution during a single working session for greater economy.

ILFOTEC HC-D is supplied in 16 ounce (473 ml) containers.

ILFOSOL-S DEVELOPER

ILFORD ILFOSOL-S is a general purpose, black and white film developer based on several modern developing agents. It is particularly suited to developing medium and slow speed films, such as FP4 Plus and PAN F Plus. ILFOSOL-S gives fine grain and excellent sharpness with full film speed. It is supplied as a liquid concentrate in 16 ounce (473ml) containers for easy and economical one-shot processing. The recommended dilution is 1+9. For greater economy, and to enable practical development times to be used when processing at higher temperatures, ILFOSOL-S can be used at 1+14.

2.4 FILM DEVELOPERS—POWDERS

Chemicals supplied as powders have an extremely long shelf life, even when stored under adverse temperature and humidity conditions.

ID-11

ILFORD ID-11 developer is for use where fine grain negatives are required without a loss of emulsion speed. ID-11 ensures the best balance of fine grain, sharpness and tonal rendition, and can be used with all formats of film, producing negatives which allow a high degree of enlargement.

ID-11 is supplied as a powder and shows exceptional consistency in performance throughout its working life. ID-11 is a Metol-Hydroquinone borax type of developer. It is made up to a stock solution for normal tank or tray use, and can be further diluted 1+1 or 1+3 for users who prefer longer development times, a higher degree of sharpness, and are willing to use ID-11 on a "one-shot" basis.

MICROPHEN

ILFORD MICROPHEN is a fine grain developer recommended for obtaining the maximum film speed with films that can be push processed. It is optimized for use at the faster end of the exposure range. Grain size is reduced and grain clumping is prevented because of the low alkalinity of the developer.

The majority of developers which give an increase in film speed usually produce a corresponding increase in grain size. MICROPHEN, however, has been specially formulated to overcome this disadvantage, and therefore has a high speed to grain ratio. That is, there is a speed increase while giving the type of grain associated with a standard developer. A speed increase can be achieved with many films—and meter settings up to EI 3200/36 can be used with ILFORD HP5 Plus film.

MICROPHEN is supplied as a powder and shows exceptional consistency in performance throughout its working life. It is made up to a stock solution for normal tank and tray use, and can be further diluted 1+1 or 1+3 for users who prefer to use fresh solution each time.

## PERCEPTOL DEVELOPER

ILFORD PERCEPTOL is an extra fine grain developer which gives excellent image quality and very fine grain. It is optimized for use at the slower end of the exposure range. PERCEPTOL has been specially formulated to yield optimum results from high resolution lenses, to exploit the superb grain structure of ILFORD medium and slow speed films and to produce significantly finer grain in ILFORD fast films compared with a standard fine grain developer.

PERCEPTOL gives excellent results with any lens/film combination and is therefore ideal when texture and definition are critical; negatives processed in PERCEPTOL are capable of producing finer grain and better quality enlargements than those produced in a standard fine grain developer.

PERCEPTOL is supplied in powdered form and shows exceptional consistency throughout its working life. It is made up to a stock solution for normal tank and tray use, and can be further diluted 1+1 or 1+3 for users who prefer to use fresh solution each time.

## 2.5 FILM CHEMICALS—GENERAL

Chemicals supplied in liquid form to complete the photographic process.

### UNIVERSAL RAPID FIXER

ILFORD UNIVERSAL Rapid fixer is an ammonium thiosulphate non-hardening rapid fixer. It is ideally suited for use with ILFORD as well as other manufacturer's films. Effective fix times range from two to five minutes. Though hardeners are not generally recommended, UNIVERSAL Rapid fixer can be used with a hardener.

UNIVERSAL Rapid fixer is supplied in liquid form in a variety of sizes ranging from one pint to 30 gallons. For film fixing it is mixed at a 1+3 ratio. UNIVERSAL Rapid fixer can also be used to fix papers. See the ILFORD technical information sheet on ILFORD PAPER CHEMICALS, catalog #12864.

### MULTIGRADE FIXER

ILFORD MULTIGRADE fixer is an ammonium thiosulphate non-hardening rapid fixer. It is specially formulated to reduce environmental impact. Normally used to fix black & white papers, MULTIGRADE fixer can be used to fix black & white films as well. Effective fix times range from two to five minutes. MULTIGRADE fixer *CAN NOT* be used with a hardener.

MULTIGRADE fixer is supplied in liquid form in one pint and ½ gallon sizes. For film fixing it is mixed at a 1+4 ratio. To use MULTIGRADE fixer for black & white papers, see the ILFORD technical information sheet on ILFORD PAPER CHEMICALS, catalog #12864.

### ILFORD FIX HARDENER

ILFORD Fix Hardener is an alum based fix hardener. It has been formulated for use with ILFORD UNIVERSAL Rapid fixer. The use of a hardener is only recommended at processing temperatures that exceed 86°F (30°C). Using ILFORD fix hardener may require doubling fixing and washing times.

ILFORD Fix Hardener comes in a one quart bottle which makes 30 gallons of hardened fixer. It is mixed with working strength UNIVERSAL Rapid fixer at a 1+40 ratio.

### ILFOTOL WETTING AGENT

ILFORD ILFOTOL Wetting Agent is a solution which aids in proper and uniform drying of black and white films. It is used as a final rinse after completely washing films.

ILFOTOL is a liquid supplied in one liter bottles. It is normally mixed at a 1+199 ratio. Depending on the hardness of the water used, ILFOTOL may be used in more dilute mixes but not more than 1+499.

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## 3 MIXING DEVELOPERS

ILFORD chemicals are easy to mix and use, no matter whether starting from liquid concentrates or powders. Always follow the health and safety recommendations given on the packaging and, in addition to any specific precautions, use these common sense rules:

1. Work in a well-ventilated area.
2. Wear safety glasses and gloves when using chemicals.
3. Wash your hands thoroughly after using chemicals.
4. If you feel you have come in contact with the chemicals and do not feel well, seek medical advice and take the chemical container with you. Call 1-800-842-9660 for emergency medical information.
5. Never eat or drink while using chemicals.
6. Never smoke while using chemicals.

### 3.1 MIXING LIQUID CONCENTRATES (ILFOTEC HC-D AND ILFOSOL-S, OR STOCK SOLUTION MADE FROM POWDER DEVELOPERS)

Determine first which tank size is being used and measure out the appropriate quantity of concentrate. Always use the smallest measuring graduate possible; it is easier to measure 1 ounce accurately in an 8-ounce graduate, than in a 32-ounce graduate. Add the measured concentrate into a larger mixing graduate. Rinse out the small graduate with a small amount of water and pour it into the larger mixing graduate. Finally, add water to make up the desired volume of working strength developer, and stir for complete mixing.

It is a good idea to let the working strength developer sit a few minutes before use to make sure any air bubbles within the water dissipate.

### MIXING ILFOTEC HC

Because ILFOTEC HC concentrate is a viscous liquid, it is difficult to accurately measure small quantities of the concentrate. Therefore, we recommend that the entire bottle of concentrate be diluted to form a stock solution, which can then be further diluted for use. The final stock solution contains one part concentrate and three parts water.

1. Pour the contents of the bottle of ILFOTEC HC concentrate into a mixing graduate that holds at least 1 gallon.

- Rinse out the ILFOTEC HC bottle with water three times and pour the rinse water into the graduate.
- Add water to make up the final volume. The final volume for a 28 ounce bottle of ILFOTEC HC is 3.5 quarts (3.31 ltr).
- Mix thoroughly and store the stock solution in a tightly capped, labeled jug if not required immediately.

**PREPARING WORKING STRENGTH DEVELOPER**

Stock solution developer must be further diluted for use. The degree of dilution will depend on the material to be processed.

Developer dilution (from developer concentrate)	Developer dilution (from stock solution)	Application
1+15	1+3	General purpose films—rapid development
1+31	1+7	General purpose films—economy
1+19, 1+39 & 1+47	1+4, 1+9 & 1+11	Continuous tone graphic arts and copy materials
1+79	1+19	Certain special graphic arts materials

**3.2 MIXING POWDER DEVELOPERS**

Always make up powder chemicals as packed; do not attempt to prepare smaller quantities by taking fractional parts of the powders.

Slowly stir in the contents of the smaller of the two packets (Part A) into a vessel containing  $\frac{3}{4}$  of the water to be used to make the total chemical volume. The water temperature should be approximately 104°F (40°C). After about 2 minutes of mixing gradually stir in the contents of the larger packet (Part B) until all contents are dissolved. Add cold water to make up the total volume.

It is advised to let the stock solution stand a few minutes before use to allow any air bubbles to disperse.

**4 DEVELOPMENT**

For best results when processing any film, solutions including wash water, stop (if used), fixers, and wetting agents should always be kept within  $\pm 10^\circ\text{F}$ , to avoid mild reticulation. Reticulation is often mistaken for very coarse grain.

**4.1 SPIRAL TANKS**

Add working strength solution at the correct temperature to the processing tank. It is good habit to tap the tank firmly on the countertop once at the start of development. This will dislodge any air bubbles which may be trapped in the reel.

The recommended agitation for spiral tank processing with ILFORD chemicals is to invert the tank 4 times during the first 10 seconds and again for 10 seconds at the start of each subsequent minute. Use this method of agitation for both developing and fixing. At the end of each agitation, tap the tank firmly again on the countertop, as before.

Some methods of agitation can cause excess foaming in the tank. This can be avoided by agitating at a slower rate.

**4.2 TRAYS (SHEETS ONLY)**

Use continuous agitation when processing sheet film in trays, and reduce, by about 15%, the recommended development times given in section 5.

To ensure even processing, always use a tray one size larger than the film format being processed.

**4.3 ROTARY PROCESSORS**

Rotary processors, such as those made by Jobo, have similar processing conditions to spiral tank processing by hand, except that they process with small amounts of solution and can be pre-programmed.

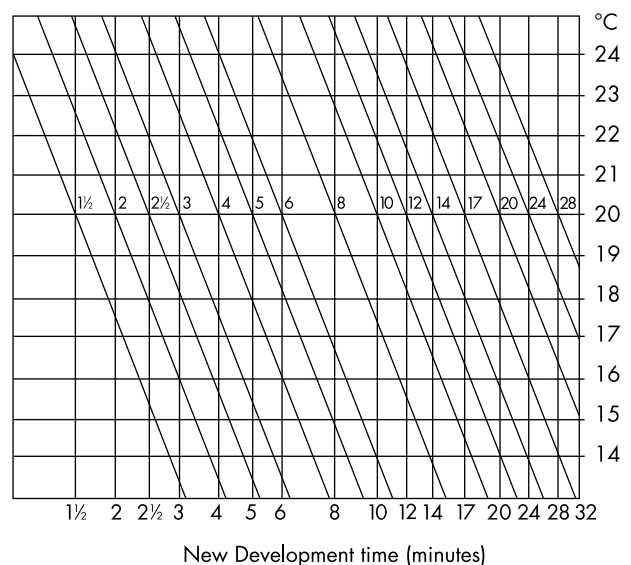
Follow any guidance given by the processor manufacturer when adjusting processing times for these processors. Standard development times given in Section 5 will need to be reduced by up to 15% for rotary processors without a pre-rinse because agitation in these processors is continuous.

Alternatively, if using a pre-wet, use the development times given in Section 5 as a guide. Generally, however, a pre-wet is not recommended as it can lead to uneven processing.

**4.4 DEVELOPMENT AT DIFFERENT TEMPERATURES**

ILFORD films can be processed over a range of temperatures. For best results, however, all processing solutions should be within 10°F. Development times at temperatures other than 68°F (20°C) may be calculated from the chart below:

- Look up the development time at 68°F in the table in section 5.
- Find this time on the 68°F line—see the figures in the middle of the chart.
- Follow the diagonal line for this time to where it intersects the horizontal line for the new temperature.
- Draw a line straight down from this point and read off the approximate new development time on the base of the chart.



## 4.5 PUSH PROCESSING

Most ILFORD films can produce high quality prints even when exposed at meter settings above their ISO rating. ILFOTEC HC, ILFOTEC HC-D, and MICROPHEN are specially designed to allow push processing and therefore are the preferred developers. However, other ILFORD developers can also be used; see Section 5 for further information.

Push processing will give higher contrast negatives than normal, together with more noticeable grain.

## 4.6 FIXING

After development, rinse the film in water and fix in ILFORD UNIVERSAL Rapid fixer for 2–5 minutes at 68° (20°C). Use the same agitation technique for fixing as with developing; this will make sure short fixing times will be maintained. A hardening fixer is only needed if temperatures are higher than 86°F (30°C). If this is the case, use ILFORD Fix Hardener, and follow the directions on the package for dilution. As a general rule, keep the fixing time constant as the temperature increases. This will still ensure adequate fixing, since there is no harm in over-fixing the film. MULTIGRADE fixer may be used to process films but is not compatible with hardeners.

In general, fix film for twice the time it takes for the emulsion to clear. If working with used fixer, discard if films do not clear within half the recommended fixing time.

## 4.7 WASHING

When a non-hardening fixer has been used, wash the film in running water for 5–10 minutes, at a temperature within 10°F of the processing temperature.

For spiral tank use, when a non-hardening fixer has been used, such as UNIVERSAL Rapid fixer, the following method of washing is recommended. This method of washing is faster, uses less water and gives negatives archival permanence.

1. Process the film in a spiral tank.
2. Fix the film with ILFORD UNIVERSAL Rapid fixer.
3. After fixing, fill the tank with water at the same temperature, and invert the tank five times.
4. Drain the water and refill. Invert the tank ten times.
5. Drain and refill a third time, and invert the tank twenty times. Drain again.

When a hardening fixer has been used because of processing at higher temperatures, wash film for 15–20 minutes at a temperature within 10°F of the processing temperature.

A final rinse in water to which a few drops of ILFOTOL Wetting Agent (1+199) have been added will aid rapid and uniform drying. Adding an excessive amount of the wetting agent can cause smears and streaks on the film.

## 4.8 DRYING

To avoid drying marks, use a clean squeegee to wipe the film before hanging it to dry. Dry the film at 85–104°F (30–40°C) in a drying cabinet or at room temperature in a clean, dust-free area.

## 5 DEVELOPMENT TIMES

The table gives development times for all formats of ILFORD films. These times will produce negatives of average contrast suitable for printing in all enlargers. The times are intended as a guide and may be altered if a different result is needed.

To use the tables, first decide which film and meter setting has been used, then choose the developer and dilution, and finally read the development time.

**Note:** Development times may need adjusting to suit individual processing systems and working practices. If an established system is producing good results, adjust the recommended development times until the desired contrast level is obtained. Higher or lower than average contrast negatives may be preferred by some individuals to suit their particular darkroom set-up and working methods.

Development times for other manufacturers' films are included for your convenience, and are only a general guide. Adjust these times to suite your processing system. Other manufacturers can and do change their product specifications from time to time, and the development times may change as a result.

### SPIRAL TANKS (Min/68°F/20°C)

ILFORD	Meter Setting		
	EI 50/18	EI 100/21	EI 200/24
ILFOTEC HC (1+15)**	—	—	—
ILFOTEC HC (1+31)**	4.5	5.5	—
ILFOTEC HC-D (1+9)**	—	—	—
ILFOTEC HC-D (1+19)**	4.5	5.5	—
ILFOTEC HC-D (1+29)**	5	7	—
ILFOSOL-S (1+9)**	3.5*	5	—
ILFOSOL-S (1+14)**	5	6.5	—
ID-11 Stock	6	7	11
ID-11 (1+1)	8	10	15
ID-11 (1+3)	14	15.5	—
MICROPHEN Stock	—	8	12
MICROPHEN (1+1)	—	9	15
MICROPHEN (1+3)	—	14	—
PERCEPTOL Stock	10	15	—
PERCEPTOL (1+1)	12	17	—
PERCEPTOL (1+3)	15	20	—

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

## SPIRAL TANKS (Min/68°F/20°C)

ILFORD 400 DELTA Professional 35mm (120/sheet)	Meter Setting			
	EI 200/24	EI 400/27	EI 800/30	EI 1600/33
ILFOTEC HC (1+15)**	—	3.5* (4*)	5 (5.5)	8 (9)
ILFOTEC HC (1+31)**	6 (6.5)	7.5 (8.5)	10 (11)	14 (15.5)
ILFOTEC HC-D (1+9)**	—	3.5* (4*)	5 (5.5)	8 (9)
ILFOTEC HC-D (1+19)**	6 (6.5)	7.5 (8.5)	10 (11)	14 (15.5)
ILFOTEC HC-D (1+29)**	—	13 (14.5)	—	—
ILFOSOL-S (1+9)**	7 (7.5)	9 (10)	13 (14.5)	—
ILFOSOL-S (1+14)**	11.5 (12.5)	14 (15.5)	—	—
ID-11 Stock	6 (6.5)	7 (7.5)	9 (10)	12.5 (14)
ID-11 (1+1)	9 (10)	10.5 (11.5)	12.5 (14)	—
ID-11 (1+3)	—	18 (20)	—	—
MICROPHEN Stock	—	7 (7.5)	9 (10)	12.5 (14)
MICROPHEN (1+1)	—	10.5 (11.5)	13 (14.5)	18 (20)
MICROPHEN (1+3)	—	17 (18.5)	—	—
PERCEPTOL Stock	10 (11)	13 (14.5)	—	—
PERCEPTOL (1+1)	14 (15.5)	18 (20)	—	—
PERCEPTOL (1+3)	—	22	—	—

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

( ) 400 DELTA Professional roll and sheet

## SPIRAL TANKS (Min/68°F/20°C)

ILFORD PAN F Plus 35mm/120	Meter Setting	
	EI 25/15	EI 50/18
ILFOTEC HC (1+15)**	—	—
ILFOTEC HC (1+31)**	—	4*
ILFOTEC HC-D (1+9)**	—	—
ILFOTEC HC-D (1+19)**	—	4*
ILFOTEC HC-D (1+29)**	—	5.5
ILFOSOL-S (1+9)**	—	4*
ILFOSOL-S (1+14)**	—	6
ID-11 Stock	6.5	6.5
ID-11 (1+1)	8.5	8.5
ID-11 (1+3)	14	15
MICROPHEN Stock	—	4.5*
MICROPHEN (1+1)	—	6
MICROPHEN (1+3)	—	11
PERCEPTOL Stock	9	14
PERCEPTOL (1+1)	10.5	15
PERCEPTOL (1+3)	15	17

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

## SPIRAL TANKS (Min/68°F/20°C)

ILFORD FP4 Plus 35mm/120/sheet	Meter Setting			
	EI 50/18	EI 125/22	EI 200/24	EI 400/27
ILFOTEC HC (1+15)**	—	—	4*	7
ILFOTEC HC (1+31)**	4.5*	6	8.5	—
ILFOTEC HC-D (1+9)**	—	—	—	7
ILFOTEC HC-D (1+19)**	4.5*	6	8.5	—
ILFOTEC HC-D (1+29)**	6	8	12	—
ILFOSOL-S (1+9)**	—	4*	5	—
ILFOSOL-S (1+14)**	5	6	7.5	—
ID-11 Stock	5	6	8	—
ID-11 (1+1)	7	8	12	—
ID-11 (1+3)	15	18	—	—
MICROPHEN Stock	—	5.5	6.5	11
MICROPHEN (1+1)	—	7	9	16
MICROPHEN (1+3)	—	10	13	—
PERCEPTOL Stock	7.5	9	—	—
PERCEPTOL (1+1)	10.5	14	—	—
PERCEPTOL (1+3)	14	18	—	—

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

## SPIRAL TANKS (Min/68°F/20°C)

ILFORD HP5 Plus 35mm/120/sheet	Meter Setting			
	EI 400/27	EI 800/30	EI 1600/33	EI 3200/36
ILFOTEC HC (1+15)**	3.5*	5	7.5	12.5
ILFOTEC HC (1+31)**	6.5	9.5	14	—
ILFOTEC HC-D (1+9)**	3.5*	5	7.5	12.5
ILFOTEC HC-D (1+19)**	6.5	9.5	14	—
ILFOTEC HC-D (1+29)**	9	—	—	—
ILFOSOL-S (1+9)**	7	8.5	14	—
ILFOSOL-S (1+14)**	9.5	14	—	—
ID-11 Stock	7.5	10.5	14	—
ID-11 (1+1)	13	16.5	—	—
ID-11 (1+3)	20	—	—	—
MICROPHEN Stock	6.5	8	11	16
MICROPHEN (1+1)	12	15	—	—
MICROPHEN (1+3)	23	—	—	—
PERCEPTOL Stock	11	—	—	—
PERCEPTOL (1+1)	15	—	—	—
PERCEPTOL (1+3)	23	—	—	—

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

## SPIRAL TANKS (Min/68°F/20°C)

Kodak®	Meter Setting			
	T-Max® 100 EI 100/21	Plus-X® EI 100/21	T-Max® 400 EI 400/27	T-Max® P3200 EI 3200/36
ILFOTEC HC (1+15)**	4*	3*	3.5*	—
ILFOTEC HC (1+31)**	7.5	5.5	6.5	11.5
ILFOTEC HC-D (1+9)**	4*	3.5*	3.5*	—
ILFOTEC HC-D (1+19)**	7.5	5.5	6.5	11.5
ILFOTEC HC-D (1+29)**	11	9	9	—
ILFOSOL-S (1+9)**	8.5	7	7.5	17.5
ILFOSOL-S (1+14)**	16	12.5	14	—
ID-11 Stock	8	7	7	15
ID-11 (1+1)	11	8	10	—
ID-11 (1+3)	16	13	15	—
MICROPHEN Stock	8	6	7	12
MICROPHEN (1+1)	11	8.5	10	—
MICROPHEN (1+3)	16	13.5	15	—
PERCEPTOL Stock	12	8	11	—
PERCEPTOL (1+1)	13.5	9.5	12.5	—
PERCEPTOL (1+3)	19	12	17	—

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

## SPIRAL TANKS (Min/68°F/20°C)

Agfa®	Meter Setting		
	APX25 EI 25/15	APX100 EI 100/21	AP 400 EI 400/27
ILFOTEC HC (1+15)**	—	4*	3*
ILFOTEC HC (1+31)**	3*	7.5	6
ILFOTEC HC-D (1+9)**	—	—	—
ILFOTEC HC-D (1+19)**	3*	7.5	6
ILFOTEC HC-D (1+29)**	5	—	—
ILFOSOL-S (1+9)**	6	7	9
ILFOSOL-S (1+14)**	10	11	—
ID-11 Stock	9	9	10.5
ID-11 (1+1)	13	13.5	14.5
ID-11 (1+3)	—	—	25
MICROPHEN Stock	8	9	10.5
MICROPHEN (1+1)	10	—	19
MICROPHEN (1+3)	—	—	27
PERCEPTOL Stock	10	9	14
PERCEPTOL (1+1)	—	—	17
PERCEPTOL (1+3)	—	—	24

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

## SPIRAL TANKS (Min/68°F/20°C)

Fuji®	Meter Setting		
	Neopan® 400 EI 400/27	Professional	Neopan® 1600 EI 1600/33
ILFOTEC HC (1+15)**	4*	—	3*
ILFOTEC HC (1+31)**	6	—	7
ILFOTEC HC-D (1+9)**	4*	—	3*
ILFOTEC HC-D (1+19)**	6	—	7
ILFOTEC HC-D (1+29)**	8	—	10
ILFOSOL-S (1+9)**	6.5	—	—
ILFOSOL-S (1+14)**	10	—	—
ID-11 Stock	8	—	6.5
ID-11 (1+1)	14	—	10
ID-11 (1+3)	20	—	15
MICROPHEN Stock	6.5	—	3.25*
MICROPHEN (1+1)	12	—	—
MICROPHEN (1+3)	16.5	—	—
PERCEPTOL Stock	14	—	—
PERCEPTOL (1+1)	18	—	—
PERCEPTOL (1+3)	23	—	—

\*Not recommended due to the risk of uneven development

\*\*Dilutions from concentrate

## 6 CAPACITY

### 6.1 CAPACITY WITHOUT REPLENISHMENT

One liter of working strength solution will process the following number of films:

Solution	35mm 36 exp	35mm 24 exp	120 Roll Film	220 Roll Film	4x5 Sheet	8x10 Sheet
<b>Developers</b>						
ILFOTEC HC (1+15)**	10	15.0	10	5.0	40	10
ILFOTEC HC (1+31)**	5	7.5	5	2.5	20	5
ILFOTEC HC-D (1+9)**	10	15	10	5.0	40	10
ILFOTEC HC-D (1+19)**	5	7.5	5	2.5	20	5
ID-11 (Stock)	10	15	10	5	40	10
ID-11 (1+1)	5	7.5	5	2.5	20	5
MICROPHEN (Stock)	10	15	10	5	40	10
MICROPHEN (1+1)	5	7.5	5	2.5	20	5
PERCEPTOL (Stock)	5	7.5	5	2.5	20	5
PERCEPTOL (1+1)	2.5	3.75	2.5	1.25	10	2.5
ILFOTEC HC (1+31)	5	7.5	5	2.5	20	5
<b>Other solutions</b>						
IN-1 stop (1+31)**	24	36	24	12	96	24
UNIVERSAL Rapid fixer (1+3)**	19	29	19	10	77	19

\*\*Dilutions from concentrate



**6.2 ONE-SHOT PROCESSING**

This processing technique is recommended for the user who prefers to use fresh solution for each roll of film or who processes film infrequently. One-shot processing produces the most consistent and predictable results. In most cases, diluted developers should be used only once and then discarded. The exceptions are ILFOTEC HC-D AND ILFOTEC HC developers. Instructions for reusing these and other ILFORD developers can be found in section 6.3 DEVELOPER REUSE.

Development of ILFORD films in one-shot developers may be preferred for convenience. Dilute development with intermittent agitation increases sharpness, but also increases apparent grain when using some developers.

**6.3 DEVELOPER REUSE**

When several rolls of film are to be processed in a single working session and economy is essential, some developers can be reused. Reusing a developer can increase its capacity while still giving correctly processed negatives.

**POWDER DEVELOPERS**

Use undiluted stock solutions *ONLY*.

Volume of Developer	Capacity
1 Quart (32 oz.)	10x35mm (36 exp.)*
1 Gallon (128 oz.)	40x35mm (36 exp.)*

\* One 35mm (36 exp.) = 1-120, 4- 4x5 or 1-8x10

To compensate for loss of activity, increase development time by 10% after 2 rolls have been processed in each quart of developer. After each use, return used developer solution to the container holding the stock solution. Reuse until the recommended capacities are reached.

**LIQUID DEVELOPERS**

The only liquid developers that can be reused are ILFORD ILFOTEC HC-D (Dilution 1+9 or 1+19) and ILFOTEC HC (Dilution 1+15 or 1+31).

To use, mix the chosen developer as instructed. Process the first batch of film at the recommended development time. The same developer solution can then be used two additional times to develop the same amount of film. To compensate for loss of developer activity after the first use, increase development time for each successive equal amount of film by 10%.

For example: If one 35mmx36 exposure roll of film is developed in 8 ounces of developer for 7 minutes, a second roll of 35mmx36 film can be processed in the same developer solution with the re-computed time of 7.7 minutes. Again using the same 8 ounces of developer solution, a third and final 35mmx36 roll can be processed with the new development time being 8.5 minutes.

ILFOTEC developers can only be reused the same day of mixing.

**6.4 FIXERS**

Compensating for loss of fixer activity is less precise. Film should remain in the fixer for twice the time it takes the emulsion to clear. Discard the fixer when the clearing time in used fixer is more than twice the clearing time in fresh fixer.

The clearing time of a film can be found by allowing a drop of fixer to act on a small piece of unprocessed film for about 30 seconds. Immerse the film in fixer, and the time it takes for the spot to disappear is the clearing time.

**7 STORAGE**

Always store chemicals away from unsupervised children or from pets, and preferably in a cool 50–68°F (10–20°C) place. The liquid concentrates and powders must be stored in their original packaging. Stock solutions and diluted solutions should be stored in tightly capped bottles, labeled with the product name and the date the solution was made. Any method of reducing the air inside solution containers (for example, collapsible bottles) extends their life over solutions stored in half full bottles.

The following table gives a guide to storage times for chemicals as supplied and for unrefilled solutions.

Chemicals	Storage time (months)	
	Unopened	Full
<b>Highly concentrated liquid</b>		
ILFOTEC HC	Indefinite	
<b>Liquid concentrate developers</b>		
ILFOTEC HC-D	18	3
ILFOSOL -S	18	3
<b>Stock solutions</b>		
ILFOTEC HC	6	2
<b>Other developers (stock solutions)</b>		
ID-11	6	1
MICROPHEN	6	1
PERCEPTOL	6	1
<b>Diluted solutions</b>		
ILFOTEC HC 1+11, 1+15	6	2
ILFOTEC HC 1+31	3	1
ILFOTEC HC 1+47	2	1
ILFOTEC HC-D 1+9	6	2
ILFOTEC HC-D 1+19	3	1
ILFOTEC HC-D 1+29	2	1
<b>Other developers (working strength)</b>		
ID-11	Do not store	
ILFOSOL -S	Do not store	
MICROPHEN	Do not store	
PERCEPTOL	Do not store	

Unmixed powder chemicals can be stored in a dry place indefinitely.

**8 ENVIRONMENTAL AND SAFETY CONSIDERATIONS**

Photographic chemicals are not hazardous when used correctly and when basic rules of common sense are observed. On each container of ILFORD chemicals, one will always find health and safety recommendations, as a guide to safe handling and use. Further details are available on all ILFORD photo chemicals by obtaining Material Safety Data Sheets (MSDS), which give full details for their safe handling, disposal, and transportation.

MSDS can be obtained by contacting the distributor from which your ILFORD photographic chemicals were purchased, or by contacting ILFORD Technical Service directly at 201-265-6000. Emergency medical information can be obtained by calling 1-800-842-9660 (24 hours).

## 8.1 SAFETY ADVICE

### ILFOTEC HC AND ILFOTEC HC-D DEVELOPERS

**CONTAINS:** Diethanolamine (111-42-2)  
Diethanolamine Bisulfite (63149-47-3)  
Diethylene Glycol (111-46-6)  
Hydroquinone (123-31-9)  
D.T.P.A. (140-01-2)  
Water (7732-18-5)

**WARNING:** May cause allergic reaction by ingestion, inhalation, skin contact. Exposure may cause liver, kidney or testicular damage, or anemia, based on the results of animal studies. Avoid ingestion, inhalation, and skin contact. Not for use by children. Keep out of reach of children.

#### FIRST AID

**EYES:** Immediately flush eyes with plenty of water for at least 15 minutes.  
*GET MEDICAL ATTENTION.*

**SKIN:** Wash thoroughly with soap and water. Get medical attention if irritation occurs.

**INGESTION:** If conscious, give 1–2 glasses of water. *DO NOT* induce vomiting unless directed to do so by medical personnel.  
*GET MEDICAL ATTENTION AT ONCE.*

**INHALATION:** Remove to fresh air. Give oxygen or artificial respiration if necessary.  
*GET MEDICAL ATTENTION.*

Call Product Misuse at 1-800-842-9660 (24 hours) for additional emergency information.

### ILFOSOL-S DEVELOPER

**CONTAINS:** Hydroquinone (123-31-9)  
Sodium Sulfite (7757-83-7)  
Sodium Carbonate (497-19-8)  
Sodium Ascorbate (134-03-2)  
Water (7732-18-5)

#### FIRST AID

**EYES:** Immediately flush eyes with plenty of water for at least 15 minutes.  
*GET MEDICAL ATTENTION.*

**SKIN:** Wash thoroughly with soap and water. Get medical attention if irritation occurs.

**INGESTION:** If conscious, give 1–2 glasses of water. *DO NOT* induce vomiting unless directed to do so by medical personnel.  
*GET MEDICAL ATTENTION AT ONCE.*

**INHALATION:** Remove to fresh air. If breathing is difficult, *GET MEDICAL ATTENTION AT ONCE!*

Call Product Misuse at 1-800-842-9660 for emergency medical information.

## ID-11 DEVELOPER

### Part A

**CONTAINS:** Hydroquinone (123-31-9)  
Methyl p-amino-phenol Sulfate (Metol) (55-55-0)

**WARNING:** May cause allergic reaction by inhalation, ingestion, or skin contact. Exposure may cause testicular damage or sterility or anemia based on the results of animal studies. Avoid inhalation, ingestion, eye or skin contact. Not for use by children. Keep out of reach of children.

### Part B

**CONTAINS:** Sodium Sulfite (7757-83-7)  
Borax (1303-96-4)  
Sodium Tripolyphosphate (7758-29-4)

**WARNING:** May be harmful if swallowed. May cause allergic reaction by inhalation, ingestion or skin contact. Avoid contact with eyes, skin and clothing. Avoid inhalation of dust. Not for use by children. Keep out of reach of children.

#### FIRST AID

### Parts A and B

**EYES:** Immediately flush eyes with plenty of water for at least 15 minutes.  
*GET MEDICAL ATTENTION.*

**SKIN:** Wash thoroughly with soap and water. Get medical attention if irritation occurs.

**INGESTION:** If conscious, give 1–2 glasses of water. *DO NOT* induce vomiting unless directed to do so by medical personnel.  
*GET MEDICAL ATTENTION AT ONCE.*

**INHALATION:** Remove to fresh air. Give oxygen or artificial respiration if necessary.  
*GET MEDICAL ATTENTION.*

Call Product Misuse at 1-800-842-9660 for additional medical emergency information.

**MICROPHEN DEVELOPER**

**Part A**

**CONTAINS:** Hydroquinone (123-31-9)  
Boric Acid (10043-35-3)  
Sodium Metabisulfite (7681-57-4)  
1-Phenyl-3-Pyrazolidone (92-43-3)

**WARNING:** May cause allergic reaction by inhalation, ingestion or skin contact. Exposure may cause testicular damage or sterility or anemia based on the results of animal studies. Avoid inhalation, ingestion, eye or skin contact. Not for use by children. Keep out of reach of children.

**Part B**

**CONTAINS:** Sodium Sulfite (7757-83-7)  
Borax (1303-96-4)  
Sodium Tripolyphosphate (7758-29-4)

**WARNING:** May be harmful if swallowed. May cause allergic reaction by inhalation, ingestion, or skin contact. Avoid contact with eyes, skin and clothing. Avoid inhalation of dust. Not for use by children. Keep out of reach of children.

**FIRST AID**

**Parts A and B**

**EYES:** Immediately flush eyes with plenty of water for at least 15 minutes.  
*GET MEDICAL ATTENTION.*

**SKIN:** Wash thoroughly with soap and water. Get medical attention if irritation occurs.

**INGESTION:** If conscious, give 1–2 glasses of water. *DO NOT* induce vomiting unless directed to do so by medical personnel.  
*GET MEDICAL ATTENTION AT ONCE.*

**INHALATION:** Remove to fresh air. Give oxygen or artificial respiration if necessary.  
*GET MEDICAL ATTENTION.*

Call Product Misuse at 1-800-842-9660 for additional medical emergency information.

**PERCEPTOL DEVELOPER**

**Part A**

**CONTAINS:** Methyl p-amino-phenol Sulfate (55-55-0)  
**WARNING:** May cause allergic reaction by inhalation, ingestion or skin contact. Avoid inhalation, ingestion, eye or skin contact. Not for use by children. Keep out of reach of children.

**Part B**

**CONTAINS:** Sodium Sulfite (7757-83-7)  
Sodium Chloride (7647-14-5)  
Sodium Tripolyphosphate (7758-29-4)

**WARNING:** May be harmful if swallowed. May cause allergic reaction by inhalation, ingestion, or skin contact. Avoid contact with eyes, skin and clothing. Avoid inhalation of dust. Not for use by children. Keep out of reach of children.

**FIRST AID**

**Parts A and B**

**EYES:** Immediately flush eyes with plenty of water for at least 15 minutes.  
*GET MEDICAL ATTENTION.*

**SKIN:** Wash thoroughly with soap and water. Get medical attention if irritation occurs.

**INGESTION:** If conscious, give 1–2 glasses of water. *DO NOT* induce vomiting unless directed to do so by medical personnel.  
*GET MEDICAL ATTENTION AT ONCE.*

**INHALATION:** Remove to fresh air. Give oxygen or artificial respiration if necessary.  
*GET MEDICAL ATTENTION.*

Call Product Misuse at 1-800-842-9660 for additional medical emergency information.

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ILFORD PHOTO  
West 70 Century Road  
PO Box 288  
Paramus, New Jersey 07653  
(201) 265-6000

ILFORD ANITEC (CANADA) LIMITED  
2751 John Street  
Markham, Ontario  
Canada L3R 2Y8  
(905) 940-4455

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