

TECHNICAL INFORMATION

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# **FP4 PLUS**

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MEDIUM SPEED BLACK AND WHITE PROFESSIONAL FILM  
FOR HIGH PRINT QUALITY AND PROCESSING CONVENIENCE

*Photo by Edward C. Ley, McDonald, TN*

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# **ILFORD**

## FP4 PLUS

### Medium Speed Black and White Film

#### 1 DESCRIPTION & USE

ILFORD FP4 Plus is an exceptionally fine grain, medium speed black and white film. It builds on the quality and reputation of ILFORD FP4 and continues the ILFORD reputation in medium speed films. Compared with FP4, it has finer grain and shorter processing times.

When given standard development it has a speed rating of ISO 125/22° to daylight. FP4 Plus has a high acutance emulsion which, combined with its fine grain and exposure latitude, ensures superlative quality—the ideal film to use for all high quality indoor and outdoor photography, particularly when giant enlargements are to be made. FP4 Plus is versatile and will give useable results even if it is overexposed by as much as six stops, or underexposed by two stops.

FP4 Plus is compatible with all major processing systems including those which give the standard short fixing and washing times. There is no need to change standard processing techniques when switching to FP4 Plus from FP4, or any other ISO 125/22° film. FP4 Plus is very robust during processing, giving excellent results under most conditions, and will also tolerate processing conditions that are less than ideal.

##### 1.1 35mm FILM

FP4 Plus 35mm film is supplied in DX coded cassettes, suitable for all 35mm cameras. DX coded cassettes mean that the film speed of ISO 125/22° is set automatically on most cameras. These cassettes are very strong and have the end caps firmly fixed to the body. This ensures the caps remain in position during rough handling.

FP4 Plus 35mm film has a neutral base tint which enables easy print contrast assessment on the light box. For easy negative identification, it also has bold frame numbering for whole frames and letters to indicate half frame numbering.

FP4 Plus 35mm film is coated on 0.125mm ( $\frac{5}{1000}$  inch) acetate base and is available in 24 or 36 exposure DX cassettes, or in bulk film length of 100 feet.

##### 1.2 ROLL FILM

FP4 Plus roll film is coated on 0.110mm clear acetate base which has an antihalation backing that clears during development. FP4 Plus roll film is available in 120 and 220 lengths and is edge numbered 1 to 19 for 120 and 1 to 40 for 220 to ensure all formats can be identified, whatever camera format is being used.

The backing paper has a white outer surface for easy frame identification. The portion of the backing paper visible after exposure is black with white printing for quick identification of exposed films.

#### 1.3 SHEET FILM

FP4 Plus sheet film is available in a wide range of standard sizes. It is coated on 0.175mm ( $\frac{7}{1000}$  inch) polyester base, offering rigidity and dimensional stability. This makes it ideally suitable for machine processing in automatic processors without the need for leaders. The base has an antihalation backing which clears during processing.

The short side of FP4 Plus sheet film is notched to indicate the emulsion surface and film type. The emulsion faces the user when the film is held in the position shown.



The new notch code, being phased in (September 1995) includes an ILFORD identifier. This identifier is an elliptical notch in the number one and number five positions. Either set of notches indicated above identifies ILFORD FP4 Plus sheet film.

Both surfaces of FP4 Plus accept commonly used retouching media and are designed to resist surface roller marks when machine processing.

In addition to general purpose photography, FP4 Plus sheet film is ideal for copying and internegative work. It also has many applications in scientific, technical and industrial photography.

#### 2 EXPOSURE DETAILS

FP4 Plus is a medium speed, black and white panchromatic film designed to give the highest quality results. It is the ideal general purpose film for use in a wide range of exposing conditions. Building on the quality and reputation of FP4, FP4 Plus gives even greater reliability and ease of use.

##### 2.1 EXPOSURE RATING

FP4 Plus has a speed rating of ISO 125/22° (125ASA 22DIN EI 125/22) to daylight and is recommended for general photography in all types of lighting. The ISO speed rating was measured using ILFORD ID-11 developer at 68°F with intermittent agitation in a spiral tank. While a meter setting of EI 125/22 is recommended for optimum results, high quality results are also obtained when FP4 Plus is exposed over the range EI 50/18 to EI 200/24.

It should be noted that the exposure index (EI) range recommended for FP4 Plus is based on a practical evaluation of film speed and is not based on foot speed, as is the ISO standard.

##### 2.2 FILTER FACTORS

FP4 Plus film can be used with all types of filters (e.g., color, polarizing and neutral density filters) in the usual way.

The table gives a practical GUIDE to the increase in exposure needed when using the filters listed. The exposure increase in daylight may vary with the angle of the sun and the time of day. In the late afternoon or the winter months, when the daylight contains more red light, green and blue filters may need slightly more exposure than usual. The exposure increases for tungsten light are based on an average tungsten source which has a color temperature of 3200K.

Cameras with through-the-lens metering will usually adjust the exposure automatically when using filters. With some automatic exposure cameras, the correction given for deep red and orange filters can produce negatives under exposed by as much as 1½ stops. To check for this, take two readings of the same subject, one with and one without a filter on the lens. Compare the difference between the two with the filter manufacturer's recommended increase in the exposure. Where a meter is causing under exposure, either adjust the speed rating or, if possible, switch to manual operation.

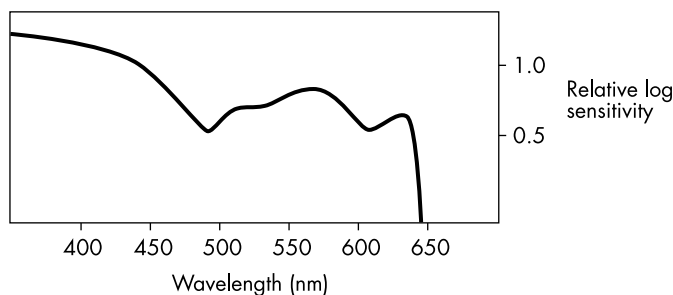
The factors are intensity scale factors, but in most cases exposures can be increased by using either a larger aperture or a slower shutter speed. Multiply a metered exposure by the filter factor to approximate the new setting.

**Exposure Increase**

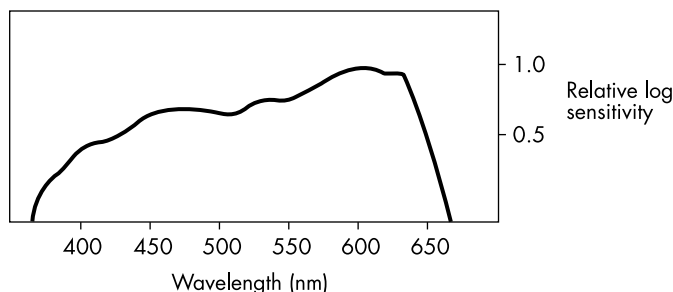
Kodak Wratten Filter	Daylight Factor	Tungsten Factor
Yellow (#8)	1.5	1.2
Deep Yellow (#15)	2.0	1.5
Yellowish Green (#11)	3.0	3.0
Orange (#21)	2.3	2.0
Deep Orange (#22)	5.0	2.5
Tricolor Red (#25)	6.0	4.0
Tricolor Blue (#47)	7.0	13.0
Tricolor Green (#58)	6.0	6.0
Neutral Density (.30)	2.0	2.0

**2.3 SPECTRAL SENSITIVITY**

Equal energy



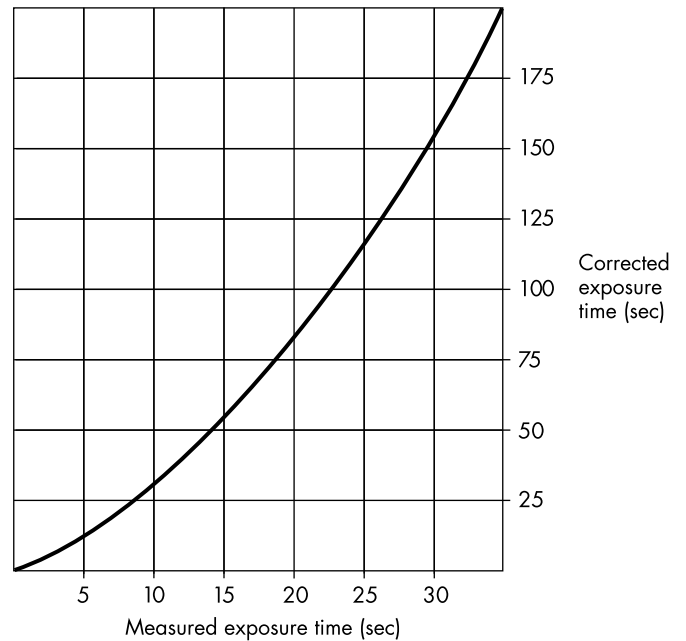
Wedge spectrogram to tungsten light (2850K)



**2.4 RECIPROcity CHARACTERISTICS**

Most films, including FP4 Plus, are designed to be used over a wide range of exposures. This range covers most normal photography, including exposure by electronic flash. Thus, for exposures between ½ and 1/10,000 second, no corrections are needed for reciprocity law failure.

When exposures longer than ½ second are given, FP4 Plus, along with other films, needs to be given more exposure than indicated by a meter. Use the graph to calculate the increased exposure time which should be given once the measured time is known.



**3 PROCESSING OPTIONS**

FP4 Plus is a versatile film and may be exposed and developed to suit a wide range of requirements. This section outlines how this can best be done.

**3.1 DEVELOPERS**

The versatility of FP4 Plus can be exploited by selecting the best ILFORD developer for the job. The table is a guide to choosing the ILFORD developer for FP4 Plus that is most suited to individual requirements.

**MANUAL PROCESSING (e.g., Spiral Tank, Tray, Deep Tank)**

Requirement	Liquid	Powder
Best Overall	ILFOSOL-S (1+9)	ID-11 (Stock)
Image Quality		
Finest Grain (EI 50/18)	ILFOSOL-S (1+9)	PERCEPTOL (Stock)
Finest Grain (EI 125/22)	ILFOSOL-S (1+14)	PERCEPTOL (1+1)
Maximum Sharpness	ILFOTEC HC (1+31)	ID-11 (1+3)
Maximum Film Speed (EI 400/27)	—	MICROPHEN (Stock)
One-Shot Convenience	ILFOSOL-S (1+14) ILFOTEC HC-D (1+29)	ID-11 (1+3) MICROPHEN (1+3)
Economy	ILFOTEC HC-D (1+29)	ID-11 (1+3) MICROPHEN (1+3)

**MACHINE PROCESSING**

Dip and Dunk	ILFOTEC DD	Best overall image quality (liquid)
	ILFOTEC HC	Flexible process time, range of dilutions and economy
Leader Card	ILFOTEC RT RAPID	Rapid processing, best overall image quality and long tank life
	ILFOTEC HC	Range of dilutions, flexibility and economy
Roller Transport	ILFOTEC RT RAPID	Rapid processing, best overall image quality
	ILFOTEC HC (1+11)	Economy

**4 PROCESSING METHODS**

FP4 Plus can be processed in all types of processing equipment including spiral tanks, rotary processors, deep tanks and automatic processors. FP4 Plus is very robust in processing and will tolerate less than ideal processing conditions. Also, it will not contaminate the processing chemicals.

**4.1 SAFELIGHT RECOMMENDATIONS**

Handle FP4 Plus film in total darkness. For very brief inspections during processing, use the ILFORD 908 (very dark green) or Kodak Series 3 safelight filter, with a 15W bulb, fitted in a darkroom lamp. Do not allow direct lighting from the safelight to fall on the film.

When processing FP4 Plus film by inspection, the safest way is to use infrared illumination in the darkroom, with infrared goggles to see the film. This method ensures the film cannot be fogged and makes it easy to see the image.

**4.2 SPIRAL TANK PROCESSING**

The recommended agitation for spiral tank processing with ILFORD chemicals is to invert the tank four times during the first 10 seconds and again for 10 seconds (four inversions) at the start of every further minute. Use this method of agitation for both developing and fixing. At the end of each agitation sequence, tap the tank firmly on the bench to dislodge any air bubbles.

**4.3 ROTARY PROCESSORS**

Rotary processors, such as those made by Jobo, have very similar processing conditions to spiral tank processing by hand, except 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 types of processors. Standard development times are given in section 5.2 Development Times; these may need reducing by up to 15% for use in rotary processors without a pre-rinse because of the continuous agitation given in these processors. Alternatively, if using a pre-rinse, use the development times for spiral tank processing as a guide.

**4.4 MACHINE PROCESSING**

FP4 Plus can be processed in all types of general purpose film processors; these include dip and dunk, short leader and roller transport processors—see the developer recommendations in section 3.1 Developers.

After development, fix FP4 Plus in ILFORD UNIVERSAL Rapid fixer (1+3). When roller transport processing, add one part ILFORD FIX HARDENER to every 40 parts working strength UNIVERSAL Rapid fixer. Hardener protects the film during the remainder of the roller transport processing sequence.

**Nitrogen Agitation**

For best results, agitate the developer solution with a nitrogen burst of one second duration every alternate second for 11 seconds in each minute. This amount of agitation, with air instead of nitrogen, can also be used with the other solutions, if desired.

**5 DEVELOPMENT**

The tables give development times for both manual and machine processing. These times will produce negatives of average contrast suitable for printing in all enlargers. The development times are intended as a guide only and may be altered if a different result is required.

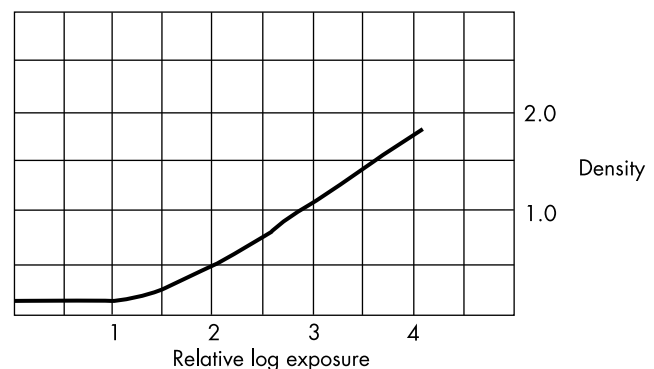
To use the tables, first decide which meter setting has been used, then choose the developer and dilution, and finally read off the development time. This time has been found to give the best quality with FP4 Plus with that meter setting and in that developer. This simplified approach to development times with FP4 Plus means there is no need to adjust the meter setting to suit the choice of developer.

For manual processing, these times are based on intermittent agitation (see section 4.2). Where continuous agitation is used for manual processing—as in a tray or with some types of developing tanks—these times should be reduced by up to 15%.

**Note:** The contrast level obtained using these development times is between the “normal” and “high” contrast levels that used to be recommended for use with condenser or diffuser enlargers respectively. This approach is no longer necessary, considering the enlarger types that are popular today.

**5.1 CHARACTERISTIC CURVE**

FP4 Plus developed in ILFORD ID-11 stock for 6 min. at 68°F (20°C) with intermittent agitation. This curve is representative of all formats.



**5.2 DEVELOPMENT TIMES**

**SPIRAL TANK, DEEP TANK AND ROTARY PROCESSORS (Min/68°F/20°C)  
35MM FILM**

ILFORD Developer 400/27*	Dilution	Meter Setting			
		EI 50/18	EI 125/22	EI 200/24	EI 400/27
ILFOTEC HC-D	1+9	*	3**	4**	7
	1+19	4½**	6	8½	*
	1+29	6	8	12	*
ILFOSOL-S	1+9	3½**	4**	5	*
	1+14	5	6	7½	*
ILFOTEC HC	1+15	*	3**	4**	7
	1+31	4½**	6	8½	*
	1+47	6	8	12	*
ID-11	Stock	5	6	8	*
	1+1	7	8	12	*
	1+3	15	18	*	*
MICROPHEN	Stock	*	5½	6½	11
	1+1	*	7	9	16
	1+3	*	10	13	*
PERCEPTOL	Stock	7½	9	*	*
	1+1	10½	14	*	*
	1+3	14	18	*	*

\*Not recommended.

\*\*Not recommended due to the risk of uneven development.

Highlighted area indicates the recommended choice for first time testing.

Non-ILFORD Developer 400/27	Dilution	Meter Setting			
		EI 50/18	EI 125/22	EI 200/24	EI 400/27
Kodak D76	Stock	5	5½	7	*
	1+1	7½	8½	11	*
	1+3	12	14	18	*
Kodak Microdol-X	Stock	7½	10½	*	*
	1+3	14	17	*	*
Kodak HC-110	A	*	3**	4**	7
	B	4**	5	8	*
Kodak T-Max	1+4	*	5½	6½	8
Acufine	Stock	*	3**	4**	10
Agfa Rodinal	1+25	5	6	9	*
	1+50	6	8½	13	*

\*Not recommended.

\*\*Not recommended due to the risk of uneven development.

**DIP AND DUNK MACHINES (Min/75.2°F/24°C)  
35MM FILM**

Developer 200/24*	Dilution/ Temperature EI 400/27	Meter Setting			
		EI 50/18	EI 125/22	EI 200/24	
ILFOTEC DD	1+4	4½**	5½	6½	*
ILFOTEC HC	1+31				
	68°F (20°C)	4½**	6	8½	*
Kodak T-Max RS	Stock	3**	5	*	*

\*Not recommended.

\*\*Not recommended due to the risk of uneven development.

**ROLLER TRANSPORT AND SHORT LEADER MACHINES (Sec)  
35MM FILM**

ILFORD Developer	Dilution/ Temperature	Meter Setting		
		EI 50/18	EI 125/22	EI 200/24
ILFOTEC RT RAPID	Stock/ 80.6°F (27°C)	*	40	55
ILFOTEC HC	1+11** 75°F (23.9°C)	*	70	*

\*Not recommended.

\*\*Other dilutions and temperatures may be more suitable for your needs.  
For more information, consult your local ILFORD company.

**SPIRAL TANK, DEEP TANK AND  
ROTARY PROCESSORS (Min/68°F/20°C)  
ROLL FILM AND SHEET FILM**

ILFORD Developer	Dilution	Meter Setting		
		EI 50/18	EI 125/22	EI 200/24
ILFOTEC HC-D	1+9	*	4**	5
	1+19	6	8	9
	1+29	8	12	*
ILFOSOL-S	1+9	4½**	6½	7½
	1+14	7½	9½	*
ILFOTEC HC	1+15	*	4**	5
	1+31	6	8	9
	1+47	8	12	*
ID-11	Stock	5	6	8
	1+1	8	9	13
	1+3	13	15	*
MICROPHEN	Stock	*	8	9
	1+1	*	10	14
	1+3	*	14	18
PERCEPTOL	Stock	9	12	*
	1+1	13	15	*
	1+3	17	21	*

\*Not recommended.

\*\*Not recommended due to the risk of uneven development.

Highlighted area indicates the recommended choice for first time testing.

Non-ILFORD Developer	Dilution	Meter Setting		
		EI 50/18	EI 125/22	EI 200/24
Kodak D76	Stock	6	8	9
	1+1	9	11	15
	1+3	14	16	20
Kodak Microdol-X	Stock	10	15	*
	1+3	17	23	*
Kodak HC-110	A	*	4½**	6
	B	6	9	12
Kodak T-Max	1+4	*	8	9
Acufine	Stock	*	4**	6
Agfa Rodinal	1+25	*	9	13
	1+50	*	15	20

\*Not recommended.

\*\*Not recommended due to the risk of uneven development.

**DIP AND DUNK MACHINES (Min/75.2°F/24°C)  
ROLL FILM AND SHEET FILM**

Developer	Dilution	Meter Setting		
		EI 50/18	EI 125/22	EI 200/24
ILFOTEC DD	1+4	*	7	*
ILFOTEC HC	1+31	6	8	9
	68°F (20°C)			
Kodak T-Max RS	1+4	*	7½	*

\*Not recommended.

**ILFOLAB FP40, ROLLER TRANSPORT AND  
LEADER CARD MACHINES (Sec)  
ROLL FILM AND SHEET FILM**

Developer	Dilution/ Temperature	Meter Setting		
		EI 50/18	EI 125/22	EI 200/24
ILFOTEC RT RAPID	Standard/ 78.8°F (26°C)	*	80	100
	Modified/ 78.8°F (26°C)	*	104	130
ILFOTEC HC	1+11/ 75°F (23.9°C)	*	85	*
Kodak DuraFlo	Stock/ 78.8°F (26°C)	*	80	100

\*Not recommended.

**5.3 METER SETTINGS BELOW EI 50/18  
OR ABOVE EI 400/27**

If FP4 Plus has been inadvertently exposed at a meter setting slower than EI 50/18 or faster than EI 400/27, the following guide will ensure that usable negatives are obtained. Obviously, the quality of negatives processed in this way will not be as high as conventionally processed ones.

**MANUAL PROCESSING (Min/68°F/20°C)**

ILFORD Developer	Dilution	Meter Setting		
		EI 25/15	EI 800/30	EI 1600/33
PERCEPTOL	Stock	6½ (8½)	*	*
MICROPHEN	Stock	*	16 (16)	16 (16)

\*Not recommended.

( ) = Roll and Sheet Film.

For users who regularly like to shoot films slower than ISO 125/22°, the recommended ILFORD film is ILFORD PAN F Plus (ISO 50/18°).

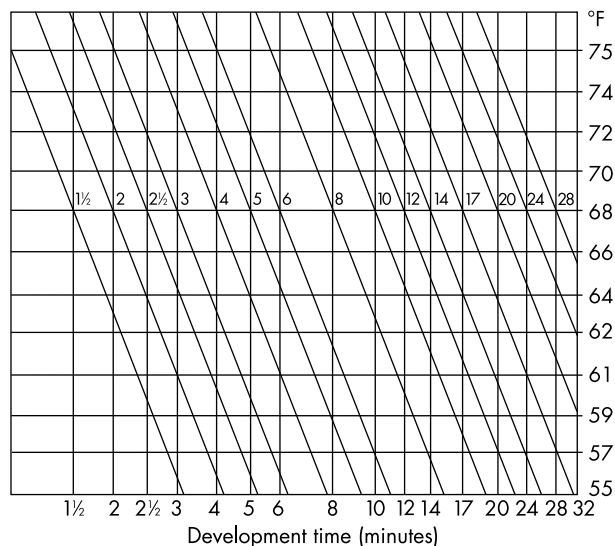
Also available is ILFORD XP2 (ISO 400/27°), a unique black and white film which can be exposed over meter settings from EI 100/21 to EI 800/30 on the same roll of film. It has very fine grain and must be processed through standard C-41 type color negative chemicals.

**5.4 PROCESSING AT  
DIFFERENT TEMPERATURES**

FP4 Plus film can be processed over a range of temperatures. Development times at temperatures other than 68°F may be calculated from the chart below.

1. Look up the development time at 68°F in the tables in section 5.2.
2. Find this time on the 68°F line—see the figures in the middle of the chart.
3. Follow the diagonal line for this time to where it cuts the horizontal line for the new temperature.
4. Draw a line straight down from this point and read off the approximate new development time on the base of the chart.

For example, if 4 minutes at 68°F is recommended, the time at 74°F will be 3 minutes and the time at 61°F will be 6 minutes.



### 5.5 FIXING

FP4 Plus is fully fixed in the standard short fixing time associated with most black and white films. There is no need to give extended fixing.

After development, rinse the film in water and fix in ILFORD UNIVERSAL Rapid fixer (1+3) for 2–4 minutes at 68°F. If ILFORD FIX HARDENER\* is added to the fixer, fix for 4 minutes at 68°F. A hardener is recommended only when processing at high temperatures (above 86°F) or in a roller transport processor.

\*ILFORD FIX HARDENER CAN NOT be used with ILFORD MULTIGRADE or ILFORD 2000 RT fixers.

### 5.6 WASHING

When a non-hardening fixer such as UNIVERSAL Rapid has been used, wash the film in running water for 5–10 minutes.

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 of archival permanence.

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

When a hardening fixer has been used, wash the film in running water for 15–20 minutes at a temperature within  $\pm 10^\circ\text{F}$  of the processing temperature. Use of a hardening fixer makes the film more difficult to wash and is therefore not recommended.

A final rinse in water to which ILFOTOL Wetting Agent, 1+200, has been added will aid rapid and uniform drying.

### 5.7 DRYING

To avoid drying marks, use a squeegee or chamois cloth to wipe FP4 Plus film before hanging it to dry. Dry FP4 Plus at 86–104°F in a drying cabinet or at room temperature in a clean, dust free area.

## 6 CONTRAST-TIME CURVES

For normal use at EI 125/22, develop FP4 Plus according to the development times given in the table in section 5.2 Development times. The development times for a meter setting of EI 125/22 correspond to zero contrast change on the contrast-time curves.

For subjects with an unusually large or small brightness range, and also to fine tune contrast to suit individual requirements, it is possible to vary the development time to obtain the type of negatives required. As a guide, try changing contrast in steps of 5%.

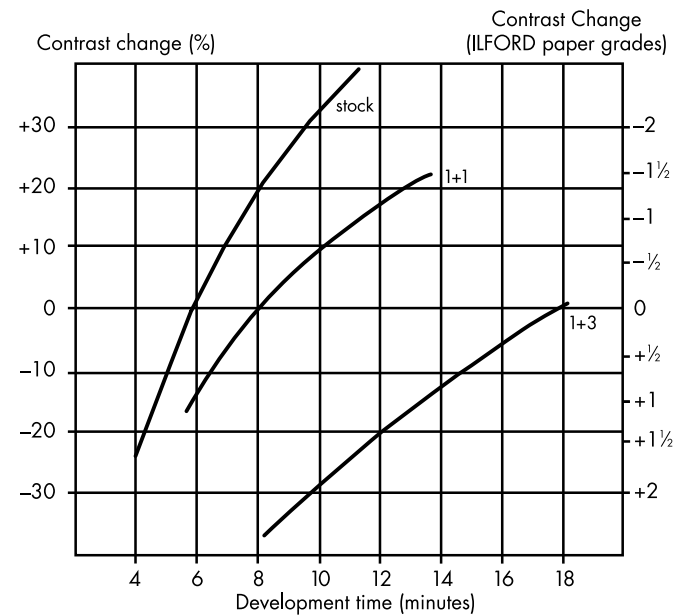
**Note:** In general, the best image quality is always obtained when the film is processed according to the recommendations given in sections 4 and 5, and printed on the appropriate grade of paper for the resulting negatives.

The scale on the right hand side of the contrast-time curves gives the contrast changes in ILFORD printing paper contrast grades.

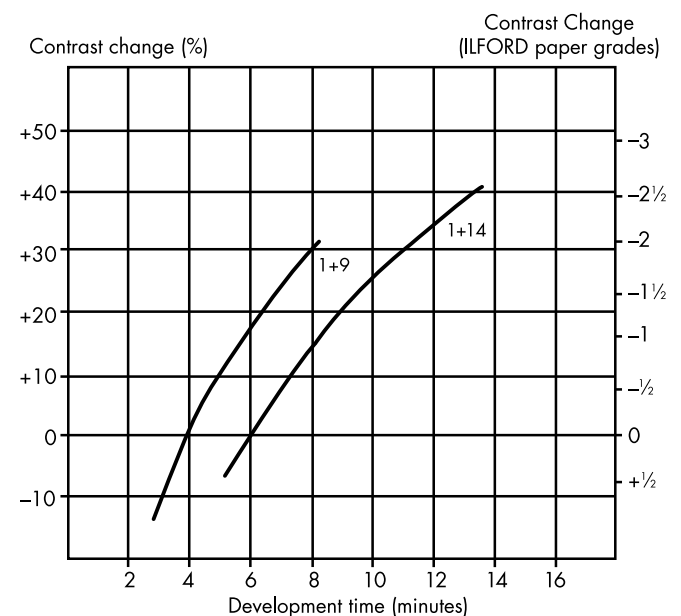
For example, if your negatives normally lie between paper grades 2 and 3, you may wish to increase the film development time, and so increase the contrast of the negatives, so they print on grade 2.

In such a case with ILFOTEC HC (1+31) developer, for example, instead of giving a development time of 6 minutes, read off the new development time of approximately 8 minutes where the  $-\frac{1}{2}$  paper grade meets the contrast-time curve. Alternatively, use one of the ILFORD MULTIGRADE papers which gives  $\frac{1}{2}$  steps of contrast.

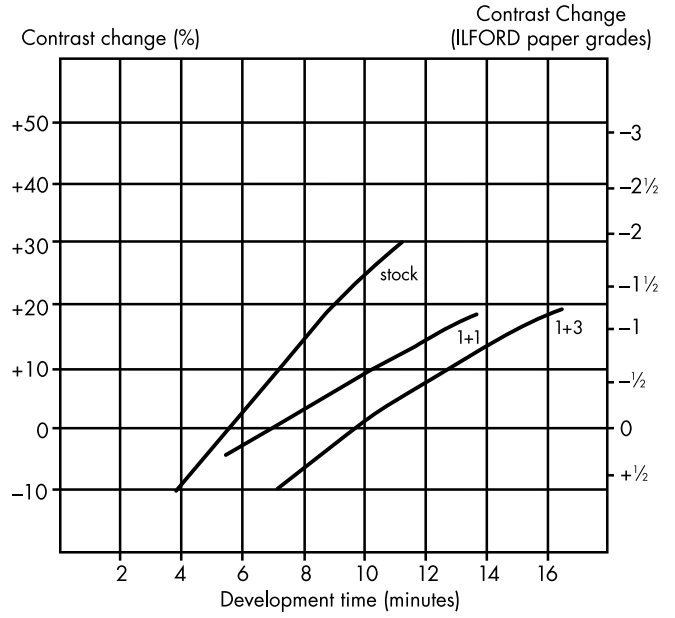
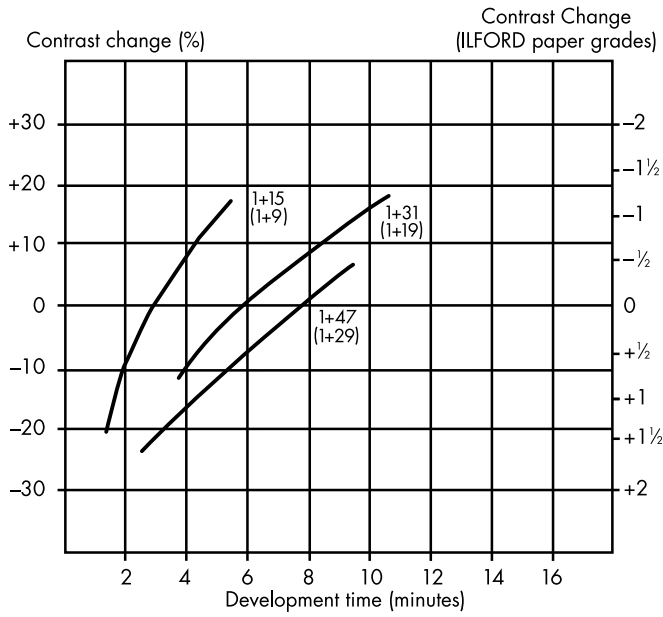
### 6.1 ID-11



### 6.2 ILFOSOL-S



**6.3 ILFOTEC HC/(HC-D)**



**6.4 MICROPHEN**

ILFORD may modify its products from time to time and consequently the information given in this publication is subject to change without notice.

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

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

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