

TECHNICAL INFORMATION

DELTA 400 PROFESSIONAL

ISO 400/27°, FINE GRAIN, BLACK AND WHITE PROFESSIONAL FILM FOR SUPERB PRINT QUALITY

ILFORD DELTA 400 Professional is a fast, fine grain, black and white professional film. It is ideal for action and available light photography and also gives fine grain results for pictorial and fine art photography. DELTA 400 Professional film gives excellent performance in seasoned developers.

Although rated at ISO 400/27°, DELTA 400 Professional film can produce high quality prints when exposed at meter settings up to EI 3200/36 and given extended development in ILFORD ILFOTEC DD-X, ILFOTEC HC, MICROPHEN or ILFOTEC RT RAPID developers.

DELTA 400 Professional 35mm film is coated on 0.125mm/5-mil acetate base and is available in 24 or 36 exposure cassettes, or in bulk lengths of 30.5 metres (100ft). DELTA 400 Professional 35mm film is supplied in DX coded cassettes, suitable for all 35mm cameras.

DELTA 400 Professional roll film is coated on 0.110mm/4-mil clear acetate base with an anti-halation backing which clears during development. It is available in 120 lengths and is edge numbered 1 to 19.

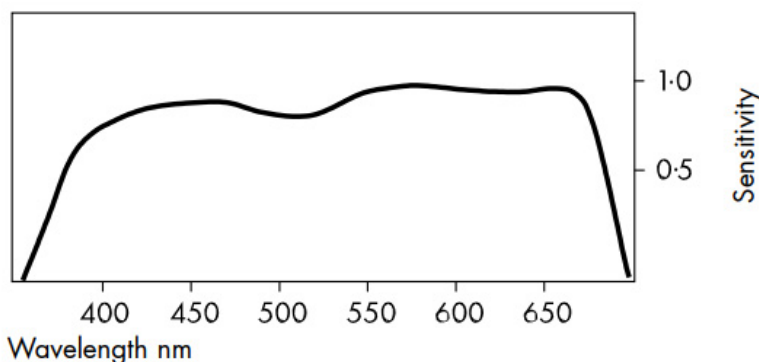
EXPOSURE RATING

DELTA 400 Professional has a speed rating of ISO 400/27° to daylight. The ISO speed rating was measured using ILFORD ID-11 developer at 20°C/68°F with intermittent agitation in a spiral tank.

Best results will be obtained at normal contrast, but good image quality will also be obtained at meter settings from EI 200/24 to EI 3200/36. It should be noted that the exposure index (EI) range recommended for DELTA 400 Professional is based on a practical evaluation of film speed and is not based on foot speed, as is the ISO standard.

SPECTRAL SENSITIVITY

Wedge spectrogram to tungsten light (2850K)



FILTER FACTORS

DELTA 400 Professional film may be used with all types of filters (eg colour, polarising and neutral density filters) in the usual way. Follow the instructions given by the filter manufacturer.

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 daylight contains more red light, green and blue filters may need slightly more exposure than usual.

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 1 1/2 stops.

MAKING LONG EXPOSURES

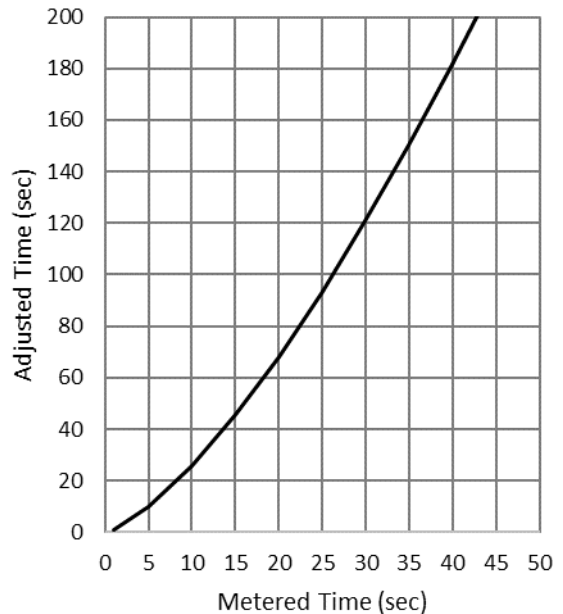
For exposures between 1/2 and 1/10 000 second, no adjustments are needed for reciprocity law failure.

When exposures longer than 1/2 second are given, DELTA 400 Professional, 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 metered time is known.

The graph is based on the formulae $T_a = T_m^{1.41}$

T_a = Adjusted Time

T_m = Metered Time



CHOOSING THE BEST ILFORD DEVELOPER FOR THE JOB

Manual processing Spiral tank, dish/tray, deep tank Including rotary processors

| | Liquid | Powder |
|---------------------------------|---|--------------------------------|
| Best overall image quality | ILFOTEC DD-X | ID-11 (stock) |
| Finest grain | ILFOTEC DD-X | ID-11 (stock) |
| Finest grain (EI 200/24) | ILFOTEC DD-X | PERCEPTOL (stock) |
| Maximum sharpness | ILFOSOL 3 (1+9) | ID-11 (1+3) |
| Maximum film speed (EI 3200/36) | ILFOTEC DD-X | MICROPHEN (stock) |
| Economy | ILFOTEC LC29 (1+29) | ID-11 (1+3) MICROPHEN (1+3) |
| One-shot convenience | ILFOSOL S (1+14) ILFOTEC LC29 (1+29) | ID-11 (1+3) MICROPHEN (1+3) |
| Replenishable | ILFOTEC DD-X | ID-11 |

Machine Processing

| | | |
|------------------|------------------|--|
| Dip and dunk | ILFOTEC DD | Best overall image quality and long tank life |
| Short leader | ILFOTEC RT RAPID | Rapid processing, best overall image quality and long tank life. |
| Roller transport | ILFOTEC RT RAPID | Rapid processing |

DELTA 400 PROFESSIONAL Technical Information

DEVELOPMENT TIMES

The table below gives development times for both manual and machine processing DELTA 400 Professional. The times **in bold** will produce negatives of normal contrast (Gbar 0.62). The development times are intended as a guide and may be altered if a different result is needed.

For manual processing in spiral tanks and deep tanks, the development times are based on intermittent agitation. Where continuous agitation is used for manual processing (as in a dish/tray or with some types of developing tank), reduce these times by up to 15%. For use in rotary processors without a pre-rinse, reduce the development times by up to 15%. A pre-rinse is not recommended as it can lead to uneven processing.

35mm and Roll Film - 20°C/68°F

| ILFORD developer | Dilution | Meter setting (EI) | | | | | | | |
|--|----------|--------------------|-----------|------------|------------|------------|--------|---------|---------|
| | | 200/24 | 250/25 | 320/26 | 400/27 | 500/28 | 800/30 | 1600/33 | 3200/36 |
| Spiral tank, deep tank, dip and dunk machines (min/20°C/68°F) | | | | | | | | | |
| ILFOTEC DD-X | 1+4 | 6 | - | - | 8 | 9½ | 10½ | 13½ | 18 |
| ILFOSOL 3 | 1+9 | 5½ | - | - | 7 | - | 14 | - | - |
| | 1+14 | 8 | - | - | 12 | - | 20½ | - | - |
| ILFOTEC HC | 1+15 | - | - | 4 | - | - | 5½ | 7½ | 13 |
| ILFOTEC HC | 1+31 | 5 | - | - | 7½ | - | 10 | 13½ | - |
| ILFOTEC LC29 | 1+9 | - | - | 4 | - | - | 5½ | 7½ | 13 |
| | 1+19 | 5 | - | - | 7½ | - | 10 | 13½ | - |
| | 1+29 | 8½ | - | - | 11½ | - | 17 | - | - |
| ID-11 | stock | 7 | - | - | 9½ | - | 11½ | 14½ | 19 |
| | 1+1 | 10 | - | - | 14 | - | 17½ | - | - |
| | 1+3 | 18 | - | - | - | - | - | - | - |
| MICROPHEN | stock | 5 | - | - | 6½ | 7½ | 8½ | 10½ | 14 |
| | 1+1 | 8½ | - | - | 11½ | 13½ | 15½ | 19 | - |
| | 1+3 | 16 | - | - | - | - | - | - | - |
| PERCEPTOL | stock | 10 | 12 | - | - | - | - | - | - |
| | 1+1 | 12½ | - | 15½ | - | - | - | - | - |
| | 1+3 | 18½ | - | - | - | - | - | - | - |
| Non-ILFORD Developers (min/20°C/68°F) | | | | | | | | | |
| Acufine | stock | 7 | - | - | 9 | 11 | 13 | 16 | - |
| Agfa Rodinal | 1+25 | 6 | - | - | 9 | - | - | - | - |
| | 1+50 | 11½ | - | - | 20 | - | - | - | - |
| Kodak D-76 | stock | 7 | - | - | 9½ | - | 11½ | 14½ | 19 |
| | 1+1 | 10 | - | - | 14 | - | 17½ | - | - |
| | 1+3 | 18 | - | - | - | - | - | - | - |
| Kodak HC-110 | A | - | - | 4 | - | - | 5½ | 7½ | 13 |
| | B | 5 | - | - | 7½ | - | 10 | 13½ | - |
| Kodak T-Max | 1+4 | 5 | - | - | 6½ | 7 | 8½ | 10½ | 13½ |
| Tetenal Ultrafin SF | Stock | 8 | - | - | 10 | 12 | 13½ | 17 | 20 |
| | 1+1 | 14 | - | - | 19 | - | - | - | - |
| Tetenal Ultrafin Plus | 1+4 | 6 | - | - | 7½ | 10 | 12 | 16½ | - |
| Kodak Xtol | stock | 6 | - | - | 7½ | 8½ | 10 | 13 | 17 |
| | 1+1 | 9 | - | - | 11½ | 13 | 15½ | 20 | - |

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

DELTA 400 PROFESSIONAL Technical Information

35mm and Roll Film - 24°C/75°F

| ILFORD developer | Dilution | Meter setting (EI) | | | | | | | |
|------------------|----------|--------------------|--------|--------|--------|--------|--------|---------|---------|
| | | 200/24 | 250/25 | 320/26 | 400/27 | 500/28 | 800/30 | 1600/33 | 3200/36 |

Spiral tank, deep tank, dip and dunk machines (min/24°C/75°F)

| | | | | | | | | | |
|--------------|-------|-----|----------|------------|------------|-----------|-----|-----|----|
| ILFOTEC DD-X | 1+4 | 4½ | - | - | 5½ | 7 | 7½ | 9½ | 13 |
| ILFOSOL 3 | 1+9 | 4½ | - | - | 6 | - | 10½ | - | - |
| | 1+14 | 6 | - | - | 8½ | - | 15½ | - | - |
| ILFOTEC HC | 1+15 | - | - | - | - | - | 4½ | 5½ | 8 |
| ILFOTEC HC | 1+31 | 4 | - | - | 5 | - | 7 | 10 | - |
| ILFOTEC LC29 | 1+9 | - | - | - | - | - | 4½ | 5½ | 8 |
| | 1+19 | 4 | - | - | 5 | - | 7 | 10 | - |
| | 1+29 | 5½ | - | - | 7½ | - | 11 | 16 | - |
| ID-11 | stock | 5½ | - | - | 8 | - | 9 | 11½ | 15 |
| | 1+1 | 8 | - | - | 11½ | - | 14 | 18 | - |
| | 1+3 | 14 | - | - | 19½ | - | - | - | - |
| MICROPHEN | stock | 4 | - | - | 5 | 6 | 6½ | 7½ | 10 |
| | 1+1 | 7 | - | - | 9 | 11 | 12 | 15½ | - |
| | 1+3 | 11½ | - | - | 16 | 20 | - | - | - |
| PERCEPTOL | stock | 7 | 9 | - | - | - | - | - | - |
| | 1+1 | 9 | - | 11½ | - | - | - | - | - |
| | 1+3 | 14½ | - | 17½ | - | - | - | - | - |

Non-ILFORD Developers (min/24°C/75°F)

| | | | | | | | | | |
|-----------------------|-------|----|---|---|------------|------------|-----|-----|-----|
| Acufine | stock | 4½ | - | - | 5½ | 7 | 7½ | 10 | 19 |
| Agfa Rodinal | 1+25 | 5 | - | - | 7 | - | 16 | - | - |
| | 1+50 | 9½ | - | - | 16 | - | - | - | - |
| Kodak D-76 | stock | 5½ | - | - | 8 | - | 9 | 11½ | 15 |
| | 1+1 | 8 | - | - | 11½ | - | 14 | 18 | - |
| | 1+3 | 14 | - | - | 19½ | - | - | - | - |
| Kodak HC-110 | A | - | - | - | - | - | 4½ | 5½ | 8 |
| | B | 4 | - | - | 5 | - | 7 | 10 | - |
| Kodak T-Max | 1+4 | 4 | - | - | 5 | 5½ | 7 | 8½ | 11 |
| Tetenal Ultrafin SF | Stock | 5½ | - | - | 7 | 8 | 9 | 11 | 14½ |
| | 1+1 | 9 | - | - | 12 | 15½ | 17½ | - | - |
| Tetenal Ultrafin Plus | 1+4 | 5 | - | - | 6 | 8 | 8½ | 10 | 13½ |
| Kodak Xtol | stock | 4 | - | - | 4½ | 6 | 7½ | 9½ | 12 |
| | 1+1 | 6½ | - | - | 8½ | 9½ | 11½ | 14 | 18 |

Dip and dunk machines (min/24°C/75°F)

| | | | | | | | | | |
|----------------|-------|----|---|---|----------|---|----|----|-----|
| ILFOTEC DD | 1+4 | 6 | - | - | 7 | - | 10 | 13 | 14 |
| Kodak T-Max RS | stock | - | - | - | 5 | - | 6½ | 9 | 12½ |
| Kodak Xtol | stock | 5½ | - | - | 7 | - | 8½ | 11 | 14 |

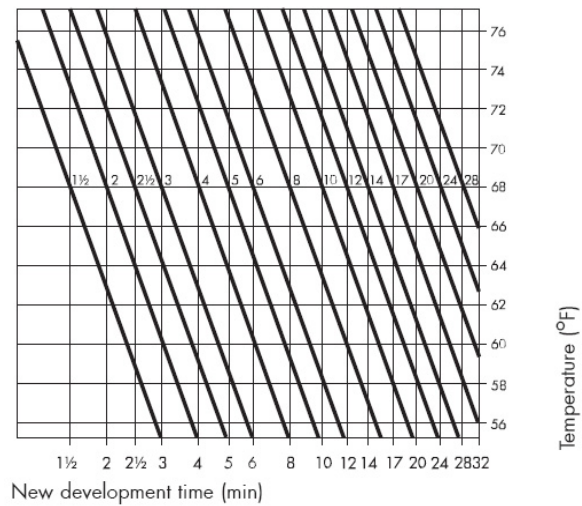
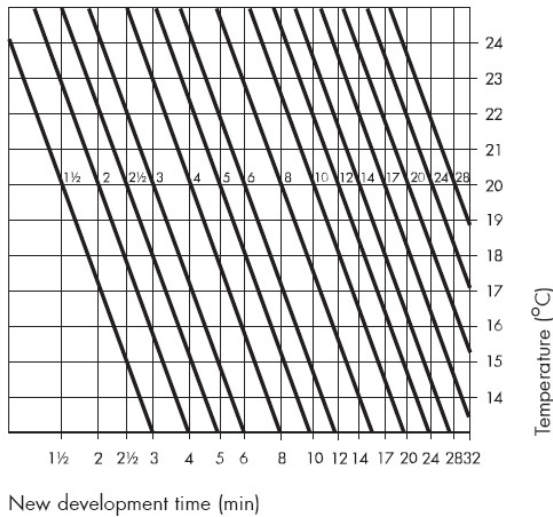
ILFOLAB FP40, roller transport and short leader machines (sec/26°C/79°F)

| | | | | | | | | | |
|------------------|-------|----|---|---|-----------|---|-----|-----|-----|
| ILFOTEC RT RAPID | 1+1+2 | 55 | - | - | 65 | - | 71 | 84 | 104 |
| | 1+1+5 | 65 | - | - | 78 | - | 104 | 127 | 166 |

PROCESSING

Processing at Different Temperatures

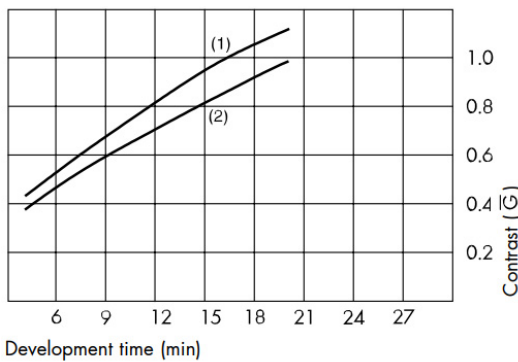
DELTA 400 Professional film can be processed over a range of temperatures. Approximate development times at temperatures other than 20°C/68°F may be calculated from the charts below. For example, if 6 minutes at 20°C/68°F is recommended, the time at 23°C/73°F will be 4½ min and the time at 16°C/61°F will be 9 min.



CONTRAST - TIME GRAPHS

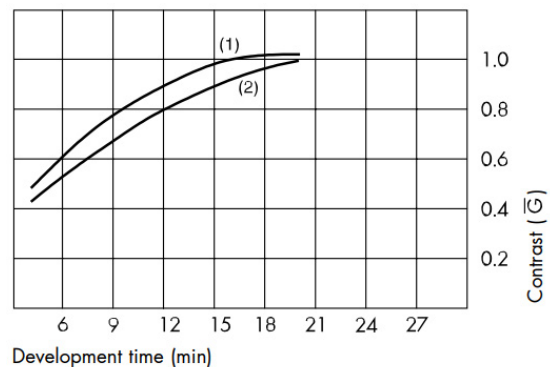
The following graphs show the contrast of DELTA 400 Professional negatives when developed over a range of development times.

ID11



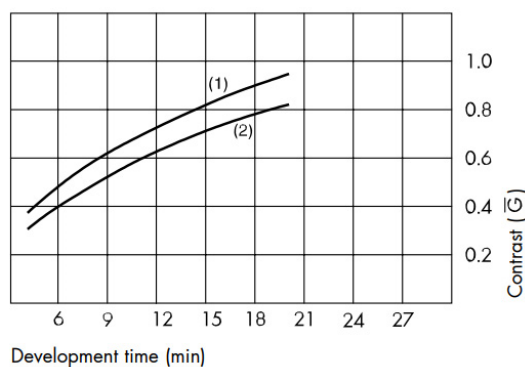
DELTA 400 Professional film developed in ILFORD ID-11 stock at (1) 24°C/75°F and (2) 20°C/68°F.

MICROPHEN



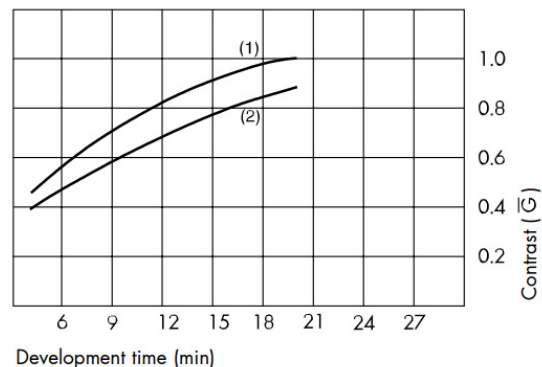
DELTA 400 Professional film developed in ILFORD MICROPHEN stock at (1) 24°C/75°F and (2) 20°C/68°F.

PERCEPTOL



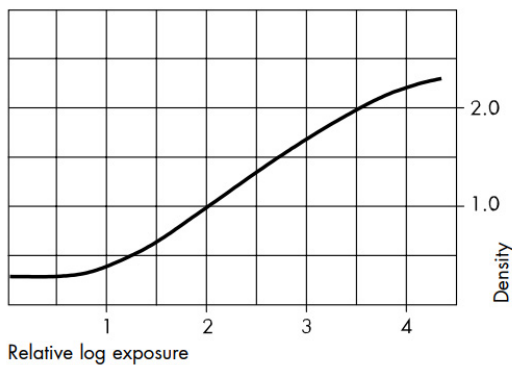
DELTA 400 Professional film developed in ILFORD PERCEPTOL stock at (1) 24°C/75°F and (2) 20°C/68°F.

ILFOTEC DD-X



DELTA 400 Professional film developed in ILFOTEC DD-X 1+4 at (1) 24°C/75°F and (2) 20°C/68°F.

CHARACTERISTIC CURVE



DELTA 400 Professional film developed in ILFORD ID-11 stock for 8 minutes at 24°C/75°F with intermittent agitation.

PROCESSING

DELTA 400 Professional can be processed in all types of processing equipment including spiral tanks, rotary processors, dishes/trays, deep tanks and automatic processors. Standard capacity figures and replenishment rates can be maintained, when fixing DELTA 400 Professional however, slightly longer times than used with conventional film are recommended for best results.

Safelight recommendations

Handle DELTA 400 Professional film in total darkness.

Agitation

Intermittent agitation is recommended for use in spiral tanks and deep tanks. With spiral tanks, invert the tank four times during the first 10 seconds, then invert the tank four times again during the first 10 seconds of each further minute. Otherwise, follow the recommendations given by the processing equipment manufacturer.

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

After development the film can be rinsed in water, but we recommend that an acid stop bath is used such as ILFORD ILFOSTOP (with indicator dye). ILFOSTOP is also recommended for all machine processing applications. When 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.

ILFORD ILFOSTOP

| | |
|--|-------------------|
| Dilution | 1+19 |
| Temperature Range | 18–24°C (64–75°F) |
| Time (sec) at 20°C (68°F) | 10 |
| Capacity (films per litre, unrefilled) | 15x (135-36) |

The process time given 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 FIXER.

ILFORD RAPID OR HYPAM FIXERS

| | |
|--|-------------------|
| Dilution | 1+4 |
| Temperature Range | 18–24°C (64–75°F) |
| Time (mins) at 20°C (68°F) | 2-5 |
| Capacity (films per litre, unrefilled) | 24x (135-36) |

Wash

Wash the films in running water for 5–10 minutes at a temperature within 5°C (9°F) of the process temperature. Or see note below for greater economy when using spiral tanks.

Note: For spiral tank use, 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, $\pm 5^{\circ}\text{C}$ (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.

Rinse

For a final rinse use ILFORD ILFOTOL wetting agent added to water, it helps the film to dry rapidly and 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.

Drying

To avoid drying marks, use a clean squeegee or chamois cloth to wipe DELTA 400 Professional film before hanging it to dry. Dry DELTA 400 Professional at 30–40°C/86–104°F in a drying cabinet or at room temperature in a clean dust-free area.

STORAGE

Unexposed Film

For immediate use, store DELTA 400 Professional in a cool (10–20°C/50–68°F), dry place in its original packaging. DELTA 400 Professional may be stored in a fridge/freezer but allow plenty of time for the film to acclimatise prior to use.

Exposed film

Once exposed, process DELTA 400 Professional as soon as practical. Exposed films should always be stored in cool, dry conditions - as recommended above.

Negatives

Store processed negatives in a cool (10–20°C/50–68°F), dry place, in the dark. Suitable storage sleeves include those made of cellulose triacetate, Mylar, paper (pH6.5–7.5) or inert polyester.

A wide range of fact sheets is available which describe and give guidance on using ILFORD PHOTO products. Some products in this fact sheet might not be available in your country.

HARMAN technology Limited, Ilford Way, Mobberley,
Knutsford, Cheshire WA16 7JL, England
www.ilmfordphoto.com