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 rollfilm 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

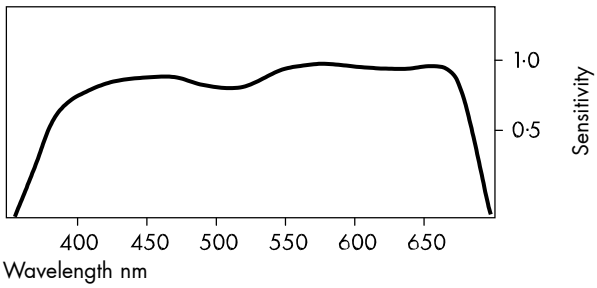
DELTA 400 Professional has a speed rating of ISO 400/27° (400ASA, 27DIN, EI 400/27) to daylight. The ISO speed rating was measured using ILFORD ID-11 developer at 20°C/68°F with intermittent agitation in a spiral tank.

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)



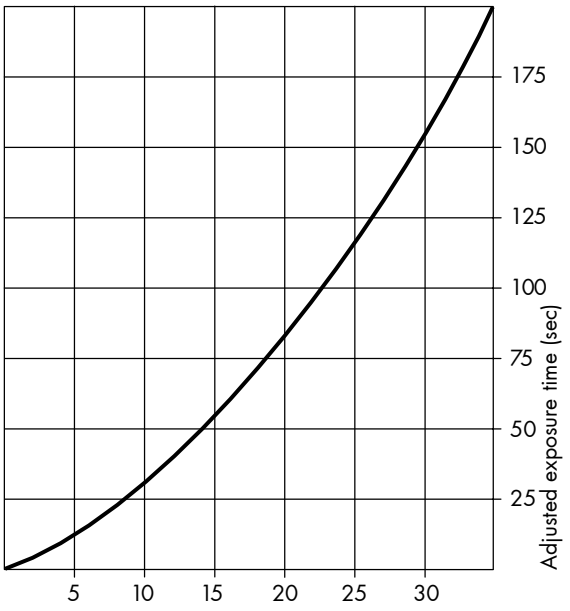
FILTER FACTORS

DELTA 400 Professional film can 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 1½ stops.

MAKING LONG EXPOSURES For exposures between ½ and 1/10 000 second, no adjustments are needed for reciprocity law failure. When exposures longer than ½ 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 measured time is known.



CHOOSING THE BEST ILFORD DEVELOPER FOR THE JOB
DELTA 400 Professional will give good results in a wide range of developers when exposed at meter settings up to EI 3200/36. After choosing your developer, refer to the development times table to check the meter setting needed with that developer.

CHOOSING THE BEST ILFORD DEVELOPER FOR THE JOB
Manual processing (eg spiral tank, dish/tray, deep tank) and rotary processors

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

Machine processing

Dip and dunk	ILFOTEC DD ID-11 ILFOTEC HC	Best overall image quality (liquid) and long tank life Best overall image quality (powder) and long tank life Flexible process time, range of dilutions and economy
Short leader	ILFOTEC RT RAPID ILFOTEC HC	Rapid processing, best overall image quality and long tank life Range of dilutions, flexibility and economy
Roller transport	ILFOTEC RT RAPID	Rapid processing

DEVELOPMENT TIMES

The table gives development times for processing DELTA 400 Professional film. The times in bold will produce negatives of normal contrast (G0.62). 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 spiral tank development times by up to 15%. A pre-rinse is not recommended because it can lead to uneven processing.

35mm film and rollfilm

ILFORD developer	Dilution	Meter setting (EI) 200/24	250/25	320/26	400/27	500/28	800/30	1600/33	3200/36
Spiral tanks and deep tanks - unreplenished developers (min/20°C/68°F)									
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	–	–	–	–	–	–	–
ILFOTEC DD–X	1+4	6	–	–	8	**9½**	10½	13½	18
ILFOTEC HC	1+15	–	–	**4**	–	–	5½	7½	13
	1+31	5	–	–	**7½**	–	10	13½	–
ILFOTEC LC29	1+19	5	–	–	**7½**	–	10	13½	–
	1+29	8½	–	–	**11½**	–	17	–	–
ILFOSOL S	1+9	6½	–	–	**9**	–	14	–	–
	1+14	10	–	–	**13**	–	–	–	–
Non-ILFORD developer									
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 Microdol X	stock	11	–	**13½**	–	–	–	–	–
	1+1	14½	–	**16½**	–	–	–	–	–
	1+3	–	–	–	–	–	–	–	–
Kodak T–Max	1+4	5	–	–	6½	**7**	8½	10½	13½
Kodak Xtol	stock	6	–	–	7½	**8½**	10	13	17
	1+1	9	–	–	11½	**13**	15½	20	–
Acufine	stock	7	–	–	9	**11**	13	16	–
Tetenal Ultrafin SF	stock	8	–	–	10	**12**	13½	17	20
	1+1	14	–	–	19	–	–	–	–
Tetenal Ultrafin Plus	1+4	6	–	–	7½	**10**	12	16½	–
Agfa Atomal FF	stock	8	**9**	–	–	–	–	–	–
Dip and dunk machines and deep tanks - replenished developers (min)									
ILFOTEC DD	1+4 (24°C/75°F)	6	–	–	7	–	10	13	14
Kodak T-Max RS	stock (22°C/72°F)	–	–	–	**5**	–	6½	9	12½
Kodak Xtol	stock (24°C/75°F)	5½	–	–	7	–	8½	11	14

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.

Note 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.

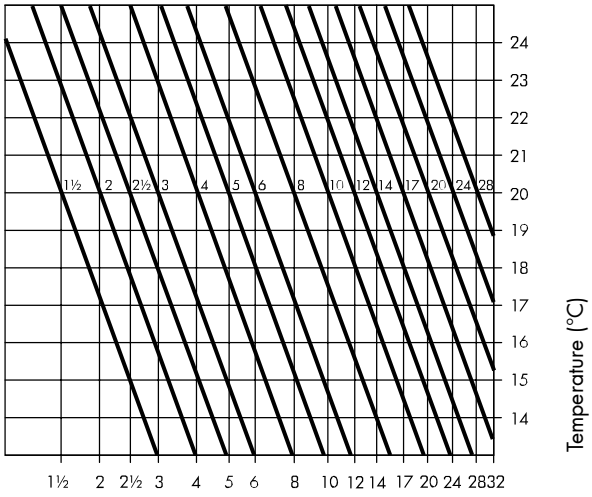
35mm film and rollfilm

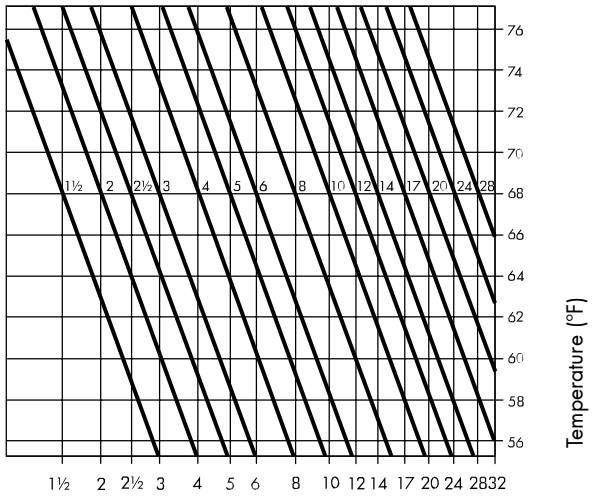
	Dilution	Meter setting (EI) 200/24	250/25	320/26	400/27	500/28	800/30	1600/33	3200/36
Spiral tanks and deep tanks - unreplenished developers (min/24°C/75°F)									
ILFORD developer									
ID–11	stock	5½	–	–	**8**	–	9	11½	15
	1+1	8	–	–	**11½**	–	14	18	–
	1+3	14	–	–	**19½**	–	–	–	–
MICROPHEN	stock	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**	–	–	–	–	–
ILFOTEC DD–X	1+4	4½	–	–	5½	**7**	7½	9½	13
ILFOTEC HC	1+15	–	–	–	–	–	4½	5½	8
	1+31	4	–	–	**5**	–	7	10	–
ILFOTEC LC29	1+19	4	–	–	**5**	–	7	10	–
	1+29	5½	–	–	**7½**	–	11	16	–
ILFOSOL S	1+9	5	–	–	**7½**	–	11½	19½	–
	1+14	8	–	–	**11½**	–	17	–	–
Non-ILFORD developer									
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 Microdol X	stock	7½	–	**9**	–	–	–	–	–
	1+1	10½	–	**12½**	–	–	–	–	–
	1+3	15½	–	–	–	–	–	–	–
Kodak T–Max	1+4	4	–	–	5	**5½**	7	8½	11
Kodak Xtol	stock	4	–	–	4½	**6**	7½	9½	12
	1+1	6½	–	–	8½	**9½**	11½	14	18
Acufine	stock	4½	–	–	5½	**7**	7½	10	19
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
Agfa Atomal FF	stock	5	**6**	–	–	–	–	–	–
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
Kodak Duraflo RT	stock	–	–	–	**65**	–	71	84	104

PROCESSING AT DIFFERENT TEMPERATURES

DELTA 400 Professional film can be processed over a range of temperatures. Development at 20°C/68°F or 24°C/75°F is recommended and the times are given in the development times table. If development is not possible at 20°C/68°F or 24°C/75°F, the following chart can be used. The chart is based at 20°C/68°F for a general developer, and can be used to give an estimate of development times at temperatures around 20°C/68°F.

For example, if 6 minutes at 20°C/68°F is recommended, the time at 23°C/73°F will be 4½ minutes and the time at 16°C/61°F will be 9 minutes.



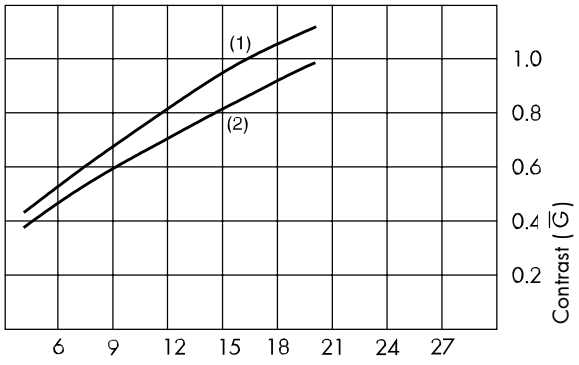


Note The chart can only be used as a guide because different developers and processing techniques can vary the results.

CONTRAST-TIME GRAPHS

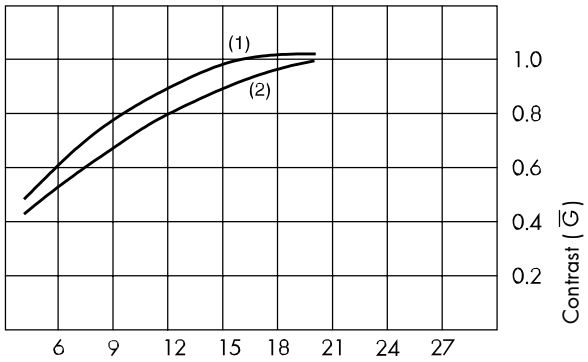
The following graphs show the contrast of DELTA 400 Professional negatives when developed over a range of development times.

ID-11



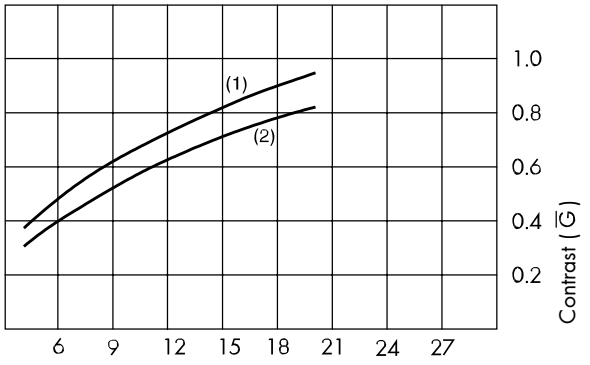
DELTA 400 Professional film developed in ILFORD ID-11 stock at (1) 24°C/75°F and (2) 20°C/ 68°F.

MICROPHEN



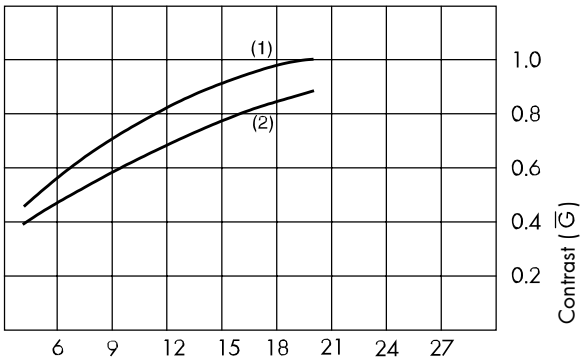
DELTA 400 Professional film developed in ILFORD MICROPHEN stock at (1) 24°C/75°F and (2) 20°C/68°F.

PERCEPTOL



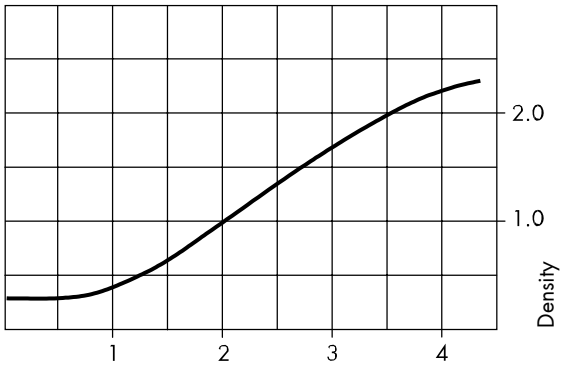
DELTA 400 Professional film developed in ILFORD PERCEPTOL stock at (1) 24°C/75°F and (2) 20°C/68°F.

ILFOTEC DD-X



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

CHARACTERISTIC CURVE



DELTA 400 Professional 35mm film developed in ILFORD ID-11 stock for 8 minutes at 24°C/75°F with intermittent agitation.

PROCESSING

DELTA 400 Professional film 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 film, however, slightly longer times than used with conventional film are recommended for best results.

Safelight recommendations

Handle DELTA 400 Professional film in total darkness. For very brief inspections during processing, use the ILFORD 908 (very dark green) safelight filter, with a 15W bulb, fitted in a darkroom lamp (such as the ILFORD DL10 or DL20). Do not allow direct lighting from the safelight to fall on the film.

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) or ILFOSTOP PRO (without indicator dye). ILFOSTOP PRO is 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 Stop Bath	ILFOSTOP	ILFOSTOP PRO
Dilution	1+19	1+19
Temperature range	18–24°C (64–75°F)	18–24°C (64–75°F)
Time (seconds) at 20°C (68°F)	10	10
Capacity films/litre (unreplenished)	15x(135–36)	22x(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 and ILFORD HYPAM liquid fixers and ILFORD ILFOFIX II powder fixer,all are non-hardening fixers.

ILFORD Fixer	ILFORD HYPAM & ILFORD RAPID FIXER	ILFORD ILFOFIX II
Dilution	1+4	stock
Temperature range	18–24°C (64–75°F)	18–24°C (64–75°F)
Time (mins) at 20°C (68°F)	2–5	4–8
Capacity films/litre (unreplenished)	24x(135–36)	24x(135–36)

WASH

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

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

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

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.

FIX HARDENER

ILFORD RAPID FIXER and ILFORD ILFOFIX II must not be used with fix hardeners as they are not compatible with them. If a fix hardener is required then only ILFORD HYPAM fixer can be used. Add ILFORD HYPAM HARDENER to turn HYPAM into a hardening fixer.

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

Using a fix hardener will require the recommended fix and wash times to be extended. Depending on the film and processing conditions the hardened fix time will be between 4 and 10 minutes and the subsequent wash time 10–20 minutes in running water.

The amount of HYPAM HARDENER that can be added to the fixer is dependant on the film and process conditions used. In some processors the full amount of hardener cannot be used as the fix and wash times cannot be extended adequately. In these circumstances we recommend starting with the minimum amount of hardener to have some effect. This is around 3–6 mls of hardener per litre of working strength HYPAM used. This increases the film hardness slightly but has a negligible effect on the fix and wash efficiency. When fix and wash times are restricted the maximum amount of HYPAM HARDENER recommended is 10–20ml of hardener per litre of working strength HYPAM used. This higher amount gives a definite increase to the hardness of the films processed and while fixing and washing efficiency are reduced the films will be adequately fixed and washed for most purposes.

When fix and wash times can be extended the maximum amount of HYPAM HARDENER needed to achieve fully hardened films is 1 part to 40 parts working strength HYPAM i.e. 24 ml per litre.

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 film at 30–40°C/86-104°F in a drying cabinet or at room temperature in a clean dust-free area.

STORAGE

Store DELTA 400 Professional film in a cool (10–20°C/50-68°F), dry place in its original packaging.

Exposed film

Once exposed, process DELTA 400 Professional film as soon as practical. Images on exposed but unprocessed film will not degrade for several months when stored as recommended.

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 products. Some products in this fact sheet might not be available in your country

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