

TECHNICAL INFORMATION

ORTHO PLUS

BLACK AND WHITE, ORTHOCHROMATIC COPY FILM

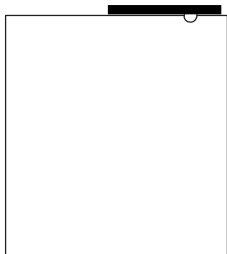
ILFORD ORTHO Plus black and white copy film is designed for many applications. It is particularly recommended for continuous tone copy work, with no sacrifice in quality when the original includes line work. The blue and green sensitivity enables the film to be handled in red safelight and allows processing by inspection. This versatile film allows you to fine-tune the contrast by the choice of developer, the exposure given and the development time. It is possible to achieve an accurate reproduction of most black and white originals, or to maintain a clean background in copies of combined line and continuous tone originals.

The characteristic curve of ORTHO Plus copy film has been optimised to ensure the tonal range of the original image is maintained. This is different to conventional films, which can give a dull, flat result when used for copying.

The qualities of a high resolution film with precise contrast control is just what is needed for photomicroscopy. ORTHO Plus copy film is highly recommended for this application.

ORTHO Plus copy film is coated on 0.180mm/7-mil polyester base, well known for its high dimensional stability and strength. The film is protected by an efficient anti-halation backing which clears during development. If processed and stored properly, ORTHO Plus copy film has excellent archival storage properties.

The emulsion faces the user when sheet film is held in the position shown.



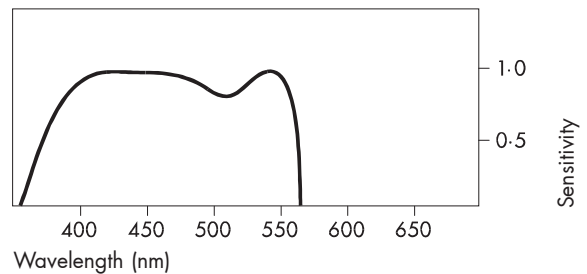
EXPOSURE RATING

The figures below, which apply to ORTHO Plus copy film developed to normal contrast in ILFORD ID-11 developer, provide a guide to exposure:

Daylight sources ISO 80/20°
Tungsten sources ISO 40/17°

SPECTRAL SENSITIVITY

Wedge spectrogram to tungsten light (2850K)



FILTER FACTORS

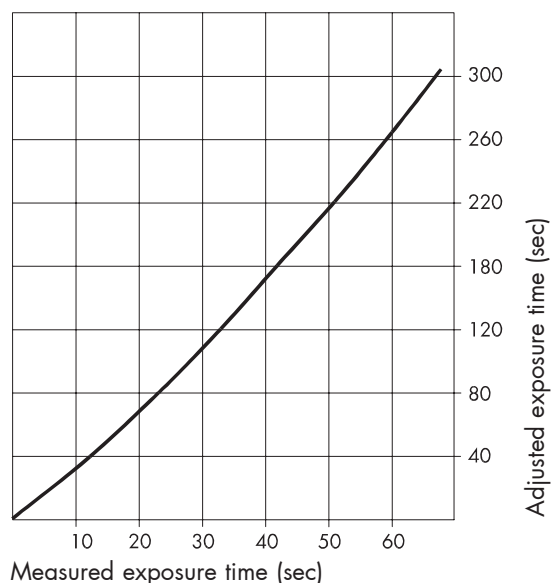
The factors quoted below give a practical guide to the increase in exposure necessary when using the filters listed.

	Daylight	Tungsten
104 Alpha (yellow)	2.5	1
109 Delta (deep yellow)	5.5	3
304 Tricolour blue	3	5
404 Tricolour green	8	4.5

For other types of filters follow the instructions given by the filter manufacturer.

MAKING LONG EXPOSURES

For exposures between 1/2 and 1/10000 second, no corrections are needed for reciprocity law failure. When exposures longer than 1/2 second are given, ORTHO Plus copy film, 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

This table gives development times in minutes for the stated contrast (G). Development times may be altered if a different contrast is needed.

Pictorial contrast

		°C/°F	G0.62	to	G0.70
ID-11	stock	20/68	8		10
ID-11	1+1	20/68	10½		13
ID-11	1+3	20/68	16		20
MICROPHEN	stock	20/68	9		12
MICROPHEN	1+1	20/68	11½		14½
MICROPHEN	1+3	20/68	13½		17
PERCEPTOL	stock	20/68	13		16
ILFOSOL S	1+9	20/68	4½		6
ILFOTEC HC	1+15	20/68	4		5
ILFOTEC HC	1+31	20/68	6		8
ILFOTEC DD	stock	24/75	5½		6½
ILFOTEC RT RAPID	1+1+2	26/79	65s		127s
ILFOTEC RT RAPID	1+1+5	26/79	78s		153s

Non-ILFORD developers

			G0.62	to	G0.70
Kodak D-76	stock	20/68	8		10
Kodak D-76	1+1	20/68	10½		13
Kodak T-Max RS	stock	24/75	3½		4½
Kodak T-Max	1+4	20/68	5		6½

Intermediate contrast

			G0.80	to	G1.00
PQ UNIVERSAL	1+9	20/68	4		12

High contrast

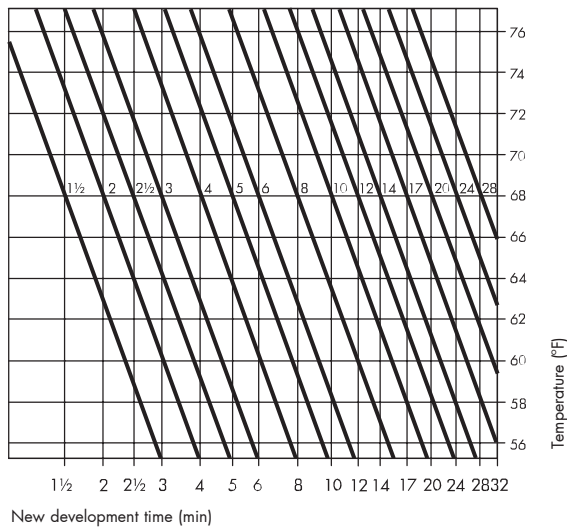
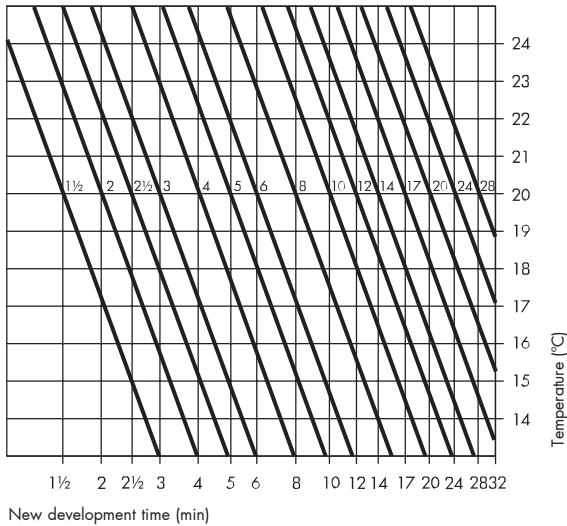
			G1.2	to	G1.8
PHENISOL	1+4	20/68	3		10

Note For dish/tray development with continuous agitation, reduce these times by 15%.

PROCESSING AT DIFFERENT TEMPERATURES

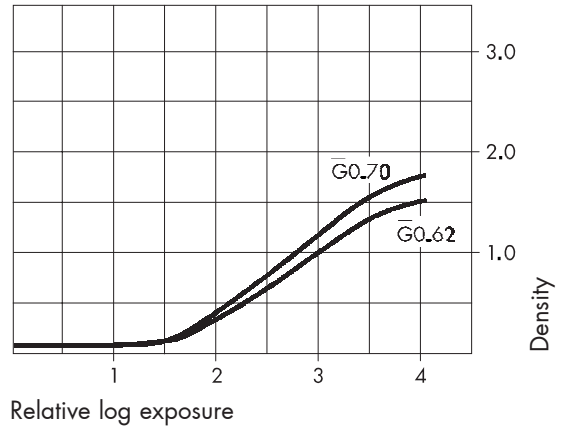
ORTHO Plus copy film can be processed over a range of temperatures. Development times at temperatures other than 20°C/68°F may be calculated from the chart below.

For example, if 4 minutes at 20°C/68°F is recommended, the time at 23°C/73°F will be 3 minutes and the time at 16°C/61°F will be 6 minutes.



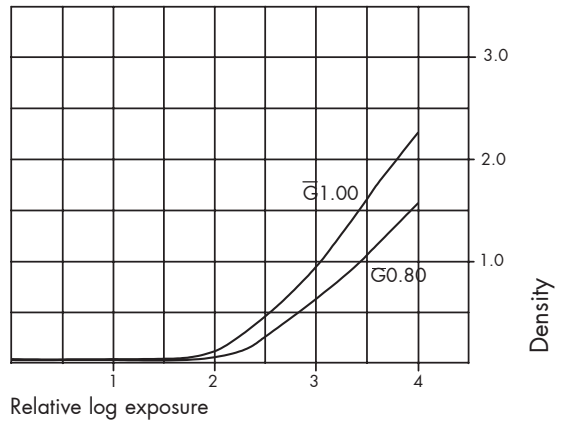
CHARACTERISTIC CURVES

Pictorial contrast



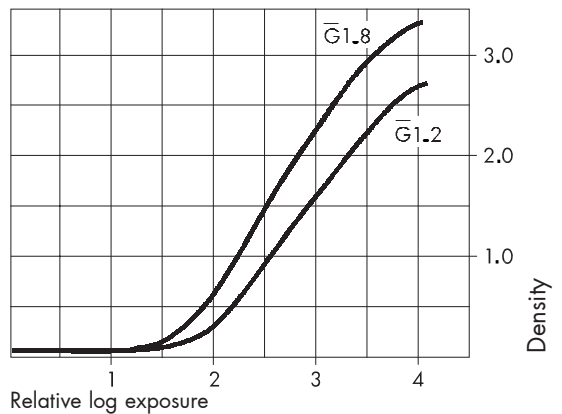
ORTHO Plus copy film developed in ILFORD ID-11 (stock) for 8 minutes and 10 minutes at 20°C/68°F with intermittent agitation.

Intermediate contrast



ORTHO Plus copy film developed in ILFORD PQ UNIVERSAL (1+9) for 4 minutes and 12 minutes, at 20°C/68°F with intermittent agitation.

High Contrast



ORTHO Plus copy film developed in ILFORD PHENISOL (1+4) for 3 minutes and 10 minutes, at 20°C/68°F with intermittent agitation.

PROCESSING

ORTHO Plus copy film can be processed in all types of processing equipment including rotary processors, dishes/trays, deep tanks and automatic processors. Standard capacity figures and replenishment rates can be maintained.

Safelight recommendations

Use an ILFORD 906 (dark red) safelight illuminated by a 15 watt bulb. As a precaution against fogging and hence reduced image contrast, a minimum distance of 1.2 m/4ft between the safelight and the working area is recommended. For best results, keep safelight exposure to a minimum.

Agitation

Intermittent agitation is recommended for use in deep tanks. Continuous agitation is recommended in dishes/trays by rocking the dish/tray. 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)	15 x 120.3x25.4cm (8x10in)	22 x 20.3x25.4cm (8x10in)

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)	24 x 20.3x25.4cm (8x10in)	24 x 20.3x25.4cm (8x10in)

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.

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 3–6mls 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

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

Storage

Store ORTHO Plus copy film in a cool (10–20°C/50–68°F), dry place in its original packaging.

Exposed film

As with any film, once exposed, process ORTHO Plus copy film as soon as possible. Images on exposed but unprocessed film will not degrade during normal working periods, that is, up to one month 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 or paper (pH 6.5–7.5) 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.