FACT SHEET

PERCEPTOL, ID-11 AND MICROPHEN FILM DEVELOPERS

POWDER DEVELOPERS FOR LOW VOLUME BLACK AND WHITE FILM PROCESSING IN SPIRAL TANKS, DEEP TANKS, DISHES/TRAYS AND ROTARY PROCESSORS WITHOUT REPLENISHMENT

ILFORD PERCEPTOL, ID-11 and MICROPHEN powder developers have been formulated to exploit the full potential of conventional black and white film emulsions in all formats. These developers enable ILFORD and other films to be developed to optimise their individual speed and quality and show consistency in performance throughout their long working lives.

PERCEPTOL is an extra fine grain film developer which gives excellent image quality. It is designed for use when very fine grain negatives are required and a decrease in film speed is not important. It has been specially formulated to get optimum results from high resolution lenses. It exploits the superb grain structure of ILFORD medium and slow speed films, 100DELTA PROFESSIONAL, FP4 Plus and PAN F Plus, and produces significantly finer grain in ILFORD fast films, DELTA 400 PROFESSIONAL, HP5 Plus and DELTA 3200 PROFESSIONAL, compared with a standard fine grain developer.

PERCEPTOL produces excellent results with any lens/film combination and is therefore ideal when texture and definition are critical - negatives developed in PERCEPTOL are capable of producing sharper and better quality enlargements that those produced using a standard fine grain developer.

ILFORD ID-11 is a fine grain film developer for all general film processing requirements where fine grain negatives are required without loss of emulsion speed. ID-11 developer is recognised internationally as a standard in many fields of scientific and technical photography.

ID-11 produces excellent results with all films and is ideal where a wide range of films and film speeds have been used. ID-11 ensures the best balance of fine grain, sharpness and tonal rendition producing negatives which allow a high degree of enlargement.

ILFORD MICROPHEN is a fine grain film developer which gives an effective increase in film speed. A speed increase of up to half a stop can be achieved with most films but with faster films such as HP5 Plus, Delta 400 Professional and Delta 3200 Professional it is more. Many developers that give an increase in film speed usually produce a corresponding increase in grain size, MICROPHEN is formulated to overcome this disadvantage, the low alkalinity of the developer reduces grain size and grain clumping. Therefore MICROPHEN is said to have a high speed/grain ratio, i.e. it gives a speed increase while retaining much of the grain characteristics associated with fine grain developers.

MICROPHEN is particularly useful when using extended development times to push process fast films such as HP5 Plus, Delta 400 Professional, Delta 3200 Professional and SFX200.

Mixing instructions

Note Photographic chemicals are not hazardous when used correctly. It is recommended that gloves, eye protection and an apron or overall are worn when handling and mixing all chemicals. Always follow the specific health and safety recommendations on the chemical packaging. Photochemical material safety data sheets containing full details for the safe handling, disposal and transportation of ILFORD chemicals are available from ILFORD agents or directly from the ILFORD web site at **www.ilford.com**.

Preparing stock developer

PERCEPTOL, ID-11 and MICROPHEN packs contain two parts, A and B, all are prepared for use by using the same method. Always make up the developer stock solution to the volume stated on the pack, do not attempt to prepare smaller solution quantities by using fractional parts of each powder, however larger stock solution quantities can be prepared by using multiples of whole packs.

To prepare stock developer, dissolve the contents of part A (the smaller bag) in about three-quarters of the total solution volume (see carton) of warm water at about 40°C/104°F. Stir until most of the part A powder has dissolved, continue to stir while gradually adding the contents of Part B (the larger bag). Keep stirring until no more powder dissolves. (**NB** it is normal for a few grains of powder to remain un-dissolved.) Add cold water to make up to the final volume (see carton) and stir. Allow to cool to room temperature, nominally 20°C/68°F, the developer is then ready to use.

As most water drawn from pressure mains is highly aerated, we advise that users draw off the water they need and leave it to stand for a few minutes before using it to make up developers.

Preparing working strength developer solutions

These developers can either be used as the stock solutions or diluted further with water to make 1+1 or 1+3 solutions for "one-shot" processing. Prepare 1+1 and 1+3 solutions from the stock solution directly before they are needed and stir them thoroughly before use.

pH and specific gravity

The following table gives the pH and specific gravity (SG) for fresh solutions of PERCEPTOL, ID-11 and MICROPHEN developers. These figures were obtained under carefully controlled laboratory conditions and may differ slightly from measurements made by users in their own working areas. Users should make their own control measurements from their own accurately mixed fresh solutions for later comparison. Ideally a pH meter should be used to measure solution pH but if one is not available pH measurement sticks can be used. These are available in various pH ranges and those covering a range from pH 7 to pH 10 are sufficient. SG can be measured by using a hydrometer and one covering the range from 1.000 to 1.200 is useful for a wide range of photographic process solutions.

Developer	dilution	pH	SG at 20°C
PERCEPTOL	stock	7.68–7.82	1.110
	1+1		1.058
	1+3		1.028
ID-11	stock	8.60–8.70	1.090
	1+1		1.047
	1+3		1.022
MICROPHEN	stock	8.67–8.93	1.095
	1+1		1.050
	1+3		1.024

PROCESS SYSTEM

Manual processing

Spiral tanks

PERCEPTOL, ID-11 and MICROPHEN can all be used to process films in spiral tanks using either stock or diluted solutions 1+1 and 1+3. The recommended developing temperature is 20°C (68°F). They can be used in the temperature range of 20–24°C (68–75°F) but the recommended development times must be reduced if higher temperatures are used. Care must be taken with the choice of dilution and temperature as very short development times with some films may lead to uneven processing

Before starting to process prepare the appropriate volume of all the required process solutions according to tank size and number of films to be processed together. The solution volume must be enough to cover all the spirals used. Check the temperature of all the process solutions and adjust them to be +/- 1°C (2°F) of the temperature being used.

Add the developer to the processing tank. Tap the tank firmly on the work bench to dislodge any air bubbles which may be trapped in the processing spiral.

The following agitation is recommended for spiral tank processing with ILFORD chemicals. Invert the tank four times during the first 10 seconds. Repeat these four inversions during the first 10 seconds of each subsequent minute of development. At the end of each agitation sequence tap the tank firmly on the work bench to dislodge any air bubbles which may be trapped in the processing spiral. This method of agitation should also be used with the fixer.

Drain off the developer 10 seconds before the end of the development time immediately fill the tank with the next process solution.

Dish (Tray) processing (Sheet film only)

PERCEPTOL, ID-11 and MICROPHEN stock solutions can all be used to process sheet film formats in dishes /trays at the recommended temperature of 20°C (68°F) +/- 1°C (2°F). Higher temperatures are not recommended as the development times may become too short and lead to uneven processing.

Before starting to process prepare the require volume of all the process solutions according to dish/tray size used and number of films to be processed. The solution volume must be enough to cover the sheet film completely during processing. Check the temperatures of all the process solutions and adjust them to be +/- 1°C (2°F) of the temperature being used.

When dish/tray processing continuous agitation is used, immerse the film completely in the developer and gently rock the dish from side to side taking care to avoid any spillage. This method of agitation is used for all subsequent processing steps. Continuous agitation reduces the recommended development times by about 15%.

Remove the film from the dish (tray) 10 seconds before the end of the development time and allow developer to drain from its surface before placing it in the stop bath.

Deep tank processing

PERCEPTOL, ID-11 and MICROPHEN stock solutions can be used in deep tanks at the recommended process temperature of 20°C (68°F). They can be used in the temperature range of 20–24°C (68–75°F) but the development times must be reduced if a higher temperature is used. Care must be taken with the choice of dilution and temperature as very short development times may lead to uneven processing.

Check the temperatures of all the process solutions and adjust them to be +/- 1°C (2°F) of the temperature being used.

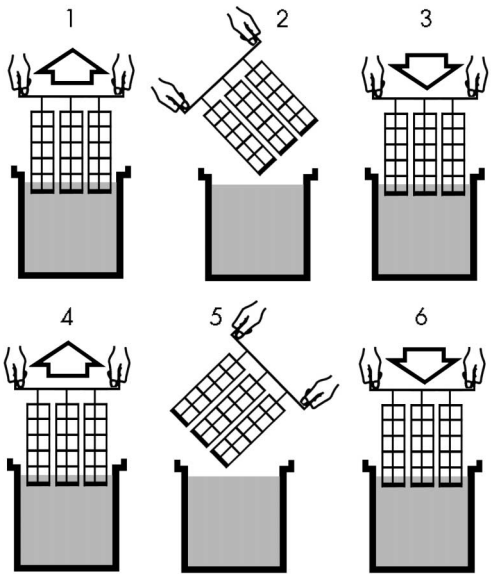
Manual agitation for deep tanks

The following method of manual agitation is recommended with PERCEPTOL, ID-11 and MICROPHEN in deep tanks. Lower the processing rack into the tank and tap the rack on the edges of the tank to remove any air bubbles. Lift the rack out of the solution and return it immediately. Tap the rack again on the edge of the tank.

At the end of each minute, lift the rack out of the solution, tilt it to one side and return it to the tank. Repeat this another two times, alternating the direction of the tilt. Tap the rack on the edge of the tank after the three lifts.

The same agitation technique should be used with the other process solutions.

Ten seconds before the end of each processing step lift the rack out of the solution and drain for the remainder of the time.



Alternatively gas agitation can be used but it is not recommended when processing films on spirals. If gas burst agitation is in use then nitrogen must be used to agitate the developer whereas air can be used for the stop bath, fixer and wash. Do not use air to agitate the developer solution. To set up gas burst agitation follow the equipment manufacturer's instructions, if none are given then as a starting point set the gas pressure to 0.3–0.9 bar (5–14 psi) and the agitation cycle to 2 seconds gas on 8 seconds gas off.

Alternatively a lower rate of agitation can be used of one gas burst every other second for eleven seconds in each minute but development times may need to be adjusted.

Care must be taken when using gas agitation as uneven processing may result with some equipment. Do not load the films to closely together as this will reduce the effect of the solutions agitation.

The same amount of agitation but with air can be used for the other process solutions.

Gas agitation of wetting agent solutions is not recommended as excessive foaming will occur.

MACHINE PROCESSING

Rotary tube processors

Rotary tube processors have very similar processing conditions to spiral tank processing by hand, except they process with small amounts of solution using continuous agitation and can be pre-programmed. PERCEPTOL, ID-11 and MICROPHEN can all be used to process films in rotary processors using either stock or diluted solutions 1+1 and 1+3 at 20°C (68°F).

Follow any guidance given by the processor manufacturer when adjusting process times for these types of processors. However, generally we do not recommend using a pre-rinse as it can lead to uneven development.

Without using a pre-rinse the given development times will need to be reduced by around 15% to compensate for the continuous agitation.

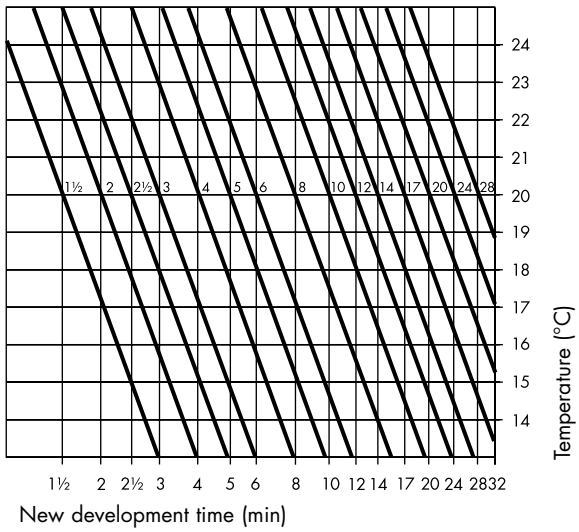
DEVELOPMENT TIMES

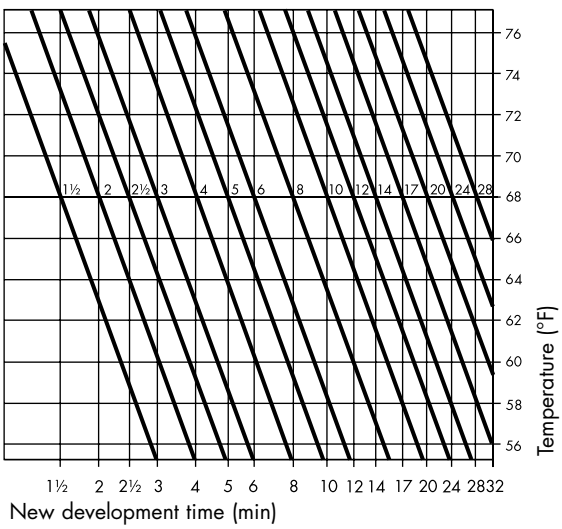
The table of development times given here gives an appropriate starting point for PERCEPTOL, ID-11 and MICROPHEN when general purpose black and white camera films are being developed.

The development times are for films rated at an appropriate EI rating for each developer and should produce negatives of normal contrast, typically around a Gbar of 0.62. However they are only a guide and may need to be adjusted to suit individual processing systems, working practices and preferences. Higher or lower contrast negatives may be preferred by some to suit their individual requirements, adjust the recommended development times until the desired contrast level is obtained.

PERCEPTOL, ID-11 and MICROPHEN can be used in the temperature range of 20–24°C (68–75°F). For processing at other temperatures increase the given development times by 10% for each 1°C (2°F) drop in temperature and decrease the given development times by 10% for each 1°C (2°F) rise in temperature. Alternatively use the time temperature graphs below.

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.





ILFORD films

Temperature 20°C/68°F
Time in minutes

Developer		PERCEPTOL			ID-11			MICROPHEN		
Dilution		stock	1+1	1+3	stock	1+1	1+3	stock	1+1	1+3
	Meter setting									
100 DELTA PROFESSIONAL	EI 50/18	12	13	16	7	10	15	–	–	–
	EI 100/21	15	17	22	8.30	11	20	6.30	10	14
	EI 200/24	–	–	–	10.30	13	—	8	14	20
DELTA 400 PROFESSIONAL	EI 200/24	10	12.30	18.30	7	10	18	5	8.30	16
	EI 250/25	12	–	–	–	–	–	–	–	–
	EI 320/26	–	15.30	–	–	—	–	–	–	–
	EI 400/27	–	–	–	9.30	14	–	6.30	11.30	–
	EI 500/28	–	–	–	–	–	–	7.30	13.30	–
	EI 800/30	–	–	–	11.30	17.30	–	8.30	15.30	–
	EI 1600/33	–	–	–	14.30	–	–	10.30	19	–
	EI 3200/36	–	–	–	19	–	–	14		–
DELTA 3200 PROFESSIONAL	EI 400/27	11	–	–	7	–	–	6	–	–
	EI 800/30	13	–	–	8	–	–	7	–	–
	EI 1600/33	15	–	–	9.30	–	–	8	–	–
	EI 3200/36	18	–	–	10.30	–	–	9	–	–
	EI 6400 /39	–	–	–	13	–	–	12	–	–
	EI 12500/42	–	–	–	17	–	–	16.30	–	–
	EI 25000/45	–	–	–	–	–	–	17.30	–	–
PANF Plus	EI 25/15	9	10.30	15	6.30	8.30	14	4.30	6	11
	EI 50/18	14	15	17	6.30	8.30	15	4.30	6	11
FP4 Plus	EI 50/18	9	13	17	6.30	8	10	–	–	–
	EI 125/22	12	15	21	8.30	11	15	8	10	14
	EI 200 /24	–	–	–	10	15	–	9	14	18
HP5 Plus	EI 400/27	11	15	25	7.30	13	20	6.30	12	23
	EI 800/30	–	–	–	10.30	16.30	–	8	15	–
	EI 1600/33	–	–	–	14	–	–	11	–	–
	EI 3200/36	–	–	–	–	–	–	16	–	–
SFX 200	EI 200/24	14.3	20	–	10	17	–	8.30	15.30	–
	EI 400/28	–	–	–	14	–	–	10.30	19	–
	EI 800/30	–	–	–	18	–	–	14.30	–	–
ORTHO PLUS Pictorial Contrast	EI 80/20 Daylight									
	Normal	–	–	–	8	10.30	16	9	11.30	13.30
	High	–	–	–	10	13	20	12	14.30	17
	EI 40/17 Tungsten									
	Normal	–	–	–	8	10.3	16	9	11.3	13.3
	High	–	–	–	10	13	20	12	14.3	17

Non-ILFORD films

Temperature 20°C/68°F
Time in minutes

Developer		PERCEPTOL			ID-11			MICROPHEN		
Dilution		stock	1+1	1+3	stock	1+1	1+3	stock	1+1	1+3
	Meter setting									
Kodak Tmax 100	EI 100/21	12	13	19	8	11	16	8	11	16
	EI 200/24	–	–	–	–	–	–	–	–	–
Kodak Tmax 400	EI 400/27	11	12	17	7	10	15	7	10	15
	EI 800/30	–	–	–	9.30	–	–	–	–	–
	EI 1600/33	–	–	–	12	–	–	–	–	–
	EI 3200/36	–	–	–	15	–	–	–	–	–
	EI 6400/39	–	–	–	18	–	–	–	–	–
Kodak Tmax 3200	EI 400/27	–	–	–	–	–	–	–	–	–
	EI 800/30	–	–	–	–	–	–	–	–	–
	EI 1600/33	–	–	–	11	–	–	9	–	–
	EI 3200/36	–	–	–	14	–	–	12	–	–
	EI 6400/39	–	–	–	–	–	–	14	–	–
Kodak Plus X	EI 64/19	8	8.30	12	–	–	–	–	–	–
	EI 125/22	–	–	–	7	8	13	–	–	–
	EI 200/24	–	–	–	–	–	–	6	8.30	13.30
Kodak Tri X	EI 200/24	10	12	15	–	–	–	–	–	–
	EI 400/27	–	–	–	7.30	11	19	–	–	–
	EI 500/30	–	–	–	–	–	–	6	11	22
	EI 800/30	–	–	–	–	–	–	–	–	–
	EI 1600/33	–	–	–	12	–	–	–	–	–
Agfa APX 100	EI 50/18	9	–	–	–	–	–	–	–	–
	EI 100/21	–	–	–	9	13.30	–	–	–	–
	EI 200/24	–	–	–	–	–	–	9	–	–
Agfa APX 400	EI 320/27	14	17	24	–	–	–	–	–	–
	EI 400/27	–	–	–	10	14.30	25	–	–	–
Fuji 100 Acros	EI 100/21	12.30	–	–	6.45	–	–	–	–	–
Fuji Neopan 400	EI 400/27	10	14	20	7.30	9.30	15	4.30	6.45	9
	EI 800/30	–	—	–	8.45	–	–	5.45	–	–
	EI 1600/33	–	–	–	13.30	–	–	8.30	–	–
	EI 3200/36	–	–	–	–	–	–	–	–	–
Fuji Neopan 1600	EI 400/27	–	–	—	–	–	—	–	–	–
	EI 800/30	–	–	–	4.3	–	–	–	–	–
	EI 1600/33	–	–	–	6.3	10	15	3.15	–	–
	EI 3200/36	–	–	–	–	–	–	5.45	–	–

The development times for other manufacturers' films are a general guide. The specification of these products may have changed over time and as a result these development times may need to be adjusted. If necessary the given times should be adjusted to give the result required.

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

When using "one-shot" processing in small spiral tanks a water rinse can substitute for a stop bath. After development 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). When deep 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 (135–36)	22 (135–36)

The process time given for the stop bath 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 ILFORD RAPID FIXER and ILFORD HYPAM liquid fixers and ILFORD ILFOFIX II powder fixer, are non-hardening fixers.

ILFORD Fixer	ILFORD HYPAM & ILFORD RAPID FIXER	ILFORD ILFOFIX II
Dilution	1+4	stock
Temperature range	18–24°C (65–75°F)	18–24°C (65–75°F)
Time (mins) at 20°C (68°F)	2–5	4–8
Capacity films/litre (unreplenished)	24 (135–36)	24 (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 ILFORD ILFOTOL wetting agent is recommended as it helps films to dry 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.

REUSING DEVELOPER WITHOUT REPLENISHMENT

ID-11, MICROPHEN and PERCEPTOL stock developers can be used in spiral tanks or deep tanks without replenishment to process either a number of films individually or multiple films in batches.

The table below gives the number of 135/36 or 120 roll films a litre of stock PERCEPTOL, ID-11 and MICROPHEN can process provided that the developer is reused.

Stock	films/litre
PERCEPTOL	4
ID-11	10
MICROPHEN	10

As each film or batch of films is processed it releases halides and other by-products into the developer that act as a restrainer on the development of subsequent films. For this reason development times will need some adjustment after each successive film or batch of films. To calculate the adjustment a tally must be kept of the number of films processed in the developer solution.

If a series of individual films is being developed in a spiral tank using 1 litre of stock ID-11 or MICROPHEN or PERCEPTOL, compensate for the loss of developer activity after developing the first film by increasing the development time 10% for each successive film, (see table below). This

method of time adjustment relies on the used developer, (250 -300ml for one film), being poured back into the stock bottle and mixed with the fresh unused part of the developer before processing the next film. When using spiral tanks this helps to give more consistent results by reducing the risks of problems due to solution losses and the restraining effect of the by-products.

ID-11/MICROPHEN

1litre ztock	N	N+ 10%	N+ 20%	N+ 30%	N+ 40%	N+ 90%
	1	2	3	4	5	10

N = standard development time

PERCEPTOL

1litre ztock	N	N+ 10%	N+ 20%	N+ 30%	N+ 40%	N+ 90%
	1	2	3	4	nr	nr

nr = not recommended

When larger quantities of developer are in use either for spiral processing or in deep tanks increase the number of films that can be processed proportionally with the volume of stock developer, e.g. if 5 litres of stock ID-11 are being used then increase the development times by 10% after processing every batch of 5 films. The following table shows for some common tank sizes the number of films that can be processed before each 10% increase in development time.

ID-11/MICROPHEN

tank volume litres	N	N+ 10%	N+ 20%	N+ 30%	N+ 40%	N+ 90%
5	1–5	6–10	11–15	16–20	21–25	46–50
13.5	1–13	14–27	28–40	41–54	55–68	122–135
25	1–25	26–50	51–75	76–100	101–125	230–250

N = standard development time

PERCEPTOL

tank volume litres	N	N+ 10%	N+ 20%	N+ 30%	N+ 40%	N+ 90%
5	1–5	6–10	11–15	16–20	nr	nr
13.5	1–13	14–27	28–40	41–54	nr	nr
25	1–25	26–50	51–75	76–100	nr	nr

N = standard development time
nr = not recommended

Reusing stock developer solutions can make more economical use of them but it is not without its drawbacks particularly when small volumes are being used. More inconsistencies will be seen by reusing a developer than by using a fresh developer solution on each occasion. The time compensation can only be an approximation to cover a range of circumstances such as film and negative types, solution losses and its age, etc. For example, if your negatives are night shots which will be relatively clear when developed then little of the developing agents will have been used in processing them. At the other extreme if the negatives are well blackened after development because they are of beach scenes in bright sunlight then more developing agent will have been used.

Overall reusing developer lowers image quality slightly and increases the risk of physical damage. As the developer oxidises with reuse and storage, the risk of contamination is increased, precipitates may be formed and tiny particles of emulsion from the films processed previously may be held in suspension. In addition there is also a risk of miss counting the number of films that have been processed by a batch of developer.

"One-shot" processing using stock or 1+1 or 1+3 developers eliminates or greatly reduces these problems. One–shot processing is recommended when image quality, reliability and consistancy are more important than economy.

We do not recommend reusing diluted developers, 1+1 and 1+3, always use fresh solutions on each occasion.

We do not recommend push processing using reused developers.

WORKING SOLUTION LIFE

PERCEPTOL, ID-11 and MICROPHEN stock solutions should last for up to:-

6 months in full capped containers
1 month in a half full tightly capped container.
4 months in a deep tank with a floating lid.
1 month in a deep tank without a floating lid.

PERCEPTOL, ID-11 and MICROPHEN diluted 1+1 or 1+3 should not be kept for more than 24 hours.

STORAGE

Always store chemicals in their original packaging and away from unsupervised children and pets.

Unopened packets of PERCEPTOL, ID-11 and MICROPHEN powder stored in cool and dry conditions, 4–20°C (44–68°F), will keep indefinitely. Once opened prepare stock solutions immediately.

AVAILABILITY

PERCEPTOL is available in cartons of 1 litre.

ID-11 is available in cartons of 1, 2.5, 5, 10 and 13.5 litres.

MICROPHEN is available in cartons of 1, 2.5 and 10 litres.

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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