FACT SHEET

HARMAN WARMTONE & HARMAN COOLTONE PAPER DEVELOPERS

DEVELOPERS FOR THE DISH/TRAY PROCESSING OF BLACK AND WHITE PHOTOGRAPHIC PAPERS TO PRODUCE WARMER AND COOLER IMAGE TONES

HARMAN WARMTONE DEVELOPER

WARMTONE DEVELOPER is a liquid concentrate hydroquinone developer suitable for the dish/tray developing of all black and white photographic papers both resin coated (RC) and traditional fibre based (FB). It is used at a dilution of 1+9. WARMTONE developer is clean working, has excellent keeping properties and gives a warmer image tone to most papers. WARMTONE developer is designed for use at ambient room temperatures, nominally 20°C/68°F. We do not recommend its use for high temperature or machine processing applications. It is not suitable for developing films.

HARMAN COOLTONE DEVELOPER

COOLTONE DEVELOPER is a liquid concentrate dimezone s/hydroquinone developer suitable for the dish/tray developing of all RC and FB black and white photographic papers. Used at a dilution of 1+9 it is clean working, has excellent keeping properties and it gives a colder image tone to most papers.COOLTONE developer is designed for use at ambient room temperatures, nominally 20°C/68°F. We do not recommend its use for high temperature or machine processing applications. It is not suitable for developing films.

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 Photo chemicals are available from ILFORD Photo agents or directly from the ILFORD Photo web site at **www.ilfordphoto.com**.

Preparing WARMTONE and COOLTONE developer

WARMTONE and COOLTONE liquid concentrates are mixed with water for use at a dilution of 1+9.

Prepare the working strength solutions of WARMTONE and COOLTONE developers directly before they are needed. Determine the amount of solution needed for the processing session, making sure that it is a least enough to fill the developing dish/tray to a depth of about half full. Measure out the appropriate amount of concentrate using the smallest measuring cylinder appropriate to the liquid volume: it is easier and more accurate to measure 100ml of solution in a 100ml cylinder than a 1000 ml cylinder.

Add the concentrate to the mixing vessel. A large measuring jug is a good mixing vessel as it provides a check on the total quantity of solution mixed. Using an appropriately sized measuring cylinder, measure out the required dilution water using hot and cold water to get to the solution's working temperature, 20°C/68°F. Rinse out the measuring cylinder used for the concentrate into the mixing vessel using some of the dilution water. Finally, add the remainder of the dilution water to make up to the final working volume and stir the solution thoroughly. 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.

Thoroughly wash all utensils, measuring and mixing vessels after use. Do not contaminate developer solutions with either stop bath or fixer solutions.

pH and specific gravity

The following table gives the pH and specific gravity (SG) for fresh solutions of WARMTONE and COOLTONE 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 9 to pH 11 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
COOLTONE	1+9	10.45–10.55	1.022
WARMTONE	1+4	10.48– 10.58	1.045

Dish/tray processing

WARMTONE and COOLTONE working strength developer solutions should be used in a dish/tray at the ambient room temperature. The recommended developing temperature is 20°C (68°F) +/– 1°C (2°F). Slightly lower temperatures can be used but development would need to be extended slightly. Slightly higher temperatures can also be used but development times would need to be reduced. These developers are not designed for high temperature processing. High temperatures will reduce the effective solution life considerably and may give very short development times that can lead to uneven processing being seen.

Before starting to process, prepare the required volume of all the process solutions according to dish/tray size used and number of sheets of paper to be processed. The solution volume should be enough to fill the processing dish/tray to a depth of about half full, it must be enough to cover the paper 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 intermittent agitation is used. For a single sheet immerse the paper 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.

When developing multiple sheets of paper at once, intermittent agitation is given by interleaving them. To interleave paper, slip the sheets into the solution one at a time, emulsion side down. When all the sheets are in the solution, pull the sheet from the bottom and place it on the top of the pile of sheets in the dish/tray. Continue this process of

moving the bottom sheet to the top until the process time is complete. Use this method of agitation for all subsequent processing steps.

The number of sheets that can be interleaved at one time is up to the individual, however do take care as too many sheets with too little agitation can lead to uneven processing. FB papers are more difficult to interleave than the waterproof RC based papers that remain rigid when wet. The traditional FB papers absorb far more liquid than RC ones and when they are wet they go rather limp and without careful handling they are more prone to damage.

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

Development times
RC paper*

ILFORD developer	Dilution	°C/°F	Time (min) Recommended	Range
WARMTONE	1+9	20/68	2	1½ - 3
COOLTONE	1+9	20/68	2	1½ - 3
COOLTONE with MULTIGRADE RC COOLTONE**	1+9	20/68	4	3½ - 6

*Except MULTIGRADE RC COOLTONE paper.
**Compared to other RC papers MULTIGRADE RC Cooltone is slow to develop. To obtain the coolest tones full development is required - see the MULTIGRADE RC Cooltone fact sheet.

For most RC papers that have been correctly exposed, the image will begin to appear between 20 and 35 seconds with these developers depending on the paper. For MULTIGRADE RC Cooltone and COOLTONE developer the induction time is noticably longer and the image will start to appear around 40 to 50 seconds.

FB paper

ILFORD developer	Dilution	°C/°F	Time (min) Recommended	Range
WARMTONE	1+9	20/68	3	2½–5
COOLTONE	1+9	20/68	3	2½–5

On correctly exposed prints, the image will begin to appear after 35 seconds with these developers. Development may be extended to 6 minutes without any noticeable change in contrast or fog.

To maintain print to print consistency when batch processing a large number of prints, it may be advantageous to reduce exposure slightly and extend development.

Developer capacities
The following table gives the developing capacity of 1 litre of working strength developer *

ILFORD developer	Dilution	20·3x25·4cm (8x10 inch) RC paper*	20·3x25·4cm (8x10 inch) FB paper
WARMTONE	1+9	60	35
COOLTONE	1+9	70**	40

*Except MULTIGRADE RC Cooltone paper.
**For MULTIGRADE RC Cooltone, the developer capacity of COOLTONE developer is 40 sheets of paper, 20.3 x 25.4 cm (8 x 10 in.).

Stop

ILFORD stop bath	Dilution	°C/°F	Time (sec)
ILFOSTOP	1+19	18–24/64–75	10
ILFOSTOP PRO	1+19	18–24/64–75	10

After development we recommend an acid stop bath is used such as ILFORD ILFOSTOP (with indicator dye) or ILFOSTOP PRO (without indicator dye). Using 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.The process time given is the minimum required. If neccessary, 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 and ILFORD HYPAM liquid fixers and ILFORD ILFOFIX II powder fixer. All are non-hardening fixers.

ILFORD non-hardening FIXER	Dilution	°C/°F	FB time (min)	RC time (min)
Liquids				
ILFORD RAPID	1+4	18–24/64–75	1	½
FIXER	1+9	18–24/64–75	2	1
HYPAM	1+4	18–24/64–75	1	½
	1+9	18–24/64–75	2	1
Powder				
ILFOFIX II	stock	18–24/64–75	3	2

Washing

Washing RC paper

Fresh, running water	°C/°F	Time (min)
	Above 5/41	120

When it is important to obtain a print in the shortest possible time, vigorously wash ILFORD resin coated papers for 30 seconds in running water.

Prolonged immersion in water can cause edge penetration and print curl with resin coated papers: for this reason, avoid wet times longer than 15 minutes.

Washing FB paper

Fresh, running water	°C/°F	Time (min)
	Above 5/41	60

Do not wash ILFORD papers with some non-ILFORD papers which 'yellow' on prolonged washing, because this can cause the papers to have a bloom or haze over the black areas on the prints.

A washing aid is not needed when conventionally processing fibre base papers, but its use does reduce the final wash times, thus saving time and water. If a hardening fixer has been used, a washing aid is recommended as hardened prints take longer to wash. When using ILFORD WASHAID, wash prints for at least 5 minutes in running water before placing them in the WASHAID bath. After the WASHAID bath wash prints in running water for at least another 5 minutes before drying.

Washing aid

ILFORD washing aid	Dilution	°C/°F	Time (min)
ILFORD WASHAID	1+4	18–24/64–75	10

Working solution life

Working strength WARMTONE and COOLTONE developer left in an open dish should not be kept for more than one working day. If stored in a tightly capped bottle they may last up to 24 hours.

Storage

Full unopened bottles of WARMTONE and COOLTONE developer concentrates stored in cool conditions, 5–20°C, (41–68°F), will keep for 2 years. Once opened use the concentrate completely within six months and keep all bottles tightly sealed until used.

Availability and capacity

WARMTONE and COOLTONE developers are available in 1 litre bottles of liquid concentrate.

A 1 litre bottle of WARMTONE developer makes enough working strength solution at 1+9 to process 600 20.3x25.4cm (8x10in) sheets (30m^2) of RC paper or 350 20.3x25.4cm (8x10in) sheets (18m^2) of FB paper.

A 1 litre bottle of COOLTONE developer makes enough working strength solution at 1+9 to process 700 20.3x25.4cm (8x10in) sheets (36m^2) of RC paper (except MULTIGRADE RC Cooltone), or 400 20.3x25.4cm (8x10in) sheets (20m^2) of FB paper. For Multigrade RC Cooltone the capacity is also 400 20.3x25.4 (8x10in) sheets of paper.

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