



Exposing and processing Bluefire™ Police film

Image Characteristics

Bluefire Police is an ultra-high resolution panchromatic black and white film. It is insensitive to infra-red.

Its grain is so fine that it does not degrade image detail even at extremes of enlargement.

This makes it an ideal film for surveillance at a distance with a telephoto lens, where positive identification of structures or individuals requires extreme enlargement of small portions of the negative. This was the film's original commercial purpose.

But it also records a full 21-step gray scale and makes lovely, full-scale pictorial images when processed in Bluefire HR developer.

With its clear base it can be reversal processed, to make black and white slides.

Its images have a "biting clarity" that comes from the combination of clear base, sub-microscopic grain, and high acutance (sharp microscopic image edges).

Exposure

Bluefire Police is of a type of film for which there are no ANSI or ISO speed rating standards. For that reason, EI (Exposure Index) ratings are specified. For practical purposes, an IE speed is the same as an ASA or ANSI speed. For example, an exposure meter set to ASA 80 will give the correct exposure for an EI 80 film.

Bluefire Police should be exposed at EI 80 for pictorial purposes, and developed in Bluefire HR developer. This is the minimum exposure that gives excellent prints on standard No. 2 grade enlarging paper.

Expose it carefully, $\pm 1/3$ stop, for good shadow and highlight detail.

It should be exposed at EI 100 when used as a high-contrast microfilm or technical film and processed in Bluefire Micro or Kodak D-19.

It can be processed for pictorial images in specialized developers such as POTA, Formulary TD-3, Clayton Ultra, Spur Nanospeed and Docuspeed, and Labor Partner Docufine LC and HC. However, film speed may be reduced.

Resolution of image detail

Films lose sharpness because of internal reflections during exposure, which expose unwanted grains (“halation”).

Bluefire Police has a magenta light-absorbing layer between its base and light-sensitive emulsion. This layer (which washes out during processing) absorbs light which has traveled through the emulsion and would otherwise reflect back.

It is also coated extremely thinly, and its emulsion contains only grains of cubic shape, uniformly sized, which minimizes the amount of light that reflects from exposed grains to nearby, non-image grains.

As a result, Bluefire Police can resolve more than 800 line pairs per millimeter under laboratory conditions, when processed as a high contrast microfilm.

The use of 35mm camera equipment, and processing for pictorial contrast, lowers resolution.

Nonetheless, the Bluefire Police film and Bluefire HR developer combination is capable of extreme enlargement. A properly exposed and processed 35mm Bluefire Police negative can be enlarged to as much as 100x without losing image detail to grain.

Even the best camera and enlarger lenses have much less resolving power than this film. The practical maximum enlargement is generally no more than about 40x because of lens resolution losses. Enlarging a 35mm negative to 40x gives a print of about 3 by 4.5 feet (1m x 1.5m).

When enlarged to extremes, shadows and highlights that are pure black or white on normal sized prints will reveal considerable detail. This is because the detail is there, in the negative, but is too small to be visible on a normal sized print. As a result, a negative created for normal printing may not have solid blacks and whites when greatly enlarged. Images intended for extreme enlargement should be exposed with that in mind.

Processing:

All films, including Bluefire Police, should be processed promptly after exposure. Exposure initiates chemical reactions which degrade the latent image over as little as a few weeks. Films that cannot be processed within a month can be preserved by refrigeration or freezing in moisture-proof containers such as Zip-Loc type bags.

Maintain uniform temperatures in all solutions throughout the processing cycle, including washing.

Use any ordinary developing equipment, stainless steel or plastic.

You will have the most consistent results using a tank large enough to hold your film plus at least one empty spiral reel on top. The empty space above your film allows good solution flow during agitation.

Note: Bluefire Police film has a magenta anti-halation undercoat that washes out during processing. It will color your stop bath and fixer, and you will probably see it in your wash water. It has no effect and can be ignored.

Bluefire Police has a very thin emulsion, and it fixes, washes, and dries in less time than ordinary films.

Development: Develop in Bluefire HR developer for 12 to 16 minutes at 20° to 21° (68° to 70° F). Time varies with agitation.

Continuous agitation, for 12 minutes — Agitate gently and continuously. You can ensure uniformity from roll to roll by using a mechanical processor, such as those made by Jobo. Yields good contrast and gradation, shadow and highlight detail is excellent.

Intermittent agitation, for 14 minutes — Agitate 5 seconds every 30 seconds after an initial 30 seconds of gentle agitation. Do not rotate or invert the tank. Instead, shake the tank straight up and down without rotation. Agitate carefully to minimize risk of streaking or mottling. Yields less contrast and better highlight detail than continuous agitation.

Compensating agitation, for 16 minutes — Use intermittent agitation (as above) for three minutes, then a five-second up-down shake every three minutes for the remaining time. Inexact technique can produce streaks or mottling in areas of solid light tone, such as skies or skin. Yields the lowest contrast and best gradation, with excellent shadow and highlight detail.

Stop bath: Use any ordinary acid stop bath, or plain water.

Fixer: Bluefire Police is generally fully fixed in as little as 90 seconds with ordinary ammonium thiosulfate rapid fixers. It is good practice to test a scrap of film in your fixer in daylight, so you can time how long it takes to clear. Fixing will be complete in 1.5 times as long as the clearing time.

Wash: Water conservation is of concern, so the following method is recommended:

Fill the tank with fresh water. Agitate gently. After 30 seconds, drain the water. Fill again and agitate continuously for 30 seconds. Then drain.

Repeat six more times, with or without agitation, so your film has been in eight changes of water over the course of about six to eight minutes total cycle time.

Dry: Rinse the film in a wetting agent according to the manufacturer's directions. Hang it vertically to dry undisturbed at room temperature in a dust-free place. Do not wipe or touch the wet emulsion layer. Do not use forced air or heat.

Bluefire Photo Science