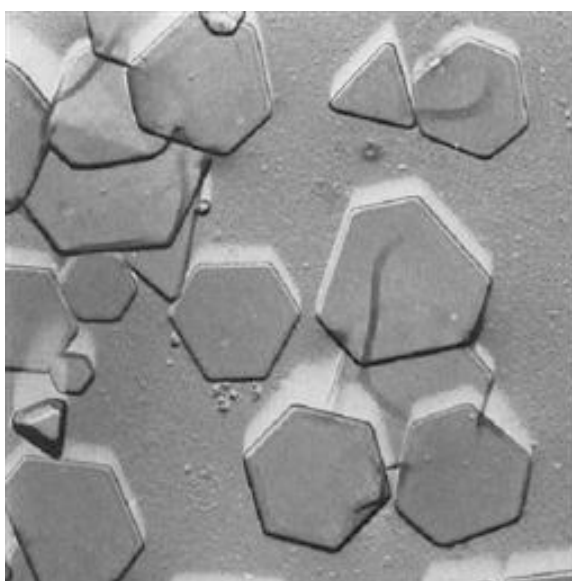


‘STANDARD’ FILM

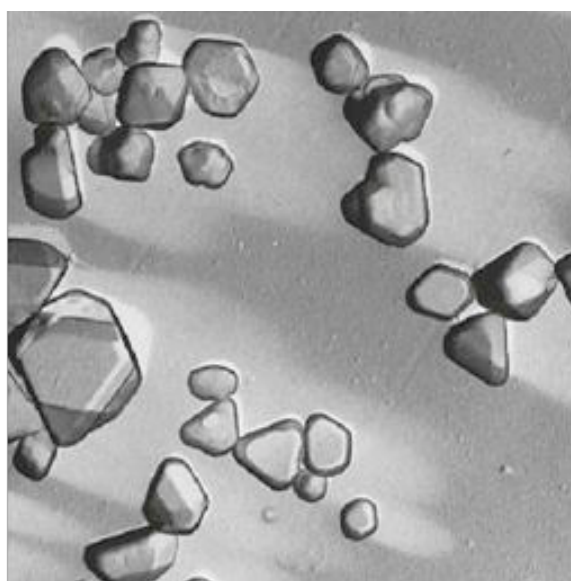
FAST EMULSION FILMS

ISO 400 speed film has become the general purpose film of today. What is considered normal in today's film market was considered fast a few decades ago. This emulsion has grain large enough to respond to light quickly without being too large to lose clarity and definition.

Many manufacturers make an ISO 400 speed film. The big manufacturers, Ilford and Kodak, make two types of ISO 400 film, regular and tabular grained film. The former has a more organic shaped grain while the latter is a flattened grain with a larger surface area that absorbs more light with the same amount of silver. Regular grain film is usually printed with a condenser enlarger that give better definition, while the tabular grained films are usually printed with a diffusion enlarger that tend to reduce the pattern created by the regularly-shaped flattened grain.



tabular grain



regular grain

Other manufacturers make ISO400 speed film, including AGFA, Arista (from Freestyle), Bergger, Foma, Kentmere, and Rollei. Foma also make an ISO320 film called RetroPan 320 Soft.

SLOWER EMULSION FILMS

ISO 200 films are available that are one stop slightly slower than ISO400. Manufacturers making ISO200 speed films include Arista (from Freestyle), Foma, and Rollei. Ilford also makes an ISO200 film called SFX that is a 'Special Effects' film in that it has a higher essentiality to red.

ALTERNATIVE FILMS

SLOW EMULSION FILMS

ISO 125/100/ 80 are slower emulsion films have a smaller, finer grain structure, which reacts more slowly to light yet renders greater detail.

Manufacturers making ISO100 speed film include Adox, AGFA, Arista (from Freestyle), Foma, Fuji, Kentmere, and Rollie. Ilford makes the only ISO125 film called FP4+. Rollei make an ISO80 film called Retro 80s that has extended red sensitivity, described below.

aesthetic considerations:

- smaller grain provides enhanced detail.

- images will have less contrast.

 - these films are great for images which have a lot of texture and definition.

- slower film speed means shots require more light

 - either open up your aperture or slow down your shutter speed

 - i.e. you will be taking shots at slower shutter speeds,

 - you will probably need a tripod or some other way to stabilize the camera.

VERY SLOW EMULSION FILMS

ISO 50/ 25/ 20 are very slow emulsion very fine grain films. These render the greatest amount of detail of any film.

AGFA and Ilford only are the only manufacturers making ISO50 film. Rollei makes RPX25 and CMS II 20. These films require special developers that are readily available.

aesthetic considerations:

- extremely small grain provides even more enhanced detail.

- images will have a long tonal range.

- a tripod will probably be needed to stabilize the camera.

VERY FAST EMULSION FILMS

ISO3200 films are very fast emulsion films have larger grain structure allowing an even faster reaction to light. There is only one brand left in this category, unfortunately, Ilford Delta 3200.

aesthetic considerations:

- these films are designed to give reasonably good negatives in low light situations

 - or shots where you need both deep depth of field and a fast shutter speed.

- the grain is much more apparent in an enlarged print.

- images will have considerably more contrast.

 - some people like the stylistic look of chunky grain and high contrast.

 - if this is your goal you may prefer to push process ASA400 film rather than use these films.

EXPERIMENT!

EXPANSION and COMPRESSION

BASIC EXPOSURE

Expose for the shadows when reading the meter on an SLR camera. The density of the shadow areas of film cannot be changed very much through development. It is important to get just the right amount of light hitting the film in the shadows. This means setting the exposure according to the tone of the subject in the shadows areas. The best way to judge exposure is to meter the darkest shadows of the scene with detail. The meter will tell how to make this area render middle grey. Underexpose 2 stops below the meter recommendation. This will render the shadow area dark grey as it should appear.

TONAL RANGE

The highlights, however, can be adjusted considerably through development. The tonal range of the subject must be determined. This is done by **taking a meter reading of the darkest shadows and then the brightest highlight**. The difference is the tonal range in 'stops'. Typical film has a range of 9 or 10 stops. If the tonal range of the subject is significantly greater than this or considerably less, the density of the highlights must be altered by over or under developing the film.

EXPANSION

The tonal range of film can be expanded by overdevelopment. The amount of extra time to develop varies with the type of film and the brand of developer.

In general:

Overdeveloping by an extra 10% will add an extra stop of tonality, up to 3 stops.

COMPRESSION

Similarly, the tonal range of film can be compressed by underdevelopment. The adjustment again varies with the type of film and the brand of developer.

In general:

Underdeveloping by an extra 5% will reduce an extra stop of tonality, up to 3 stops.

DEVELOPMENT ADJUSTMENT

A general working model would be to mark every roll of film with the tonal range of most pictures, designating a range of either **very flat, flat, normal, hot, very hot**.

Then adjust the developing time in increments of **-10%, -5%, 0, +10%, +20%**.

note: These values are just starting recommendations. If you really want to know how much your film will change, a series of exposure tests should be made. See the book "*Zone System for 35mm Photographers*" by Carson Graves for a more detailed explanation of these controls.

EXPOSURE VARIATIONS

Some people routinely shoot Kodak Tri-X or Ilford HP5+ ISO400 speed films at ISO200 or even ISO100 with little or no change in development time. It depends on the visual effect one is trying to achieve. The Kodak will look more extreme while the Ilford will try to remain consistent.

ALTERNATIVE DEVELOPMENT - PUSH PROCESSING

Under-exposure and Over-development

It is possible to deliberately under-expose your film and then compensate by over-developing it.

The result is **negatives with high contrast, fat grain and no shadow detail.**

The effect is dramatic, but can be gimmicky if not properly considered.

What actually happens is the film does not really receive the amount of light necessary to render a properly exposed negative. Thus there will be no details in the shadow areas. When the film is over-developed the grains of silver that have been struck by light will be greatly enlarged, making the highlight areas of the negative appear relatively normal.

Some people like this look and use it deliberately. Some people, such as dance photographers, use this technique because there is never enough light, always too much movement and deep depth of field is needed to get all the dancers in focus. Through time, however, so many dance photographers have used this technique that up-and-coming dancers now ask specifically for "contrasty, grainy photographs" like the professionals have.

ASA 400 film can be pushed 1 stop to EI 800 or 2 stops to EI 1600. A 3 stop push to EI 3200 is possible but not recommended. Developing times are increased by 50% per stop using normal developer:

ISO 400 film			
pushed to:	800	1600	3200
developed at:	+50%	+100% (double)	+150 ~ 200%

ISO 3200 film		
pushed to:	6400	12800
developed at:	+50%	+100% (double)

Higher concentration dilutions of developer can be used if you do not want to develop film for hours. The higher dilution yields excessive grain and little or no shadow detail. Use something other than Sprint Standard Film Developer to do this, however.

High-energy developers such as Ilford Microphen, Acufine, Diafine or ACU-I are better for 'creative development'. These will give you a higher film speed without even pushing the film. They will also produce better pushed negatives (necessary if you want to go the ASA 3200 route).

ALTERNATIVE DEVELOPMENT - PULL PROCESSING

Over-exposure and Under-development

Although not a term used by the photo world in general, "pull" processing seems an applicable tag for the technique that is the opposite of Pull Processing, i.e. deliberately over-exposing film and then compensating by under-developing.

The result is **negatives with lower contrast, smaller grain and bright highlights.**

What actually happens in this situation is too much light hits the film and the highlights get over saturated. Yet when the film is under-developed the grains of silver remain small and do not overlap, which keeps the highlight areas from blocking up. At the same time the film renders more subtle gradations in the tones near the shadow end of the negative.

This technique will produce brilliant highlights, allowing you to print the rest of the picture darker while maintaining white whites.

ASA 400 film can be "pulled" 2 stops to EI 100. Developing time can then be reduced by about 20%, which doesn't sound like much but will suffice.

ISO 400 film			
pulled to:	200	100	50
developed at:	-10%	-20%	-30 ~ 50%

ISO 100 film		
pulled to:	50	25
developed at:	-10%	-20%

Many people say that film can be pulled by at least 1 stop without any change in development. Try this first. If the film comes out too dense or the highlights block up, then reduce the developing time by 20%. If this comes out too thin, you can extrapolate just how much to change it in between these two, based on the previous attempts.

In both Pushing and Pulling, Ilford films will try to make the best negatives they can. Kodak films will vary more. If you want cleaner negs, use Ilford. If you like more dramatic photos Kodak will go crazier. The other film that works very well when pulled is Fuji Neopan Acros, now only available at ISO 100.

SPECIALITY FILMS

Special films are films that respond to light differently than normal Panchromatic Film.

Panchromatic Films

Most modern films are Panchromatic, meaning that they are sensitive to all colors of light. (pan = across all; chroma = color). These films have a spectral response that is close to what the eye perceives, ranging from 390 - 710nm. These films can be made to even more closely match the eye's response by using a yellow (8) filter.

Extended Red Sensitivity Films

These special films extend their sensitivity into the red end of the spectrum. Where most panchromatic films drop off at 620 - 680nm, these films extend out to around 775 - 780nm.

Rollei Retro 400S, Ilford SFX 200, Rollei Retro 80S

Any filter from yellow (8), that will add a nominal amount of contrast, through orange (21), to a normal red (25a), will add successively more contrast and darken the sky. Using a very deep red filter (89b) with an Extended Red film can render skies very dark, and green vegetation that reflect a lot of heat (infra-red radiation) will be rendered almost white.

Infrared Films

True infra-red films extend even further into the red end of the spectrum. These are almost always used with a red to dark red filter to limit the amount of visible light hitting the film to intensify the appearance of the heat radiating surfaces (e.g. foliage).

Rollei Infrared 400

Orthochromatic Films

Orthochromatic films go in the other direction. They are highly sensitive to blue with a lower sensitivity to orange. This film is almost completely insensitive to red, and begins dropping off at wavelengths longer than 580 nm that is in the yellow to orange range.

Rollei Ortho 25

Orthopanchromatic Films

These films have increased blue sensitivity with reduced red sensitivity, dropping off around 640nm.

Adox CHS 100 II, Fuji Neopan Acros 100, Adox CMS II 20 High Resolution Film

INFRA-RED FILM

The spectrum of visible light covers from low frequency red through yellow, green, and blue and up to high frequency violet light. Panchromatic film, which most B&W film is, responds to all of these frequencies of light. (pan = all, chroma = color) Infra-red film, however, is also sensitive to frequencies of red light that are even lower than those our eyes can see. (infra = below) These frequencies are more associated with heat generation than light reflection. Organic materials such as trees and skin will appear lighter than normal film and inorganic materials such as water and sky will register darker. Buildings also tend to reflect a high amount of infra-red radiation.

AESTHETICS

There have been large numbers of infra-red photographs made of nice landscapes and pleasant portraits, and these have become clichés. The point is that if the technique is stronger than the content of the photo, you have lost. Most of these typical photos are merely surface and were not interesting to begin with. And if an image is not interesting to start, no technical trick will help you. So let form support content and make intriguing photographs that use the infra-red look as a secondary device that enhances the image already being made.

FILM CHARACTERISTICS

Both Kodak and Konica make infra-red films, HIE 135-36 and 750nm respectively. The Konica film draws its name from its peak spectral sensitivity of 750 nm which is the center of the infra-red wavelength band. The images from these films tend to be grainy and contrasty. There is a significant loss in shadow detail while the highlights tend to glow. The result is a somewhat surreal or dreamlike look. The Konica film has been said to be, "so bad that it is cool". But this film is new on the market and this page will surely read differently next year after we have more experience with it.

FILTERS

The infra-red effect can be altered by filtering out varying degrees of visible light coming from the subject. Yellow, orange, and red filters remove successively more light. Even when used with conventional film these filters create more contrast and tend to darken the sky. <see Filters page> When used with infra-red film they shift the balance between the visible and low frequency light. A number 15 orange filter renders some shadow detail and reasonable contrast by passing a small amount of the blue-green bands of the spectrum. A 25A red filter is most often used because it produces a very dramatic effect while still letting some visible light to enter the camera. A 29 red filter is even darker. It is also possible to use a 87C dark red filter which blocks out all visible light. It is impossible to see through this opaque filter to compose your picture. This may pose a problem or can be seen as an interesting challenge.

INFRA-RED FILM, cont'd.

EXPOSURE

Kodak rates their film at ASA 50. Konica rates theirs at ASA 32. In reality there is no good way to use a meter for these films since meters are designed to measure light in the visible spectrum only. The exposure is made mostly by the heat that is generated by your subject. Infra-red film tends to wash out in the highlights. If you have broad areas of whites or organic material in bright sun, expose for the highlights. Exposures change not only according to the season but by the time of day you are shooting. The infra-red light in the sky changes hourly! A more pronounced effect will occur on a bright sunny day than on one that is overcast because there is more infra-red radiation present. Proper use comes from experimenting and becoming used to the way your chosen subject responds to specific atmospheric conditions.

One general suggestion is to find what you want to photograph and then shoot a roll bracketing at least two stops up and down from what you think will be correct. Then you can zero in on the correct exposure values for that situation and you can re-shoot more film with less bracketing. Another approach is to make one exposure for the highlights. Then average this exposure with a reading of the shadows and shoot again at this new rating. Inside the carton is a table of suggested exposures according to lighting conditions these are also good starting points for experimental exposures.

FOCUSING

Infra-red lightwaves are considerably longer than those of visible light and they focus at a different location in your camera. It is necessary to first focus normally then shift the focus manually by taking the number of feet or meters you are focused on and shifting your lens so that number lines up with the small red dot on the barrel of the lens. The image may look out of focus to your eye but the film will respond correctly.

STORAGE

It is best to purchase infra-red film from a store that keeps the film refrigerated at below 55°F/ 13°C or below. It is also recommended that you refrigerate it at home until about an hour or so before being shot. If there will be a significant time between when you shoot and when you process the film, the film should go back into the fridge for this period.

LOADING

Due to the extreme length of the infra-red light, the felt edge of the film cassette will not keep the light from entering the cassette and fogging the film. Kodak recommends that its infra-red film be loaded into the camera in total darkness. Konica claims that this is not so much a problem with their emulsion.

ORTHOCHROMATIC FILM

Orthochromatic films go the other way from infra-red film in that they are only sensitive to the violet, blue and green end of the spectrum. They are not sensitive to the red end. This film, then, can be handled under safelights just as photo printing paper.

LITHOGRAPHY

Ortho film is most often used in the printing business to produce plates for offset lithography, and therefore is quite often known as Litho film. A lithographic printing press can only print a solid color of ink. Shades of ink are produced by printing many small dots of varying sizes very close to each other, giving the illusion of grey tones. When processed in special chemistry (KODALITH A & B developers) the litho film develops as pure black or pure clear. When the film is used to shoot text and graphic design work and these images are called line shots.

When photographic images are reproduced the negatives are shot through dot screens which break an image up into small dots. These images are called screened shots. The number of dots per inch determines the resolution of a printed image. The daily newspapers use 50 line screens while fine art publications use 150 to 200 line screens.

CONTINUOUS TONE

When litho film is processed in a standard developer, however, one can get continuous tone images. The result is still very grainy and contrasty. There are other orthochromatic sheet films which will give you very high quality negatives, holding the fine grain resolution of your original negatives. Kodak fine grain positive film 7302 is available in 8" x 10" sheets. Be careful when working in the darkroom because the safelights are not as dark a red as these films want them to be. Close the wings of the safelights. Don't leave your film exposed too long or get too close to the safelights.

SHEET FILM

The negatives being discussed above are the same size as the printed page will be, which means we are talking about sheet film being handled much the way you are used to handling photo paper. The value of this is that you can print enlargements from your 35mm negatives onto pieces of sheet film and then do things to alter these film images, either chemically, such as solarization, or physically, such as draw into or scratch them.

PRINTING

The first image you make will be a film positive, much like regular print, only on film instead of paper. You will then have to make a contact print to of this image to get a negative, from which you can then contact print onto paper to get your final image. This gives you two chances to alter the image. Realize that marks made on a negative image will look considerably different than those made on a positive.

MASKS

It is possible to mask of parts of an image with material called Rubylith, which is a layer of clear plastic coated with a layer of red. The red layer can be cut away by slicing it lightly with a razor or x-acto blade and then peeling away the undesired parts. The clear plastic will then hold the red pieces in position and it can be aligned with an enlarged image to allow only certain parts of the image to print through. Any opaque material put onto mylar or clear acetate can be used as a mask just as easily. Text can be produced with rubylith or by putting Press-Type onto sheets of clear mylar to burn writing into or mask writing out of a photographic image. The difference is whether the majority of the mask is black with clear "holes", or clear with black areas.

REDUCTION

Farmer's reducer, named for Howard Farmer, its inventor, can be used to lighten or reduce the density of overexposed or overdeveloped negatives. It is also possible to use this process to reduce a print after it has been fixed. This is basically a LAST RESORT PROCESS!

Reducer turns the silver in the emulsion into a compound that is soluble in fixer. You must be careful to not go too far, as you cannot reverse the process. Light grey areas are particularly vulnerable. It is easier to use burning and dodging to achieve the desired tonalities when printing, but sometimes, like when solarizing, you do not have the kind of control you need, then reducing comes in handy.

Overall Print or Negative Reduction presoak the image in water

<u>immerse</u>	the image in a tray of Reducer for 30 seconds to 1 minute
<u>remove</u>	the image before it is as light as you want
<u>transfer</u>	the image quickly into a tray of running water
<u>repeat</u>	the procedure if image is not reduced enough
<u>rinse</u>	images until yellow stains are removed
<u>Fix</u>	as usual
<u>Fixer-Remover</u>	as usual
<u>Final wash</u>	images as usual

Localized Print Reduction

<u>presoak</u>	the print in water
<u>dry</u>	the print surface with a sponge
<u>apply reducer</u>	to the print with Q tip or cotton wad
<u>flood</u>	the print with water before the result is obvious
<u>repeat</u>	this process three or four times, or until the results are satisfactory
<u>rinse</u>	prints until yellow stains are removed
<u>Fix</u>	as usual
<u>Hypo-Clear</u>	as usual
<u>Final wash</u>	prints as usual

CHEMICAL RECIPES

REDUCER:

Stock Solution A

water	500 ml	16 oz
Potassium Ferricyanide	37.5 gm	2 Tbs + 1 tsp

Stock Solution B

warm water	2 liters	2 qt
Sodium Thiosulfate	480 gm	26 Tbs

Fix (non-hardening)

water	860 m	127.5 oz
Fix A (from brown cube)	125 m	14 oz

Working Solution - mix fresh solution for each use then discard
add 30 ml of Solution A to 120ml of Solution B or Non-Hardening Fix
add 850 ml of water to make 1 liter of working solution
stir thoroughly!

use more water for slower action on prints
use less water for faster action on negatives

Bleach

water to start with	750 ml	24 oz
Potassium Ferricyanide	3 gm	1 tsp
add water to make	1 l it	32 oz

FARMER'S REDUCER: from: Phil Davis

Stock Solution A

water	100 ml
Potassium Ferricyanide	4 gm

Stock Solution B

warm water	300 ml
Sodium Thiosulfate	60 gm

Working Solution - mix fresh solution for each use then discard

add 1 part Solution A to 16 parts water; then
add 3 parts Solution B and stir thoroughly!

use more water for slower action on prints
use more water for faster action on negatives

PERMANGANATE BLEACH: Stock Solution A

warm water	200 ml
Potassium Permanganate	1 gm

Stock Solution B

water	200 ml
Hydrochloric acid (concentrate)	20ml

this acid is extremely corrosive and dangerous even when diluted

Working Solution - mix fresh solution for each use

mix equal parts Solution A and Solution B
use 2 or more parts water for milder action

INTENSIFICATION

It is possible to increase the density of underexposed or underdeveloped negatives using a chromium intensifier. This is also a LAST RESORT PROCESS! It is not recommended that you use either reduction or intensification as a regular part of your photo processing. There are much easier and more controllable ways to get the same effects. Although careful documented experimentation may yield a desirable result that can be repeated.

The results of this process resemble the appearance of push processing for several reasons. Since it involves building up a metal such as chromium onto the silver that already exists on the emulsion, it alters the highlights greatly. Where there is little silver in the shadow areas, there is little change in the image. The build up also creates an increase in the size of the grain. The net result of all of this is increased contrast.

Negatives that need intensification must be processed in hardening fixer, which is the standard in the photo lab. Negatives must also be properly fixed or they will stain.

PROCEDURE

<u>presoak</u>	_____	the negative in water
<u>immerse</u>	_____	3 to 5 min. in Intensifier (part A) with constant agitation
		the image will turn to a pale yellow stain
<u>rinse</u>	_____	1 min. in running water
<u>soak</u>	_____	2 min. in Clearing Bath (part B) with constant agitation
		the stain will clear
<u>rinse</u>	_____	1 min. in running water
<u>Redevelop</u>	_____	in dilute Print Developer, until it looks good to you
<u>Stop</u>	_____	in Stop Bath
<u>wash</u>	_____	as usual, Fixing is not necessary

This process may be repeated if the image is not satisfactorily intensified.

note: It is also possible to bathe your prints in **Selenium Toner**. This will enlarge the silver crystals in the grain somewhat. It will also protect the film, make it resistant to oxidation, making it even more archival.