

Mees Photography - Technical notes

How I develop black and white film

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Abstract

Here is how I develop my black and white films. Methods for 135, 120 and sheet film are all described. For roll film I use a Paterson developing tank. For sheet film I use an ancient rectangular developing tank which is probably not made anymore.

1 Used chemicals

The development method and all development times are based on the use of **Ilford ID-11** or **Kodak D-76** developer, which are basically the same.

The stop bath is made of **citric acid**. To make the stock solution simply dissolve 100 grams of citric acid in 1 liter of water.

I am not picky when it comes to fixer. In the past I used **Amaloco X89 Extrafix**, recently I am using **Ilford Rapid Fixer**. All available film fixers from reputable sources will do.

All working solutions are one shot. Which means I only use them once.

Do not pour the used chemicals down the drain. They may be harmful for the environment. Besides, the fixer contains silver, which is a valuable element which can be recycled.

1.1 Developer (1+1)

Rolls	Film size	Developer (ml)	Water (ml)	Total (ml)
1	135	150	150	300
2	135	300	300	600
1	120	250	250	500

1.2 Stop bath (1+19)

Rolls	Film size	Stop (ml)	Water (ml)	Total (ml)
1	135	15	285	300
2	135	30	570	600
1	120	25	475	500

1.3 Fixer (1+4)

Rolls	Film size	Fix (ml)	Water (ml)	Total (ml)
1	135	60	240	300
2	135	120	480	600
1	120	100	400	500

2 Process

All chemicals should be heated to 20 degrees Celsius. I use a Jobo temperature controlled water bath for this purpose.

2.1 Develop

- Pour the developer in the tank
- Inverse the tank 5 times
- Tap the tank gently on a hard surface to get rid off any air bubbles on the film
- Put tank in water bath
- Inverse the tank 5 times every first 10 seconds of every minute and tap
- Develop for the appropriate time (see table below)
- Pour out the developer and discard

2.2 Stop

- Pour the stop bath in the tank
- Inverse the tank 5 times
- Tap the tank gently on a hard surface to get rid off any air bubbles on the film
- Put tank in water bath
- After 30 seconds inverse the tank 5 times and tap
- Put tank in water bath and wait another 30 seconds
- Pour out the stop bath and discard

2.3 Fix

- Pour the fix in the tank
- Inverse the tank 5 times
- Tap the tank gently on a hard surface to get rid off any air bubbles on the film
- Put tank in water bath
- Inverse the tank 5 times every first 10 seconds of every minute and tap
- Fix for 5 minutes
- Pour out the fix and discard

2.4 Wash

- Fill the tank with clean water of about 20 degrees Celsius
- Inverse the tank 5 times
- Pour out the water and discard
- Fill the tank with clean water of about 20 degrees Celsius
- Inverse the tank 10 times
- Pour out the water and discard
- Fill the tank with clean water of about 20 degrees Celsius
- Inverse the tank 20 times
- Pour out the water and discard
- Fill the tank with clean water of about 20 degrees Celsius
- Inverse the tank 20 times
- Pour out the water and discard
- Fill the tank with clean water of about 20 degrees Celsius and add 2ml wetting agent
- Inverse the tank 2 times
- Pour out the water and discard

2.5 Dry

Unspool the film from the tank and hang it to dry. Place 2 clothespin on the end of the film to stop it curling. Under the clothespin and film clamp, the film can still be wet. Make sure the film is thoroughly dry before storing it.

3 Developing times for various films

Film stock	ISO	Time (min)
Ilford Pan F Plus 50	50	8.5
Ilford FP4 Plus 125	125	11
Ilford HP5 Plus 400	320	13
Ilford HP5 Plus 400	800	16.5
Ilford HP5 Plus 400	100	15

4 Ilford Delta 3200 in XTOL

In order to achieve the box speed of 3200 my default D-76 developer is not suitable. Instead, I use Kodak XTOL or Adox XT-3, which are the same. Both at stock solution at 20 degrees Celsius. The developing process is the same as with D-76. I shoot the film on ISO 3200 and develop it as ISO 6400.

Film stock	ISO	Time (min)
Ilford Delta 3200	3200	10