

# Basic B&W Film Developing Guide

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This guide is an introduction to film developers. A lot of experimentation is possible, and the different results can be very noticeable. When starting out, it's best to stick with common 400-speed films and common developers, because the more widespread something is, the more information is available. **If you don't know where to start, then get Ilford HP5+, and develop with either Kodak D-76, Kodak HC-110 or Sprint Standard.**

Sprint 1+9				
Film	20°C	21°C	22°C	23°C
Fomapan 400	13:00	11:45	10:15	9:30
Ilford HP5+ 400	10:00	9:00	8:00	7:15
Kentmere 400	11:30			
Kodak T-Max 400	11:30	10:15	9:15	8:30
Kodak Tri-X 400	10:00	9:00	8:00	7:15
Kodak TXP 320	8:30	7:45	7:00	6:15

Kodak D-76 1+1				
Film	20°C	21°C	22°C	23°C
Fomapan 400	12:00			
Ilford HP5+ 400	13:00			
Kentmere 400	14:00			
Kodak T-Max 400	12:30	11:00	10:00	9:00
Kodak Tri-X 400	10:00	9:30	9:00	8:00
Kodak TXP 320	9:00			

Kodak HC-110 1+31 Dilution B				
Film	20°C	21°C	22°C	23°C
Fomapan 400	7:00			
Ilford HP5+ 400	5:00			
Kentmere 400	5:30			
Kodak T-Max 400	6:00	5:30	5:00	4:30
Kodak Tri-X 400	3:45	3:30	3:00	2:30
Kodak TXP 320	4:45	4:15	4:00	3:30

## Basic Developing Questions

### What does 1+1, 1+31, etc mean?

- That value represents dilution. It does not represent ratio.
- Example: "Sprint 1:9" means you have 50mL concentrate and 450mL water.
- A high dilution let you save money by using less concentrate; the tradeoff is longer developing times and less contrast.

### What is the correct way to agitate?

When developing film, follow Ilford's method: 2 inversions every 5 seconds (see <https://www.ilfordphoto.com/beginners-guide-processing-film/>).

- If the instructions say "agitate for 10 seconds," then do 4 inversions.
- If the instructions say "agitate for 30 seconds," then do 12 inversions.
- After doing inversions, tap the tank against the table to dislodge any air bubbles.
- Kodak has slightly different rules for agitation.

### When do I start and stop the timer?

- Ilford recommends starting the timer as soon as all chemicals are in the tank.
- Ilford also recommends pouring chemicals out 15 seconds before the timer ends.
- Do not develop anything under 5 minutes. Adjust developer temperature if necessary.

## Basic Developing Steps

Instructions combine Ilford's official method and Bob Laubach's guidance. Consistency is key.

### 1. Prewash

- 60 seconds of water inversions
- Required for 120 film
- Pour out water into drain

### 2. Develop

- Pour chemicals into tank and start timer
- Agitate continuously first 30 seconds (12 inversions)
- Let rest
- At start of each minute, agitate 10 seconds (4 inversions)
- When timer stops, pour chemicals into drain

### 3. Stop Bath

- Pour stop bath into tank
- Timer: 30 seconds, agitate continuously
- Pour down drain

### 4. Fixer

- Pour fixer into tank
- Timer: 5 minutes
- Agitate continuously first 3 minutes (30 inversions per minute)
- Agitate 10s per minute afterwards
- Pour into recycling drain, not regular drain

### 5. Wash

- Open lid, timer 5 minutes
- Fill tank under running water, let sit a few seconds
- Repeat

### 6. Final Rinse

- Optional, recommended
- Timer: 60 seconds
- Fill with wetting agent (e.g., Photo Flo)
- Spin reel a few rotations

## Film Reviews

### ISO 400 films rankings

- 1st place = smoothest linear contrast, not highest contrast
- Prices vary by source

Rank	Dynamic Range	Fine Grain	Contrast	Sharpness	Price
Best	Kodak Tri-X	Kodak T-Max	Kodak T-Max	Kodak T-Max	Foma
2nd	Ilford HP5+	Ilford Delta 400	Ilford Delta 400	Ilford Delta 400	Kentmere
3rd	Kodak T-Max	Kodak Tri-X	Ilford HP5+	Kodak Tri-X	Ilford HP5+
4th	Ilford Delta	Ilford HP5+	Kodak Tri-X	Ilford HP5+	Ilford Delta
5th	Kentmere	Kentmore	Kentmere	Kentmere	Kodak Tri-X
Last	Foma	Foma	Foma	Foma	Kodak T-Max

### ISO 400 Films Summary

Push/Pull allows using a different ISO for lighting: push = higher ISO (e.g., 800), pull = lower ISO (e.g., 200).

## **Arista EDU Ultra 400**

- Not real, relabeled Fomapan 400

## **Foma Fomapan 400**

- 4x5 available
- High contrast, narrow dynamic range, limited push/pull, cheap
- Use only if experienced

## **Ilford Delta 400**

- 4x5 available
- Good dynamic range, small grain, decent push/pull, cheaper than T-Max

## **Ilford HP5+ 400**

- 4x5 available
- Excellent dynamic range and push/pull
- Good for beginners

## **Kentmere Pan 400**

- No 4x5
- Decent dynamic range and push/pull, flimsy base
- Cheaper alternative to HP5+

## **Kodak T-Max**

- 4x5 available
- Technically high quality: smallest grain, best sharpness, best contrast
- More expensive than Tri-X

## **Kodak Tri-X**

- 4x5 available for ISO 320
- Best dynamic range and push/pull
- Comparable to HP5+ but more contrast

## **Useful Links**

- The Massive Dev Chart: <https://www.digitaltruth.com/devchart.php>

# Technical Data Sheets

## Developers

- Agfa Rodinal: [https://www.digitaltruth.com/products/agfa\\_tech/Rodinal\\_Leaflet.pdf](https://www.digitaltruth.com/products/agfa_tech/Rodinal_Leaflet.pdf)
- Ilford Ilfotec DD-X: <https://www.ilfordphoto.com/wp/wp-content/uploads/2019/08/ILFOTEC-DDX-AU.pdf>
- Ilford Perceptol: <https://www.ilfordphoto.com/amfile/file/download/file/1829/product/551/>
- Kodak D-76: <https://business.kodakmoments.com/sites/default/files/files/resources/j78.pdf>
- Kodak XTOL: [https://www.kodakprofessional.com/sites/default/files/wysiwyg/pro/chemistry/J-109\\_Feb\\_2018.pdf](https://www.kodakprofessional.com/sites/default/files/wysiwyg/pro/chemistry/J-109_Feb_2018.pdf)
- Kodak HC-110: <https://www.kodakprofessional.com/sites/default/files/wysiwyg/pro/chemistry/j24.pdf>
- Kodak T-Max 400: <https://www.kodakprofessional.com/sites/default/files/wysiwyg/pro/chemistry/j86.pdf>
- Sprint Standard: [https://static1.squarespace.com/static/5e2f0253df34017bdcf28821/t/5eaf5cff21588550913997/Standard\\_TimeChart.pdf](https://static1.squarespace.com/static/5e2f0253df34017bdcf28821/t/5eaf5cff21588550913997/Standard_TimeChart.pdf)

## Films

- Foma Fomapan 400: <https://www.foma.cz/en/fomapan-400>
- Ilford tables: <https://www.ilfordphoto.com/wp/wp-content/uploads/2017/03/Film-processing-chart.pdf>
- Ilford HP5+: <https://www.ilfordphoto.com/amfile/file/download/file/1953/product/691/>
- Kentmere Pan 400: <https://www.ilfordphoto.com/amfile/file/download/file/1959/product/2136/>
- Kodak T-Max: [https://www.kodakprofessional.com/sites/default/files/wysiwyg/pro/resources/f4043\\_TMax\\_400.pdf](https://www.kodakprofessional.com/sites/default/files/wysiwyg/pro/resources/f4043_TMax_400.pdf)
- Kodak Tri-X: [https://business.kodakmoments.com/sites/default/files/files/resources/f4017\\_TriX.pdf](https://business.kodakmoments.com/sites/default/files/files/resources/f4017_TriX.pdf)