



A Step By Step Guide To The SP-445 Film Processing System

This guide is intended for the novice who has never processed film. However, it is also useful for any old-timers that are new to the SP-445. Obviously, we can't teach you everything there is to know about processing large format film in a five page tutorial but we can get you started on the right path. If you follow the directions, you should end up with a usable negative when you're finished. You can also find our videos online.

To avoid surprises, read through the entire tutorial before starting.

Equipping your darkroom:

Let's start with a checklist of what you'll need to process your film:

1. Hardware

- a. An SP-445 film processing system: tank, film holders, baffles, lid and caps. See the SP-445 user's guide for details. Be sure to read it before continuing.
- b. Beaker – you'll need something to mix the chemicals in, 500 ml is a good size.
- c. Graduated cylinder – you'll need to measure smaller amounts of liquid accurately. A 50 ml cylinder works well.
- d. Thermometer – some people get crazy about thermometers; don't be one of them. Any of the modern digital thermometers should be accurate enough. Even most of the old style dial thermometers are fine. Just use the same one every time and you'll get consistent results.
- e. Funnel – easy to forget about until you're spilling fixer all over the bathroom sink. A cheap plastic funnel will suffice.
- f. Storage bottle – a 500 ml bottle for holding the fixer after you mix it. You'll need another one if you're planning to reuse your developer.
- g. Gloves – not that we're paranoid but nitrile gloves are a good idea. Not only do they protect your skin but they provide a better grip when handling potentially wet objects.
- h. Timer – every smart phone has a timer function, just be sure it works if you're wearing gloves. It's probably worth investing in an inexpensive stand-alone elapsed timer.
- i. hangers/clips – Photo stores sell specially made clips for holding film to dry. However, clothes pins will work in a pinch (ignore the pun). So will those large spring steel paper clips. You'll also need a dust-free place to hang it (that doesn't mind getting dripped on.)

A word of advice: start simple. Don't get carried away buying every gadget you can find for your darkroom. You can always upgrade as you figure out what really works for you.

2. Chemistry:

- a. Developer – We recommend starting with our SP-76EC. It's beginner friendly but flexible enough for advanced experts. More details on our technical page: <https://shop.stearmanpress.com/pages/film-data-foma>

There are at least a hundred published developer formulas. Pick one and stick with it for a while. Same for choosing a film. Frankly, when just starting out, you won't notice that much difference between most of them (film or developer.) After you have more experience, you can start experimenting.

- b. Stop bath – Our Fixer #7, uses water as a stop bath (you can probably get away with tap water for this step.) Other chemistry might require an acid Stop Bath.
 - c. Fixer – again, there are dozens of options. Our Fixer #7 is a non-hardening alkaline rapid fixer. It not only fixes the film faster than traditional fixers but it washes out faster as well. (Editorial comment: most modern films don't need a hardener and by keeping the fixer alkaline, you don't need an acid stop bath.)
 - d. Wash agent – our SP-H2O-FLOW helps the negative dry spot free. There are other options available and many people have good luck with just distilled water.
3. Miscellaneous:
- a. Water – it may seem silly to mention it, but water is actually pretty complicated. Unless you are absolutely certain of your local water quality, buy distilled water! If in doubt, use distilled water for mixing your developer, fix and final rinse. At a buck a gallon (or less), it's cheap insurance.

Do not use artificially softened water, not even for rinse/wash; it can soften the gelatin on the film and cause it to stick to the holders (this will be the subject of another video.)

- b. Darkness – finding *absolute* darkness can be more challenging than you might expect. We have a video series on building your own dark box using cardboard and duct tape: <https://youtu.be/fAXAavTAMbk> It's much easier to handle sheet film in a box than a bag.

Getting setup:

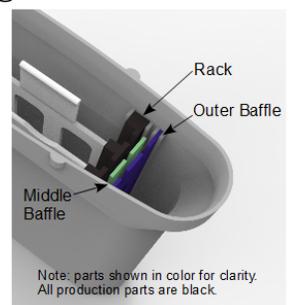
Now, let's make sure everything is ready to go:

1. You'll need several liters of water for wash etc, be sure it's close to 68°F/20°C. You don't want to “shock” the film by dousing it with warm water (it can cause the emulsion to swell.) Tap water will be fine (as long as it's not *softened*) except for the final rinse.
2. Mix up the working solution of fixer. Most fixers come as a concentrated liquid or in powder form; follow the directions. You'll need at least 500 ml. You can reuse it, so keep it in its own bottle.

Loading the tank:

1. Did you read the “getting started” checklist in the user's guide? If not, go read it now.
2. Remove the lid and make sure rack and baffles are correctly installed. Note: the parts are labeled as “Rack”, “Middle Baffle” and “Outer Baffle”; don't swap the Middle and Outer Baffles!
3. Put the film holders in the tank.

You probably need to do the next steps in complete darkness. It's highly advised that you practice with scrap film in the light until you're comfortable with the process.



4. Remove one film holder from the tank and carefully slide a sheet of film into place, emulsion side up. Here's a video: <https://youtu.be/DNSNFY85lqc>

Leave the second film holder in the tank, while loading the film into the first. This prevents you from "cross loading" the first film holder when placing it back in the tank.

5. Repeat for the other side.
6. Slide the film holder into the tank.
7. Load the other film holder and slide it into the tank.
8. Use the locator nubs to align the lid with the tank.
9. Press the lid into place.

Processing the film (finally):

Mixing the developer

- a. Use your 500 ml beaker to measure out 450 ml of water, check that it's at 68°F. Adjust as needed.

If using a different chemistry, you'll need to follow the instructions for that chemistry/film combination. There can be significant differences!

Temperature hacks: We make ice cubes out of distilled water (in a cheap plastic tray). Adding an ice cube to 450ml of water will lower the temperature by about 5°F (pour off the extra once the temperature is stable.)

You can always warm things up in a microwave.

Of course, you'll have to experiment.

- b. Measure out either 32 ml or 50 ml of SP-76EC and add it to the water (see chart below; complete details are on our technical page on our website).

68°F/20°C	Foma 100 Recommended ISO: 50	Foma 200 Recommended ISO: 100	Foma 400 Recommended ISO: 200
ratio (water + developer)	14+1 450+32 ml	14+1 450+32 ml	9+1 450+50 ml
Time (minutes)	8:00	7:00	9:00
Agitation	15 seconds followed by 10 seconds every 30 seconds. (Skip the first 30 second mark.)		15 seconds followed by 10 seconds every 60 seconds.

You want your chemistry at 68°F/20°C but don't get too fanatical about it!

We have a blog post that explains the details:

<https://shop.stearmanpress.com/blogs/news/you-dont-need-a-water-bath-and-other-heresy>

Developing: (This is where the image is actually formed on the film.)

Note that one port on the SP-445 is marked Fill/Drain and the other is marked Vent. Always fill and empty the tank using the Fill/Drain port.

1. Remove both caps.
2. Quickly fill the tank with developer (via the *Fill/Drain* Port.) We like to hold the tank with the "Vent" port slightly higher than the "Fill/drain" port as we add liquid.
3. Start your timer. (Start it at the same step every time, it's important to be consistent.)
4. Tap the tank firmly on the bench to dislodge any air bubbles.
5. Install the *vent* cap. While gently squeezing the tank, (you can see the liquid level in *Fill/Drain* outlet rise a bit), install the *Fill/Drain* cap. Start agitation by inverting the tank, holding it inverted for 1 second, then turning it right side up for 1 second.



Always invert the tank along the "long" side of the tank. (The two caps should always be at approximately the same level.) Inverting on the short axis will allow liquid to flow in/out through the baffles and can cause uneven development.



6. Continue to agitate every 30 or 60 seconds until the time has expired (depending on which film you're using).
7. Remove both caps and empty the tank. We recommend using the developer as a "one shot" to ensure consistent results.

To be completely honest, until you've mastered the exposure calculation, you can probably reuse the working solution of SP-76EC several times. Most beginners won't notice the variation that could result from reusing it. Just keep it in a tightly closed bottle and use it within a day or two of mixing it.

Stop/rinse: (This stops the development and removes any left over developer, to keep it from contaminating the fix.)

1. Fill the tank with water (you can usually get away with tap water for this step), let it soak for 10 seconds and empty it.
2. One fill/drain cycle is probably sufficient, but we like to repeat once or twice just because we're a bit paranoid.

If you're using an acid fixer, you probably need an acid stop bath. Check with your chemistry manufacturer.

Fix: (The step removes the unexposed/undeveloped silver molecules from the film. If not properly fixed, the negative will darken over time.)

1. Fill the tank with 500 ml of fixer.
2. Start your timer.
3. Tap the tank firmly on the bench to dislodge any air bubbles
4. Install the *vent* cap.
5. Gently squeeze the tank (just like before) as you install the *Fill/Drain* cap.
6. Agitate for 10 seconds.
7. Continue to agitate at least for 10 seconds every 30 seconds for 4 minutes.
8. Remove the caps and pour the fixer back into its bottle (you can reuse it multiple times.)

To test fixer, drop a small piece of undeveloped (but exposed) film into a beaker of fixer. It should turn clear in 30-45 seconds. If not, the fixer should be replaced.

Wash: (Now we need to remove all traces of the fixer from the negative or the image will degrade over time.) Again, more details on our blog:

<https://shop.stearmanpress.com/blogs/news/film-washing-myths>

1. Fill with clean water (tap water should be fine), slosh it around a minute and drain. (This gets rid of any fixer trapped in the tank or clinging by surface tension.)
2. Do it again because we're a little paranoid.
3. Now refill, cap the tank and agitate gently for 30 seconds. Drain.
4. Refill, cap and agitate for 60 seconds, then drain.
5. Repeat step <4> two more times.
6. Add a few drops of a wetting agent (our H2O flow is recommended), refill with distilled water (distilled water is free from mineral that can leave waterspots on your film); cap and agitate for 30 seconds. DO NOT DRAIN.
7. Remove the lid, carefully remove the film from the holders while submerged.
8. Hang the film to dry. Depending on your local temperature/humidity, it will take at least several hours.

One more step: find a notebook and write down everything you did. Record the developer used, time, agitation scheme, temperature, etc. You may not appreciate this information right now, but someday you will.

We also like to add a date code or index number in the margin of our negatives with a fine felt tip marker so we can identify them later. Special negative sleeves or protective pages are available to store your negatives.

Summary:

Hopefully, your first attempt at processing large format was a success! Once you gain confidence, both behind your camera and in your darkroom, you can start to explore all the wild possibilities of analog photography.

We'd love for you to share your results in our flickr group: <https://www.flickr.com/groups/sp-445/> or on your favorite social media account.

Send your comments/questions/suggestions to editor@stearmanpress.com

For more information visit:

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