

Black and white film speed is found by testing for the minimum exposure that will produce enough density in the negative to print as a tone just visibly lighter than maximum black. Zone I. You can shoot this test on a roll of film that you plan to develop normally. It only takes six frames.

Making Test Exposures

1. Set up a target, white, gray or any medium color will do. It should be large enough to fill the frame from six feet away. The target should be smooth - wrinkles can cause shadows or uneven brightness.
2. Light the target evenly. Meter readings in the center and at the edges should not vary more than 1/3 of a stop.
3. Set your meter at the film's ISO rating (e.g. 400 for Tri-x). This will be called the **test speed**.
4. Take a reflected meter reading of the target; choose a shutter speed that will allow you to bracket without using the slowest or fastest speeds.
5. Set your camera for manual exposure; any auto-exposure setting will make the test meaningless.
6. Record your exposures as you make them.
7. Make the following exposures
 - a. Meter reading - Zone V
 - b. Blank frame - FB+F film base plus fog
 - c. 5 stops less than the meter reading. (close down the lens, you may need to increase the shutter speed don't forget to put it back at your original setting as soon as possible) - Zone 0
 - d. 4 stops less than the meter reading - Zone I
 - e. 3 stops less than the meter reading - Zone II
 - f. 2 stops less than the meter reading - Zone III
8. Develop the film normally. Using the developer, time temperature you usually use.

Evaluating the test

To get the true film speed you must determine which test exposure produces Zone I. There are two ways to do this: you could make a visual determination by judging prints or you could use a densitometer. The densitometer is more accurate but you need to have access to the equipment.

The Densitometer Method

1. Take a reading of the blank frame (exposure b)
2. Take readings of all other frames; the frame with 0.10 - 0.15 more density than the blank frame (b) is the **speed frame**.

If test frame **c** is the speed frame then your true speed is 2x the test speed.

If test frame **d** is the speed frame then your true speed is equal to the test speed.

If test frame **e** is the speed frame then your true speed is ½ the test speed

If test frame **f** is the speed frame then your true speed is ¼ the test speed

For example: You tested Kodak Tri-x (ISO 400) and your blank frame (b) reads 0.23

Frame c reads 0.23

Frame d reads 0.26

Frame e reads 0.33

Frame f reads 0.41

Your speed frame is **e**; if your test speed is ISO 400 then your true speed or EI (exposure index) is ½ that or 200.

The Visual Method

1. Print a test strip from the blank frame (b)
2. From the test strip choose the shortest exposure that turns the paper maximum black. If your not sure what maximum black looks like compare your test to a piece of paper that has been exposed to white light then developed.
3. Print the rest of the frames from your test (c,d,e,f,) using the exposure time you determined in step 2 which would maximum black in the minimum time.
4. When the prints are dry judge which print is a tone just visibly lighter than max black. That is the speed frame.

For example: You test Kodak Tri-x (ISO 400) and your blank frame (b) prints max black in 5 sec.

At 5 sec frame c is max black

At 5 sec frame d is max black

At 5 sec frame e is just lighter than max black

At 5 sec frame f is almost gray

Your speed frame is **e**; if your test speed is ISO 400 then your true speed or EI (exposure index) is $\frac{1}{2}$ that or 200.

Another variation on the Visual Method is to place your target in a scene with recognizable tones. These tones will help you determine which is the correct exposure.

The Practical Method

This method is not as scientific or accurate as the densitometer tests however it works. You will need a gray card for this method

1. Choose an evenly lit stationary subject.
2. Set your meter at the film's ISO rating (e.g. 400 for Tri-x). This will be called the **test speed**.
3. Take a reflected meter reading of the gray card; choose a shutter speed that will allow you to bracket without using the slowest or fastest speeds.
4. Set your camera for manual exposure; any auto-exposure setting will make the test meaningless.
5. Record your exposures as you make them.
6. Make the following exposures.
 - a. Blank frame - FB+F film base plus fog
 - b. 5 stops less than the meter reading. (close down the lens, you may need to increase the shutter speed don't forget to put it back at your original setting as soon as possible) - Zone 0
 - c. 4 stops less than the meter reading - Zone I
 - d. 3 stops less than the meter reading - Zone II
 - e. 2 stops less than the meter reading - Zone III
 - f. 1 stop less than the meter reading - Zone IV
 - g. Meter reading - Zone V
 - h. 1 more than the meter reading - Zone VI
 - i. 2 more than the meter reading - Zone VII
 - j. 3 more than the meter reading - Zone VIII
 - k. 4 more than the meter reading - Zone IX
 - l. 5 more than the meter reading - Zone X

Develop the film normally. Using the developer, time temperature you usually use.

Evaluating the test

Contact the film for the minimum time it takes to reach maximum black.

Choose the frame with the best detail in both high lights and shadows.

If frame **g** – zone V is correct then your EI is equal to the test speed.

If frame **f** – zone IV is correct then your EI 2x the test speed

If frame **h** – zone VI is correct then your EI half the test speed.

If frame **i** – zone VII is correct then your EI one quarter the test speed.

For example:

You test Tri-x ISO 400 and frame **f** looks best then your EI would be 200. $ISO/2=EI$