KODAK SAFELIGHT FILTERS

In photography, the term "safelight" is used to describe darkroom illumination that does not fog a light-sensitive material under the conditions in which it is normally handled and processed. In this connection, the word "safe" is a relative term; no sensitized photographic material is completely safe from the action of a safelight for an indefinite time. Since photographic materials vary widely in both speed and sensitivity to light of different colors, it follows that the intensity and color of the safelight will also vary, except, of course, in cases where the sensitivity of the material does not permit the use of any safelight.

1. **Safelight filters should be chosen so that the transmitted light lies outside the normal color-sensitivity range of the emulsion.** However, the color sensitivity of an emulsion does not cut off abruptly at a particular point in the spectrum. Most emulsions have some sensitivity to light of other colors that are outside their normal range. Hence the necessity to keep exposure to safelight illumination as short as possible.

2. **Always use the safelight filter recommended for the product, and observe the instructions about bulb wattage and the distance of the fixture from the material.** Heat generated by a bulb of higher wattage than that recommended can damage the filter. On no account use colored bulbs or other improvised safelights. They may appear to be of the proper color, but they usually transmit light that will fog a photographic emulsion.

3. **Change the safelight filters periodically,** and record the date of replacement on a small sticker placed on the filter. If the bulbs are burned for long periods—all day or all night throughout the year, for example—change the filters yearly. Also, change the bulbs at intervals; they discolor or blacken and so give reduced illumination.

KODAK SAFELIGHT FILTERS

Eastman Kodak Company manufactures a range of safelight filters scientifically designed to provide the maximum amount of safe illumination for the products for which they are recommended. See the table below. KODAK Safelight Filters are made in sizes to fit KODAK Darkroom Lamps available from your photo dealer. In most cases, a 15-watt bulb is required; with some materials, however, a 7½-watt bulb only is permitted. **The filter should be placed in the safelight fixture so that the printing can be read by looking at the fixture.**

SAFELIGHTS FOR FILM PROCESSING

Because of their sensitivity to all colors, panchromatic films and plates, both negative and reversal color films, and high-speed infrared materials must be handled in total darkness. A suitable safelight should be available, however, in all darkrooms where such materials are processed. This light is mainly for orientation, and it should not be used for working illumination.

KODAK MATERIAL	*KODAK* SAFELIGHT FILTER	BULB WATTAGE	COLOR
NOTE: Refer to the carton or instruction sheet for complete safelight recommendations.			
Black-and-white contact and duplicating materials, projection films	OA	15	Greenish Yellow
Contact and enlarging papers. TRANSLITE Film 5561.	OC	15	Light Amber
Used for flashing halftones through a KODAK Contact Screen to control contrast	OO	7½ at 6 feet	Light Yellow
Blue-sensitive materials, most phototypesetting materials, KODAGRAPH Projection, and some LINAGRAPH Papers	No. 1	15	Red
Slow orthochromatic materials, KODALITH and KODAGRAPH Orthochromatic Materials, High Resolution Plates	No. 1A	15	Light Red
Fast orthochromatic materials, some green-sensitive x-ray films, EKTALINE Papers, Orthochromatic LINAGRAPH Papers	No. 2	15	Dark Red
Some panchromatic materials	No. 3*	15	Dark Green
INDUSTREX Films and Papers	No. 6B	15	Brown
Some black-and-white infrared materials	No. 7*	15	Green
Some EASTMAN Color Print and Intermediate Films	No. 8	15	Dark Yellow
RESISTO Rapid Pan Paper, VERICOLOR Slide Film 5072, VERICOLOR Print Film 4111	No. 10*	15	Dark Amber
PANALURE, PANALURE Portrait Papers		7½	
For use with KODAK Infrared Scope or similar inspection devices	No. 11	15	†
PANALURE, PANALURE II RC, PANALURE Portrait, and RESISTO Rapid Pan Papers§	No. 13‡	15	Amber
EKTACOLOR 74 RC and 78 Papers		7½	
Intraoral dental x-ray films	Type ML-2	15	Light Orange
Blue-sensitive x-ray films except KODAK SB Films; most green-sensitive medical x-ray films except KODAK CFA, PF, Single-Coated Medical X-ray Film–Green Sensitive, and KODAK PHOTOFLURE Film–Green Sensitive, which require KODAK Safelight Filter No. 2	Type GBX-2	15	—
KODAK SB Film		7½	

*Refer to the product instruction sheets for time limitations on safelight exposure with certain materials.
†Appears opaque but transmits infrared radiation.
‡Refer to product instruction sheet for time limitations on safelight exposure. Because it provides brighter illumination, the No. 13 Safelight Filter is preferable to the No. 10 Safelight Filter when both are listed for the same products.
§Use intermittently only to locate apparatus when using RESISTO Rapid Pan Paper.

In processing most black-and-white panchromatic films, you can examine the negatives for a few seconds only when development is half completed, provided that a KODAK Safelight Filter No. 3 (dark green), is used in a suitable safelight fixture with a 15-watt bulb, at a distance of not less than 4 feet (1.2 metres). However, such an inspection is of questionable value unless you have a considerable amount of experience in judging negative density in these circumstances. Gross underexposure can usually be detected; but to control the development of overexposed negatives, you need to know the character and brightness of the subject or subjects that were photographed.

Safelights for Orthochromatic Films: These materials are generally handled under a red safelight—either a KODAK Safelight Filter No. 1A (light red) or No. 2 (dark red), according to the speed of the film.

Safelights for Blue-Sensitive Films: Although these films have sensitivity similar to photographic papers, they are often faster and should be handled under a KODAK Safelight Filter No. 1 (red). Some blue-sensitive films can be handled for a limited time in the same safelight that is used for ordinary papers. For recommendations, see the instruction sheet that accompanies the material.

SAFELIGHTS FOR BLACK-AND-WHITE PAPERS

Since black-and-white papers are often developed by inspection, the safelights must give the greatest amount of light consistent with safety. However, the paper should not be exposed to the safelight for longer than is necessary. Too long exposure to the safelight, or exposure to unsafe darkroom illumination, will result in fog which detracts from print quality; at the same time, it may introduce a lack of uniformity in the contrast of prints, depending on the length of time the paper is exposed to the safelight.

Unfortunately, safelight fog may go undetected because the safelight exposure is often insufficient to render the silver grains in the emulsion developable. However, exposures are cumulative in effect; excessive safelight exposure added to the printing exposure will add density to the highlights in a print. The result is a slight degradation of the image, although no fog appears on white borders or on unexposed parts of the paper. Consequently, your prints may suffer a lack of quality for no apparent reason.

The speed of a paper is not necessarily a measure of its tolerance to safelight exposure. Fast, warm-tone papers are often dye-sensitized to get certain characteristics, and variable-contrast papers depend on some green sensitivity to obtain control of contrast with yellow filters. These papers must be handled with care in the safelighting normally used in black-and-white printing rooms.

HOW TO TEST SAFELIGHT FILTERS FOR BLACK-AND-WHITE PAPERS

Before starting the test:

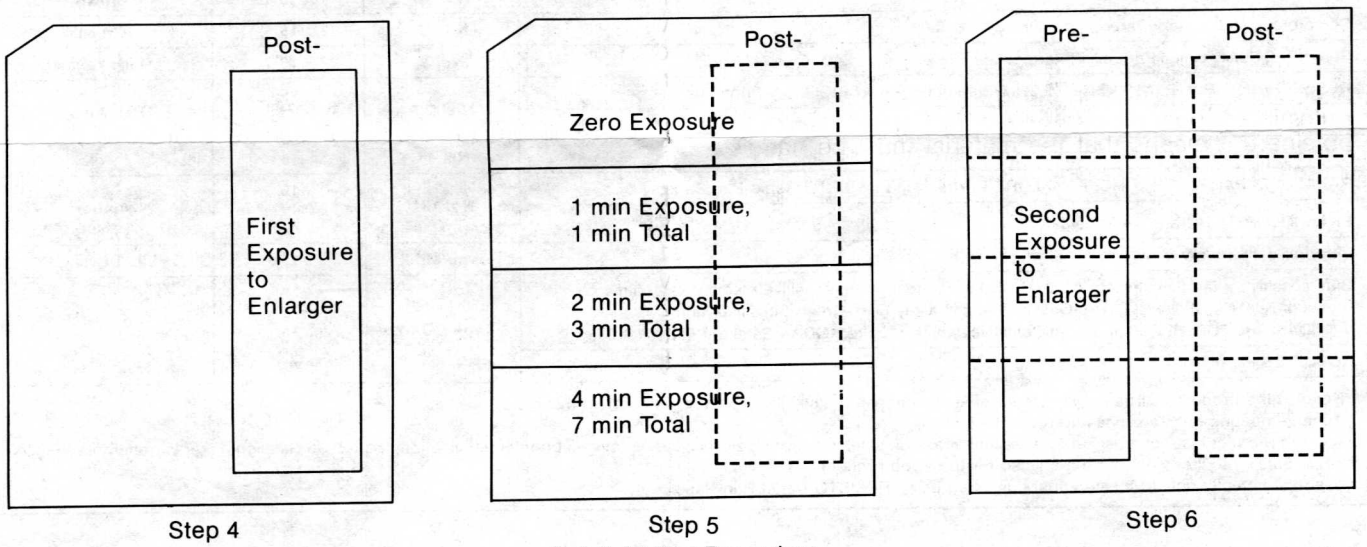
- Install a new bulb of the correct wattage in each safelight housing.
- Check to be sure that no white light is entering the darkroom through doorways, pass-through covers, etc. Correct any leakage. Remember, it takes at least 10 minutes for your eyes to become dark adapted so that you can see all the light leaks.
- Be sure no white light is escaping from the enlarger or from the safelight lamps.

Step 1. With only the safelights on, choose the location where paper is handled in which the illumination is brightest. This will usually be at the developing station. Get a flat piece of stiff cardboard to cover the developer tray.

Step 2. Set up the enlarger with a negative carrier but no negative in it, and an easel to make an exposure on a section of paper masked as shown in the illustration as "First Exposure to Enlarger."

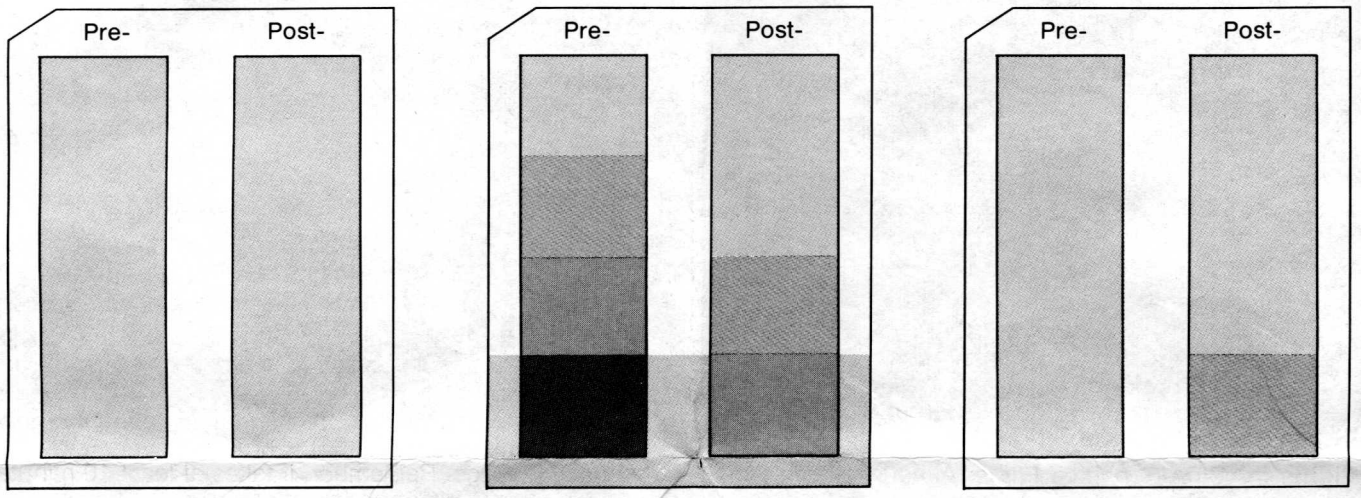
Step 3. Turn off all lights and run a test to find what exposure is required to produce a light gray tone after standard processing. (Process without safelights.) This tone should have a reflection density of .25 to .50 (.15 to .40 above the paper base density). Measure with a reflection densitometer, or by visual comparison with the labeled gray scale steps in Kodak Publications No. R-19, *KODAK Color Darkroom DATA-GUIDE,* or R-28, KODAK Professional Photoguide.

Step 4. First Enlarger Exposure. Turn off all lights. Cut a corner off of a fresh sheet of paper for orientation, and expose under the enlarger for the time and at the *f*-number found in Step 3. Label this area "Post-." (Illustration labeled Step 4.)



Step 4 Step 5 Step 6

Safelight Test Procedure



Evaluation of Safelight Tests

Step 5. Safelight Exposure. With the lights still off, place the cardboard on the developing tray or other area where the safelight was found to be the brightest. Place the paper on the cardboard and, using an opaque card, give a series of exposures to the safelight. Cover about ¼ of the paper with the opaque card for the zero exposure, and give all the exposed part of the paper a 1-minute exposure. Move the card to cover ½ the paper and give the rest 2 minutes' exposure. Cover all but ¼, and give the last area 4 minutes' exposure. The four steps will have received zero, 1, 3, and 7 minutes' exposure. (Illustration labeled Step 5.)

Step 6. Second Enlarger Exposure. Using the cut corner as a guide, give the second enlarger exposure to the other section of the paper, and label this area "Pre-."

Step 7. Process the paper in the dark.

Step 8. Evaluate the Test. The illustrations show three possible results of the tests. Some products are more sensitive to one sequence of exposures than the other; this test can show any difference.

In the first test illustrated, (a), no added density shows on either side as a result of the safelight exposure. This represents conditions with a safety time of at least 7 minutes.

A potentially unsafe condition is shown in (b). The paper fogged at 7 minutes' exposure to the safelight. This is shown by the density in the areas exposed 7 minutes to the safelight, but that had no enlarger exposure, as in the center section and the borders. The paper also shows signs of image change at 1 minute in the pre-exposure area, and at 3 minutes in the post-exposure area. When results like this are obtained, it means that the material must be handled very carefully, both before and after the enlarger exposure. If the safelight filter is an old one, such results could indicate filter fading; replacing the filter could give a longer safety time. If the filter is a new one, several steps can be taken to extend the safety time: use a lower wattage bulb, move the safelight lamp to a greater distance, use only dim, indirect safelighting for handling, and develop for half of the total time with the safelight off. From the test results, you know what the safety time limit is, and your print quality will not be affected if you limit safelight exposure to this time.

A more typical test result is shown in (c). The paper is safe up to 7 minutes of pre-exposure to safelight, and up to 3 minutes of post-exposure. No fogging shows. This indicates that conditions are safe if the total safelight exposure time is 3 minutes or less.

PLACEMENT OF SAFELIGHT FIXTURES

In general, safelights used for developing and handling sensitized materials cannot be placed closer than 4 feet (1.2 metres) from the work. In black-and-white printing rooms and areas where general safelighting is required, the lamps should be placed so that the illumination is evenly distributed over the whole area. Avoid a situation where pools of relatively bright light appear against a background of darkness; dark-colored walls, for example. This effect tends to tire the eyes. Darkroom walls should be painted in a light color, preferably a color similar to the filters.

Good general illumination is provided by light from the KODAK Utility Safelight Lamp, Model D, reflected by a white ceiling. In large rooms, allow one of these for every 64 square feet (5.9 square metres) of ceiling area. More concentrated light on working areas is provided by the KODAK Darkroom Lamp. Although the requirements for intensity and distance from sensitized materials are stringent with these safelights, a number of them can be used in a darkroom, provided that they are not less than 5 feet (1.5 metres) apart.

For more information about the use of safelights, refer to Kodak Publication K-4, "How Safe Is Your Safelight?"

BULBS FOR SAFELIGHT FIXTURES

Safelight recommendations are usually based on a 110- to 130-volt, 60 Hz source using a frosted bulb of indicated voltage. Where 200- to 250-volt, 50 Hz sources are used, a 25-watt pearl bulb of European manufacture may be substituted for a 15-watt frosted bulb of North American manufacture.