7 KODAK Graded-Contrast B&W Papers

AD-TYPE
AZO
KODABROME II RC
KODABROMIDE
MEDALIST
Mural
VELOX

QUALITY CHOICES FOR EVERY B&W PRINTING JOB.

Match Paper Grade to Negative Contrast with KODAK Graded-Contrast B&W Papers

Contrast-Grade Names and Numbers

The seven KODAK Graded-Contrast B&W Papers described in this brochure are each available in several different contrast grades. These various contrast grades allow you to match paper grade to negative contrast, since all negatives vary somewhat in contrast and density scale resulting from differences in subject, lighting, exposure, film type, and degree of development.

Six of the seven papers described in this brochure are available as *numbered* contrast grades (such as KODAK AZO Paper, which is available in five contrast grades numbered 1, 2, 3, 4, and 5). The other paper, KODABROME II RC Paper, is available in contrast grades that are *named* rather than numbered. These contrast grades are named Soft, Medium, Hard, Extra Hard, and Ultra Hard.

A major difference between KODABROME II RC Paper and the "number-graded" papers mentioned above is what is called speed equalization. With KODABROME II RC Paper, Soft, Medium, and Hard grades have essentially the same paper speed while Extra Hard and Ultra Hard grades have essentially half that speed.

This means that with KODABROME II RC Paper you can usually change paper grades without making new test strips. And generally only a simple one-stop exposure adjustment is required to change from any of the first three grades to either of the second two.

The following table describes both "name-grade" and "number-grade" contrast categories. Use the table as a general guide when choosing a contrast grade to suit a particular negative.

Choosing a Contrast Grade

Selecting a contrast grade to use in printing a particular negative is important because using the proper contrast grade can help correct for low or high contrast between tones in the negative. In all cases, the character of the negative will influence the contrast grade of the paper used.

If you are in doubt as to which contrast grade to use, start by making a print on paper grade No. 2. (Or, in the case of a "name-grade" paper, use contrast grade "Medium.") This grade is intended to yield a print of normal contrast from a normal negative. If you get a "soot-and-whitewash" effect in the first print, with few middle tones, try grade No. 1 (or "Soft"). If the result is "flat" or "muddy," try grade No. 3 (or "Hard"). The KODAK Black-and-White Darkroom DATAGUIDE gives a method of matching negative density range and type of enlarger to paper grade.

The contrast-grade numbers and names are broad indications of the density ranges of the negatives that can be printed satisfactorily on each grade of paper. A high-density-range negative will generally print best on grade No. 1 (or "Soft") contrast-grade paper. Conversely, a low-density-range negative will print best on grade No. 5 (or "Extra Hard") contrast grade paper.

The contrast-grade names and numbers give an approximate idea of the inherent contrast of the emulsion.

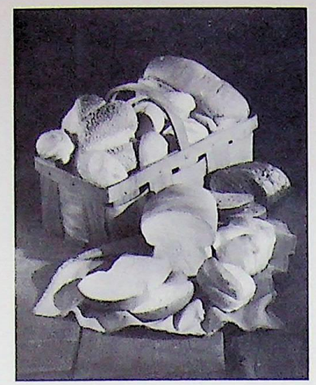
With negatives appropriate to the paper grade being used, there is little difference in quality between prints made on No. 2, No. 3, or even high-contrast No. 4 grade paper. If you process your own film, it is best to aim your negative contrast so that you can print on a No. 2 or No. 3 grade paper. That way, you will have some contrast latitude on either side of normal. If your film is developed by a commercial finishing establishment, normal-contrast results are usually achieved.

How Enlargers Affect Contrast

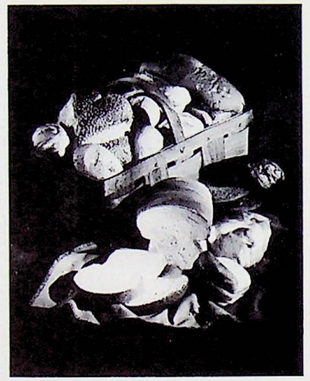
The type of enlarger used will have an effect on the contrast of the print image. Condenser enlargers produce prints with higher contrast than those printed on diffusion enlargers. Refer to Publication R-20, the KODAK Black-and-White Darkroom DATAGUIDE, to determine the approximate density scale of negatives required to print on a particular contrast grade of Kodak paper with the two types of enlargers.

Water-Resistant Base

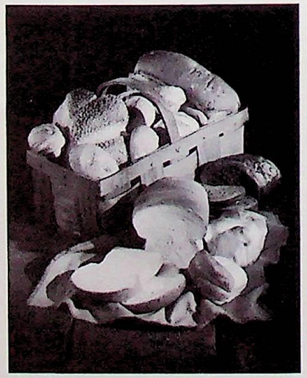
The use of a water-resistant (resin-coated) base provides good dimensional stability for applications where this characteristic is important. Also, processing times are shorter than with fiber-base papers because the base is water-resistant. Another feature is that ferrotyping is not required to obtain a gloss (F) surface. KODABROME II RC Paper is made with medium-weight water-resistant base.



This photograph shows the effect when a negative with a normal density scale is printed on low-contrast paper, such as contrast-grade No. 1, or "Soft."



This photograph shows the effect when the same negative is printed on high-contrast paper, such as contrast-grade No. 5, or "Extra Hard."



This photograph shows the effect when the same negative is printed on a normal-contrast paper, such as contrast-grade No. 2, or "Medium." Since this is a critical, or sensitive, subject, it has a very limited contrast latitude and—out of three prints shown here—only this normal-contrast print is acceptable.

Contrast Grades by Name and Number

Contrast Categories by Name	Contrast Categories by Number	Description
Soft	1	Yields normal prints from high-contrast negatives where density scale is long or subject contrast is high.
Medium	2	Gives normal prints from normal-contrast negatives where density scale and subject contrast are average.
Medium / Hard	3	Produces normal prints from low-contrast negatives with short density scale, or subjects requiring slightly more tonal separation in the print.
Hard	4	Provides normal prints from very low-contrast negatives where extra contrast is needed for separation of tones.
Extra Hard	5	Delivers normal prints from extremely low-contrast negatives where the negative density scale is very short.
Ultra Hard	—	This grade delivers acceptable prints from ultra-low-contrast negatives. Or, this grade can be used for line copy and special effects where compressed midtones are wanted.

NOTE: The contrast range shown in this table is *approximate;* the contrast range of KODABROME II RC Paper varies somewhat as it is processed in different processors.

Surfaces and Textures

KODAK Graded-Contrast B&W Papers are made in a variety of surface textures and degrees of gloss, or sheen. Some papers, for example, have a smooth surface without noticeable texture. Sheen varies from the high gloss of a ferrotyped print to the lower sheen of a lustre surface paper.

The maximum blackness, or density, a paper can produce is partly determined by its surface sheen. In general, the more lustre (or gloss) the surface has, the blacker the blacks will appear, and the greater the apparent tonal range in the print. Glossy and high-lustre surfaces provide the highest degree of sheen, hence the best blacks and the longest visual tonal ranges.

Texture, or surface pattern, largely determines how the paper reproduces fine detail. The smoother the surface, the finer the detail. Prints for halftone reproduction are usually made on smooth-surface papers.

The chart at right describes the different surface texture and brilliance combinations available in KODAK Graded-Contrast B&W Papers. Each combination is indicated by a letter of the alphabet.

Surfaces and Textures of KODAK Graded-Contrast B&W Papers

Surface Letter Code	Texture	Brilliance	Remarks
F	smooth	glossy	An "F-glossy" paper generally yields very dense blacks and, therefore, a very long density scale. KODAK Graded-Contrast Papers thus designated (except those on water-resistant paper base) can be ferrotyped. F-surface water-resistant papers produce a glossy surface without ferrotyping.
J	smooth	high lustre	This surface has no noticeable pattern, and it yields a density scale slightly lower than that of F-surface papers.
N	smooth	semi-matt	Although this surface has no noticeable pattern, it has less sheen than the smooth high-lustre paper just described. It has enough "tooth" for pencil retouching.
A	smooth	lustre	The letter "A" indicates a lightweight base which may be folded.
E, G	fine-grain	lustre	These letters indicate a slightly pebbled surface which has little effect on fine detail. It is a good choice for most pictures when a smooth or a glossy surface is undesirable. "E" papers are made with a white or warm-white paper base, while "G" papers have a cream-white tint.
R	tweed	lustre	Has a fairly rough texture that tends to subdue fine detail and to emphasize the larger masses and planes in a subject. This surface minimizes the need for fine retouching, and it is especially useful for big enlargements.

All these textures and degrees of lustre, combined with the variations in image tone and base tint available, give you a wide choice of paper to create mood and to suggest the lighting conditions that existed when the picture was taken. As in all manufactured materials, there are slight batch-to-batch variations in paper characteristics.

Fluorescent Brighteners

Fluorescent material is added to some papers to give greater apparent contrast, brilliant-quality whites, and long visual scale. KODABROME II RC Paper is an example of papers that feature fluorescent brighteners. The visible brightening effect varies, however, with the amount of ultraviolet radiation in the light by which prints are viewed. Daylight and radiation from fluorescent bulbs contain relatively large amounts of UV, whereas incandescent bulbs emit relatively small amounts. Moreover, the effect of a brightener is not easily appreciated unless prints on a brightened and a nonbrightened paper are compared side by side.

Since brighteners tend to leach out of the paper during processing, prints that have been developed for considerably different times may appear to have different degrees of brightness, and to the eye this is equivalent to different degrees of grayness. Consequently, in manual processing of papers containing a brightening agent, developing time should be kept as uniform as possible.

Weight

KODAK Graded-Contrast B&W Papers come in various thickness or base weights. Lightweight paper folds well and resists emulsion cracking when folded. Single-weight paper is normally used for general-purpose work and for reproduction. Double-weight lends itself to large prints, display prints, or prints that must receive considerable handling. Medium-weight paper offers features similar to both single- and double-weight.

Base Tints

The tint is the color of the paper stock or a composite of the color of the paper and the coatings applied to it in manufacture. A white-base paper, such as KODABROME II RC Paper, might best be described as having a white tint. A cream-white base paper, such as KODAK Mural Paper, is somewhat "warmer" than a white-base paper.

Image Tone

The term "image tone" refers to the color of the silver image. KODAK Graded-Contrast B&W Papers come in three image tone groups: neutral-black, warm-black, and blue-black. Neutral-black and blue-black papers are referred to as "cold" because of their bluish cast. Warm-black papers are called "warm" because their tones tend toward brown.

Papers for Machine Processing

KODABROME II RC Paper was designed for the speed and convenience of machine processing, as well as tray processing.

A developer-incorporated emulsion allows faster development. In addition, prints fix and wash rapidly because of the resin-coated paper base, which does not absorb processing chemicals. The paper is designed to accommodate high-temperature processing.

In fact, two 8 x 10-inch prints on KODABROME II RC Paper can be processed completely dry, in just 55 seconds in the KODAK ROYALPRINT Processor, Model 417. For more information on the KODAK ROYALPRINT Processor, Model 417, see Publication P3-820, which is available free from Dept. 412-L, Eastman Kodak Company, 343 State Street, Rochester, N.Y. 14650. (Note: KODABROME II RC Paper may also be processed in some other processors, as well as tray processed. See chart in center of this brochure for details.)

When KODABROME II RC Paper is processed, according to instructions, in the KODAK ROYALPRINT Processor, Model 417, prints will have *optimum process stability.* This is the highest of the three American National Standards Institute (ANSI PH4.32-1974) categories, the lower two being short-term and commercial. They are long-lasting, properly *fixed and washed prints, not* stabilization-type prints.

Light Sources for Printing

KODAK Graded-Contrast B&W Papers are designed for printing by exposure to tungsten enlarger lamps (including quartz-iodine and tungsten-halogen). Among the lamps commonly used with these papers is Photo Enlarger No. 212 or 302. Other light sources, such as cool-white (4500 K) fluorescent lamps, mercury vapor lamps, and various cathode-ray tubes, also may be used but may change the paper speed somewhat.

Safelight

Use a KODAK Safelight Filter OC (light amber), or equivalent, in a suitable safelight lamp with a 15-watt bulb kept at least 4 feet from the paper. Keep the safelight exposure to a minimum. Do not use a KODAK Safelight Filter OA (greenish yellow). Note that the safe time under the recommended safelight for fast graded-contrast papers may be relatively short. Remember to replace safelight filters periodically.

The KODAK ROYALPRINT Processor, Model 417, is designed for rapid processing of developer-incorporated, water resistant papers such as KODABROME II RC Paper, or equivalent enlarging papers.

Important Notice About Safelight Illumination

Exposure of any KODAK Graded-Contrast B&W Paper to safelight illumination is safe only for a limited time. Since safelight fog can cause undesirable changes in contrast and print quality, it is best to keep safelight exposure to a minimum. For more information on this subject, see Kodak Publication No. K-4, *How Safe Is Your Safelight?,* a single copy of which is available from Eastman Kodak Company, Dept. 412-L, Rochester, N.Y. 14650.

Data and Specifications for KODAK Graded-Contrast B&W Papers

NAME	DESCRIPTION and APPLICATIONS	Paper Base Type	Surface Symbol[1]	Texture	Brilliance	Weight (contrast grades)	Base Tint	Image Tone
KODABROME II RC Paper	A graded paper with an developer-incorporated emulsion, that allows rapid processing in machines as well as in trays. The paper has applications in commercial, industrial, press, aerial, photofinishing, school, advertising, display, police photography, and in other applications where a general-purpose black-and-white enlarging paper is normally used. Fast, optimum stability processing can be obtained in the KODAK ROYALPRINT Processor, Model 417, and in some other continuous paper processors. For information on the processing of this paper in machines other than the ROYALPRINT Processor, write to Eastman Kodak Company, Dept. 761-B, Rochester, N.Y. 14650.	Water-Resistant	F*	Smooth	Glossy	MW (Soft-Ultra Hard)	White	Warm Black
			N	Smooth	Semi-Matt	MW (Soft-Ultra Hard)	White	Warm Black
			E	Fine-Grained	Lustre-Luxe®	MW (Soft-Hard)	White	Warm Black
KODAK AD-TYPE Paper	A contact-printing paper with the emulsion coated on smooth, lightweight stock. KODAK AD-TYPE Paper is designed to fold without cracking, which makes it an ideal paper for prints to be bound into reports.	Fiber-Base	A	Smooth	Lustre	LW (2, 3)	White	Neutral Black
KODAK AZO Paper	A general-purpose contact-printing paper which yields fine-quality prints for reproduction and most other purposes in commercial, industrial, and illustrative photography when a contact-speed paper is required. The E surface is suitable for portraits or exhibition prints made by contact.	Fiber-Base	F	Smooth	Glossy	SW (1-5) DW (2)	White	Neutral Black
			E	Fine-Grain	Lustre	SW (2-3) DW (2)	White	Neutral Black
KODABROMIDE Paper	A very fast enlarging paper of exceptional quality, KODABROMIDE Paper possesses broad exposure and development latitude which can reduce the percentage of discards. Its speed makes it valuable for producing big enlargements from small or dense negatives. Its rich black tone is uniform through all five printing grades, and remains so over a wide range of processing conditions. KODABROMIDE Paper is widely used for studio, commercial, press, photofinishing, and exhibition prints. Single-weight "F" is excellent for news photos.	Fiber-Base	F	Smooth	Glossy	SW (1-5) DW (1-5)	White	Neutral Black
			E	Fine-Grain	Lustre	SW (2-4) DW (2-4)	White	Neutral Black
KODAK MEDALIST Paper	A fine-quality, all-purpose enlarging paper which is excellent for illustrative, commercial, and pictorial subjects. It has high speeds in all four printing grades, and it has an exposure and development latitude that makes it possible to obtain "in-between" contrasts. This latitude also makes it a good choice for applications where negatives tend to vary in contrast and density.	Fiber-Base	F	Smooth	Glossy	SW (2-4) DW (2,3)	White	Warm Black
			G	Fine-Grain	Lustre	DW (2,3)	Cream-White	Warm Black
KODAK Mural Paper	A special-purpose warm-image tone paper recommended for making big enlargements and photomurals. The paper base is a tough, abrasion-resistant, single-weight material that withstands the handling necessary in making large prints. When photomurals are made in more than one piece, less visible splices can be made with single-weight paper than with double-weight. The R—tweed lustre—surface of KODAK Mural Paper is easy to spot, and it tends to break up grain. Also, this surface is excellent for hand-coloring. This paper is available in rolls up to 54 inches in width.	Fiber-Base	R	Tweed	Lustre	SW (2,3)	Cream-White	Warm Black
KODAK VELOX Paper	A medium-speed contact-printing paper particularly suited for making snapshot-type prints, as well as prints for commercial and professional applications. KODAK VELOX Paper has a wide-latitude and a blue-black image tone that is uniform throughout all four contrast grades, so that you can make consistently good prints from negatives of different contrasts. It has a smooth, glossy surface on single-weight white paper stock for producing brilliant prints.	Fiber-Base	F	Smooth	Glossy	SW (1-4)	White	Blue Black

1. For description of letter codes, see chart on page 3.

*Do not ferrotype. Paper may stick to ferrotyping surface. Air-dries to a glossy surface without ferrotyping.

Weights
SW Single-Weight
DW Double-Weight
LW Lightweight
MW Medium-Weight

Image Tone	"Name-Grade" Papers	EFFECTIVE PAPER SPEEDS[2] (ASAP) Contrast Grade (by name or number, as indicated)					SAFELIGHT FILTER	DEVELOPMENT/PROCESSING RECOMMENDATIONS					NAME
		Soft	Medium	Hard	Extra Hard	Ultra Hard		KODAK Developer	Dilution	Development Time in Minutes: Recommended	Development Time in Minutes: Useful Range	Capacity (8″ x 10″ Prints/Gal., except as noted)	
Warm Black	Tray Processing	400	400	400	200	200	Use KODAK Safelight Filter OC (light amber) or equivalent.	DEKTOL EKTAFLO, Type 1	1:2 1:9	1 1	¾ to 2 ¾ to 2	120 120	KODABROME II RC Paper
Warm Black Warm Black	Machine Processing (Effective paper speeds shown for KODABROME II RC Paper are speeds for this paper when it is processed in the KODAK ROYALPRINT Processor, Model 417. These are not ASAP speeds.)	320	320	320	160	160		**Processing in KODAK ROYALPRINT Processor, Model 417** This processor is designed for rapid processing of developer-incorporated, water-resistant papers such as KODABROME II or equivalent enlarging papers. It is *not* a stabilization processor. Dry 8 x 10-inch prints that have optimum process stability are obtained in 55 seconds (dry to dry) with this machine. *Optimum* stability is the highest of three American National Standards Institute (ANSI PH4.32-1974) categories. **Processing with KODAK ROYALPRINT Chemicals** The chemical solutions recommended for use in the KODAK ROYALPRINT Processor, Model 417, are: KODAK ROYALPRINT Activator, KODAK ROYALPRINT Stop Bath, and KODAK ROYALPRINT Fixer. The capacity of these solutions is one thousand 8 x 10-inch prints, or the equivalent of 556 square feet per batch. For operating instructions and further information, refer to the processor manual. **Processing in Stabilization Processors** Stabilization processing is *not* recommended for this paper.				NOTE: 1,000 8″ x 10″ prints per charge of chemicals (three ½ gallon bottles of Activator, one ½ gallon bottle of Stop Bath, and one 5 quart bottle of Fixer concentrate) in the KODAK ROYALPRINT Processor, Model 417.	
Neutral Black	"Number-Grade" Papers	1	2	3	4	5	"	DEKTOL D-72 EKTAFLO, Type 1	1:2 1:2 1:9	1 1 1	¾ to 2 ¾ to 2 ¾ to 2	120 100 120	KODAK AD-TYPE Paper
		3	1.6	1.2	.8	—							
Neutral Black Neutral Black		3	1.6	1.2	.8	.6	"	DEKTOL D-72 EKTAFLO, Type 1	1:2 1:2 1:9	1 1 1	¾ to 2 ¾ to 2 ¾ to 2	120 100 120	KODAK AZO Paper
Neutral Black Neutral Black		500	320	200	160	125	"	DEKTOL D-72 EKTAFLO, Type 1	1:2 1:2 1:9	1½ 1½ 1½	1 to 3 1 to 3 1 to 3	120 100 120	KODABROMIDE Paper
Warm Black Warm Black		160	125	160	200	—	"	DEKTOL D-72 EKTAFLO, Type 1	1:2 1:2 1:9	1 1 1	¾ to 2 ¾ to 2 ¾ to 2	120 100 120	KODAK MEDALIST Paper
Warm Black		—	250	250	—	—	"	EKTONOL SELECTOL D-52	1:1 1:1 1:1	2 2 2	1½ to 4 1½ to 4 1½ to 4	80 80 80	KODAK Mural Paper
Blue Black		10	5	4	2	—	"	DEKTOL D-72 EKTAFLO, Type 1	1:2 1:2 1:9	1 1 1	¾ to 2 ¾ to 2 ¾ to 2	120 100 120	KODAK VELOX Paper

2. The paper speeds given in the above table were determined using methods given in ANSI Standard PH2. 2-1966, and are labeled ASAP. Paper speeds are indicated for a developer like KODAK DEKTOL Developer (1:2), and slight differences in speed may be encountered when other developers are used. Paper speeds provide an approximate indication of the relative exposures needed for the various papers.

The speed numbers indicate the relative speeds of the papers when exposed with white light of tungsten quality. The higher the number, the faster the effective speed. Paper speed numbers can be used to compare the speeds of different papers and to calculate approximate exposure times.

The speeds given are for average products; aging and adverse storage conditions may alter the speed of an emulsion. Exposure must often be adjusted to suit the subject matter and individual preference. Note that the ASAP paper speeds bear no direct relationship to ASA film speeds; they are derived by different methods.

For more information about paper speeds, refer to Kodak Data Book G-1, *KODAK B/W Photographic Papers*. The book is available from photographic supply dealers.

See Your Professional Photographic Supply Dealer For More Information

There you have it. The characteristics, the choices. Your alternatives to good-looking printmaking using KODAK Graded-Contrast B&W Papers, plus a handy fold-out chart that's great for your stockroom wall, darkroom, or wherever you need graded-contrast paper comparison data.

The photographic papers covered in this brochure are also discussed in the growing library of Kodak Technical Literature. It presently numbers more than 800 clear, current, and informative technical pamphlets, Data Books, DATAGUIDES, and literature packets, including the titles shown on this page.

Technical information, Kodak Technical Literature, paper, film, photographic chemicals, equipment. Your specialist in things photographic is the dealer who carries KODAK Professional Products. Your dealer is the source for technical assistance on any KODAK Professional Product.

A good person to know.

The Kodak materials described in this publication are available from those dealers normally supplying Kodak materials. Equivalent materials may be used.

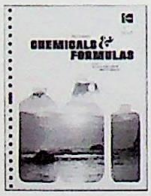
KODAK B/W Photographic Papers
G-1, 44 pp.

Provides a better understanding of paper characteristics which contribute to the finest print quality. Includes data on Kodak B/W photographic papers.

KODAK Filters for Scientific and Technical Uses
B-3, 92 pp.

Describes physical, optical, and transmission characteristics of the complete line of Kodak filters.

Processing Chemicals and Formulas
J-1, 52 pp.



Presents recommended black-and-white processing techniques and Kodak formulas.

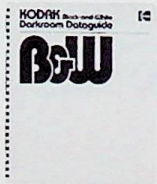
What Is B/W Quality? . . . And How To Get It.
G-4, 12 pp.

Details characteristics of high-quality black-and-white photography and describes how to control quality from exposure through printing.

Practical Processing in Black-and-White Photography
P-229, 20 pp.

Gives basic facts on developing, fixing, washing, stabilization processing, and silver recovery.

KODAK B&W Darkroom DATAGUIDE
R-20, 36 pp., Major Revision



New, large, easy-to-read reference guide features completely updated information on Kodak black-and-white films, papers, and chemicals. Covers exposure, processing, printing, toning, and much more.

Bigger and Better Enlarging
AG-19, 288 pp.

A how-to book on enlarging both color and black-and-white negatives. Teaches you how to choose the right paper, determine exposure, dodge and burn-in, and finish your prints. Filled with clever darkroom ideas. Hard cover.

KODAK Professional Black-and-White Films
F-5, 60 pp., Major Revision

A valuable reference guide, this revised second edition includes expanded sections on negative quality, contrast index and use, choosing a film, handling, and processing. Also, the text includes several enlarged data tables.

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