

TECHNICAL INFORMATION

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# **MULTIGRADE IV RC DELUXE AND PORTFOLIO**

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**ILFORD**

## MULTIGRADE IV RC DELUXE AND PORTFOLIO

### 1 DESCRIPTION AND USE

ILFORD MULTIGRADE IV RC DELUXE is a variable contrast, black and white, non-developer incorporated photographic paper on a resin coated base. It is a premium quality paper which produces prints with deep rich blacks and a neutral image color on a bright white base.

ILFORD MULTIGRADE IV RC DELUXE black and white paper has been improved to give an even higher level of performance and quality. Compared with MULTIGRADE III, it has better tonal rendition throughout the contrast range, especially in the highlights. It also has excellent stability when stored for long periods before use and fast development to ensure the paper is fully developed in the recommended time, even in marginal processing conditions.

MULTIGRADE IV RC PORTFOLIO is a resin coated variable contrast black and white paper with identical image properties to MULTIGRADE IV RC DELUXE, but coated on a double-weight (250g/m<sup>2</sup>) RC base.

MULTIGRADE IV RC DELUXE and MULTIGRADE IV RC PORTFOLIO can be processed in trays or in automatic paper processors. However, because it is not developer incorporated it is not recommended for activation/stabilization type processors.

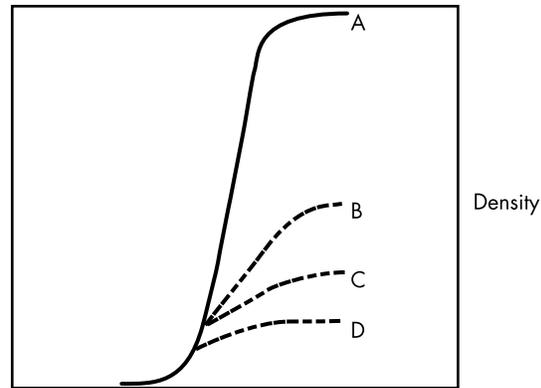
ILFORD variable contrast papers are a blend of emulsion components of differing spectral sensitization.

When the paper is exposed to blue light, all parts of the emulsion react and contribute equally to the final image. This image is of high contrast because of the additive effect produced by three emulsions with the same speed and contrast.

When the paper is exposed to green light, only the parts of the emulsion with the larger amounts of green sensitizing dye react initially. This is because the three emulsions have very different sensitivities to green light. The resultant curve has a very much wider exposure range and is thus of low contrast.

By varying the proportion of blue to green light, a contrast range between these two extremes can be obtained. The simplest way of controlling the color of the light reaching the emulsion during exposure is by the use of filters: A magenta filter absorbs green light and transmits blue; a yellow filter absorbs blue light and transmits green. In this way, high and low contrast images can be made.

Figure 1. Combined sensitometric curve to blue light

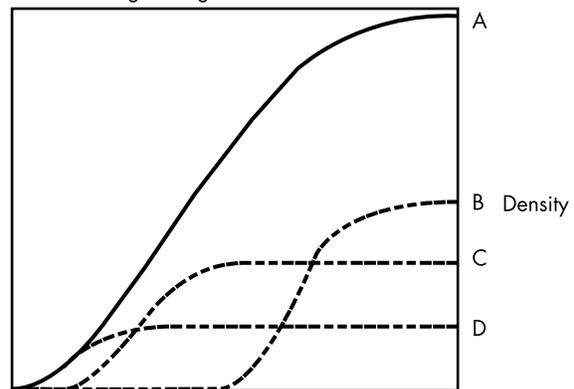


Relative log exposure

- A Combined curve
- B Dyed emulsion I
- C Dyed emulsion II
- D Dyed emulsion III

By varying the levels and types of sensitizing dyes, the spectral characteristic of the individual components provide low, medium and high blue/green sensitivity which produces marked speed differences.

Figure 2. Combined sensitometric curve to green light



Relative log exposure

- A Combined curve
- B Dyed emulsion I
- C Dyed emulsion II
- D Dyed emulsion III

The limitation in most variable contrast systems is that the contrast at the foot of the curve (the highlight region of the print) is determined by a somewhat high contrast component. ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO incorporate an entirely new component which actually is itself a variable contrast emulsion. This, coupled with improved sensitizing technology, gives highlights whose contrast changes across the entire filter range without compromising maximum contrast.

There are three MULTIGRADE IV RC DELUXE surfaces: (MGD.1M) glossy, (MGD.25M) satin and (MGD.44M) pearl. There are two MULTIGRADE IV RC PORTFOLIO surfaces: (MGS.1K) glossy and (MGS.44K) pearl.

**2 EXPOSURE**

**2.1 ANSI PAPER SPEEDS**

(Tray or ILFORD 2650 machine processed)

<b>ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO—Unfiltered</b>													
Paper Speed	500												
<b>ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO with MULTIGRADE Filters</b>													
Filter Number	00	0	½	1	1½	2	2½	3	3½	4	4½	5	
Paper Speed	200	.....200						100	.....100				

**2.2 CONTRAST RANGE**

Seven full grades of contrast are available with MULTIGRADE IV RC papers when used with MULTIGRADE filters or the ILFORD MULTIGRADE 100 System; six when used with the ILFORD MULTIGRADE 500 Exposure System. Each of these systems allows half grades in addition to full grades, making 12 contrast steps in all, from 00–5. MULTIGRADE IV RC papers unfiltered, have an ISO range of R100.

<b>ISO Range MULTIGRADE IV RC DELUXE and PORTFOLIO with MULTIGRADE Filters</b>							
Filter	00	0	1	2	3	4	5
Range (R)	180	160	130	110	90	60	40

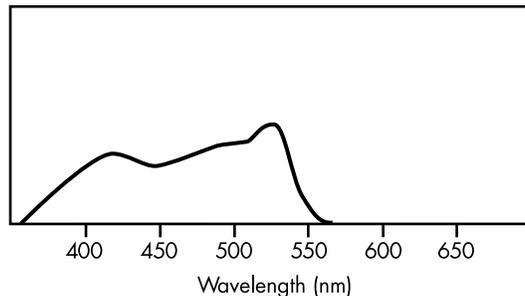
The above values refer to tray processing using ILFORD MULTIGRADE Developer and to machine processing in an ILFORD 2650 RC paper processor.

**2.3 SAFELIGHT RECOMMENDATIONS**

MULTIGRADE IV RC papers can be used with an ILFORD 902 safelight filter (light brown) or a Kodak OC or equivalent, in a safelight lamp fitted with a 15W bulb. For direct lighting, do not expose the paper to the safelight for more than 4 minutes and the distance between the paper and the safelight should be a minimum of three feet.

**2.4 SPECTRAL SENSITIVITY**

The wedge spectrogram of MULTIGRADE IV RC papers, unfiltered, to tungsten light (2850K) is given below.



**2.5 LIGHT SOURCE**

MULTIGRADE IV RC papers are designed for use with most enlargers fitted with either a tungsten or tungsten halogen light source.

Enlargers with a cold cathode or cold light enlarger head can be used, but the contrast range will vary, and is dependent on the spectral characteristics of the light source used. The only way to determine the contrast range available with each model of enlarger is to carry out a practical test. Some additional yellow filtration, up to 70Y, may be helpful in these circumstances.

**3 ILFORD MULTIGRADE FILTERS**

ILFORD MULTIGRADE filters have been specifically designed for use with MULTIGRADE papers to achieve a contrast range equivalent to 00–5 on the ILFORD graded paper contrast scale. The whole number filters correspond approximately to the grades on the graded paper scale, where the lowest number corresponds to the softest grade of paper. The half number filters offer the additional flexibility of half grades when required.

As all MULTIGRADE filters are made to a very high optical standard, negatives may be finely focused prior to exposure without a filter in place. This feature is especially useful when a high contrast filter is to be used and when dense negatives have to be printed.

The set, comprised of 12 filters, is solvent coated on a polyester base. Filter sets are available in sizes of 3½"x3½", 6"x6", and individually in 12"x12". These may be used above or below the lens and may be cut to fit the filter drawer on a particular enlarger. Filters are also available in a kit for below the lens use. This kit is comprised of 12 mounted filters, a filter holder and a filter holder adaptor.

MULTIGRADE filters are easy to use; no complicated calculations are needed when changing from one filter to another. The filters require the following relative exposures:

Filters 00–3½	1X
Filters 4–5	2X

For example, if a print made from filter 3 requires an exposure of 10 seconds at f5.6, a print of similar overall density made from the same negative would require 20 seconds at f5.6 when using filter 4½.

Clean MULTIGRADE filters with a soft cloth or camel hair brush. Always store the filters in their original packaging as this protects them and allows an individual filter to be selected quickly and easily. If a filter used below the lens does get badly scratched, it should be replaced as it will reduce image quality.

**3.1 USING ILFORD MULTIGRADE IV RC DELUXE AND PORTFOLIO PAPERS WITH DICHROIC ENLARGERS**

Color enlargers fitted with dichroic filter heads can be used to vary the contrast of MULTIGRADE RC and FB papers. Although it seems easy to just dial in a filter value to achieve the desired contrast level, ILFORD MULTIGRADE filters offer much more convenience. The operator just switches the dichroic enlarger to the white light mode, inserts the proper filter below the lens and starts making prints.

The advantages of MULTIGRADE filters are as follows:

- Simple and fast to use.
- No reference chart for filter settings and contrast value is needed.
- No need for exposure compensations when going from grade to grade.
- Wider contrast range than dichroics can usually achieve.
- Optimum grade spacing between all 12 half grades from 00 to 5.

However, for those who insist, dichroic filters may be used. By adjusting the yellow and magenta filters in dichroic color heads, it is possible to achieve a wide range of contrast with MULTIGRADE RC and FB papers. The majority of enlarger manufacturers use Durst or Kodak filtration values.

From the following table, select the type of filtration needed according to the enlarger type.

Durst	Kodak
Dunco	Beseler
Durst	Chromega
Kaiser	De Vere
Kienzle	Fujimoto
Leitz	IFF
Lupo	Jobo
	LPL
	Omega
	Paterson
	Simmard
	Vivitar

Two methods can be used to vary contrast when using dichroic filters. The first table titled "SINGLE FILTER METHOD" requires technicians to modify exposure when changing filtration. Exposure can be relatively maintained by using the "TWO FILTER METHOD".

From the following tables, read off the approximate filtration needed for each contrast step. While these figures are a useful guide, the actual filtration needed for a particular enlarger can only be determined by trial.

Filter Settings	SINGLE FILTER METHOD		
ILFORD MULTIGRADE Filters	Durst (max 130M) CC Filters	Durst (max 170M) CC Filters	Kodak Color CC Filters
00	120Y	150Y	199Y
0	70Y	90Y	90Y
½	50Y	70Y	70Y
1	40Y	55Y	50Y
1½	25Y	30Y	30Y
2	0	0	0
2½	10M	20M	5M
3	30M	45M	25M
3½	50M	65M	50M
4	75M	100M	80M
4½	120M	140M	140M
5	130M	170M	199M

Filter Settings	TWO FILTER METHOD					
ILFORD MULTIGRADE Filters	Durst (max 130) CC Filters		Durst (max 170) CC Filters		Kodak Color CC Filters	
00	120Y	0M	115Y	0M	162Y	0M
0	88Y	6M	100Y	5M	90Y	0M
½	78Y	8M	88Y	7M	78Y	5M
1	64Y	12M	75Y	10M	68Y	10M
1½	53Y	17M	65Y	15M	49Y	23M
2	45Y	24M	52Y	20M	41Y	32M
2½	35Y	31M	42Y	28M	32Y	42M
3	24Y	42M	34Y	45M	23Y	56M
3½	17Y	53M	27Y	60M	15Y	75M
4	10Y	69M	17Y	76M	6Y	102M
4½	6Y	89M	10Y	105M	0Y	150M
5	0Y	130M	0Y	170M	*	*

\*GRADE 5 Equivalent NOT Available

## 3.2 MULTIGRADE 500 EXPOSURE SYSTEM

MULTIGRADE IV RC papers are fully compatible with the ILFORD MULTIGRADE Enlarging Systems. Compared with MULTIGRADE III, MULTIGRADE IV RC DELUXE and PORTFOLIO have a different balance of sensitivity to blue and green light. For this reason, it might be necessary to rebalance the lamps on the MULTIGRADE 500 equipment. Refer to the "Program Selector Switch" section in the operating manual. For shortest exposures, put the brighter lamp(s) for the blue (or magenta) light.

## 3.3 LATENT IMAGE STABILITY

MULTIGRADE IV RC papers have excellent latent image stability. They are especially recommended for all applications that require paper to be left for a reasonable time between exposure and processing. For periods up to 24 hours after exposure, no perceptible change in image quality will be seen.

# 4 PROCESSING

## 4.1 DEVELOPING

To maintain the tradition of short development times, ILFORD MULTIGRADE Developer is recommended for use with MULTIGRADE RC and FB papers. For MULTIGRADE IV RC DELUXE and PORTFOLIO the image appears after 10 seconds and development is complete in 1 minute. When processed in standard tray developers, MULTIGRADE IV RC papers require about 30 seconds before image appearance and about 2 minutes before complete development takes place.

## 4.2 PREPARATION

ILFORD MULTIGRADE Developer is supplied as a liquid concentrate and is economical to use. The recommended dilution is one part developer mixed with nine parts water. For greater economy ILFORD MULTIGRADE Developer can also be diluted one part developer mixed with fourteen parts water.

## 4.3 USE

The recommended development time of 1 minute at 68°F (20°C) for MULTIGRADE IV RC papers produces prints identical in contrast and maximum density to prints processed for 2 minutes in a conventional tray developer.

The minimum recommended development time using ILFORD MULTIGRADE Developer is 45 seconds. Overexposed prints processed for a minimum of 35 seconds are acceptable for those applications where the highest quality is not required. To maintain print to print consistency when batch processing a large number of prints, it may be advantageous to reduce exposure slightly and extend development time.

For optimum results, mix only enough developer for a maximum of two consecutive printing sessions.

**4.4 STOP BATH**

After development, rinse prints in an acid stop bath. ILFORD IN-1 Stop Bath is recommended, diluted 1+31. The use of a stop bath terminates development immediately and helps to maintain the fixer bath in good condition. Where a stop bath is not available, a plain water rinse may be used, provided care is taken to change it completely at regular intervals.

**4.5 FIXING**

Transfer prints from the stop bath to MULTIGRADE Fixer diluted 1+4. Prints should be agitated initially and fixed for 30 seconds at 68°F (20°C). A hardener CAN NOT be used with MULTIGRADE Fixer. The use of a hardening fixer is not recommended as wash times must then be increased.

**4.6 WASHING**

The polyethylene coating on each side of the MULTIGRADE IV RC paper base prevents absorption and wash times are therefore, short. To ensure prints are completely free of chemicals, wash for 2 minutes in a good supply of running water at a temperature not below 41°F (5°C).

When speed is important, vigorous washing for only 30 seconds at 68°F (20°C) will still result in prints having a high degree of permanence. Prolonged immersion in water can cause edge penetration and print curl with resin coated papers. For this reason, avoid wet times longer than 15 minutes.

**4.7 DRYING**

Optimum results will be obtained with the ILFORD 1250 RC dryer.

**Note:** MULTIGRADE IV RC DELUXE and PORTFOLIO, like other RC papers, should not be ferrotyped or dried on a drum or flatbed ferrotyper as these can cause softening of the polyethylene. When a dryer for polyethylene laminated papers is not available, remove excess water from the prints and leave them to dry naturally. At room temperature, prints will dry in 10 to 20 minutes.

**5 MACHINE PROCESSING**

MULTIGRADE IV RC papers can be processed in all conventional machines designed to process black and white resin coated papers. The ILFORD 2650 with ILFORD 2000 RT chemicals and the ILFORD ILFOLAB 2150 with ILFORD 2150 XL chemicals are recommended.

The replenishment rate of ILFORD 2000 RT chemicals for MULTIGRADE IV RC DELUXE and PORTFOLIO is: For every 8x10 inch sheet processed, replenish with 7.5ml of ILFORD 2000 RT developer and 12.5ml of ILFORD 2000 RT fixer.

MULTIGRADE IV RC papers have an increased rate of drying. In most machines (and dryers) the drying temperature can be reduced to lower energy consumption and thus lower machine heat output into the working environment.

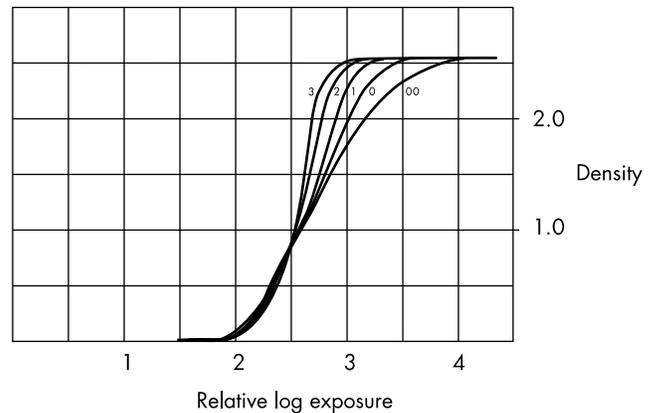
MULTIGRADE IV RC papers CAN NOT be processed in the Kodak Royalprint processor, in activation/stabilization processors (i.e., Kodak Ektamatic processor) or four bath activation processors.

**The recommended ILFORD paper for this type of processing is MULTIGRADE III RC RAPID.**

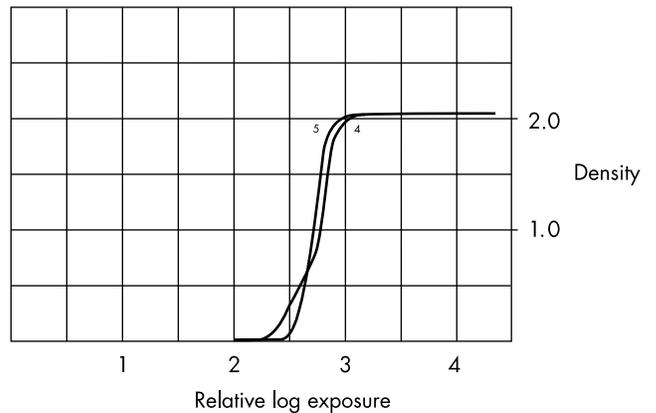
**5.1 CHARACTERISTIC CURVES**

MULTIGRADE IV RC DELUXE and PORTFOLIO glossy or pearl paper exposed through MULTIGRADE filters 00, 0, 1, 2, 3, 4 and 5. Processed in ILFORD MULTIGRADE Developer diluted 1+9 for 1 minute at 68°F.

Glossy and Pearl, Grades 00–3



Glossy and Pearl, Grades 4 and 5



## 6 FINISHING

### 6.1 TONING

ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO can be used with most toners. Modern photographic paper emulsions, however, are more resistant to image color changes and can vary between manufacturers. The following table is a guide to determine which toner to use to produce a given color change. Use of a hardening fixer is not recommended as it will impede toning.

Toner	Color
*Polysulfide	Light Brown/Yellow
*Sepia (Sulfide)	Brown (Slightly Red)
Thiorea	Rich Brown (Variable to Cool Brown)
*Gold	Light Brown/Yellow
*Selenium	Neutral (Slightly Cool or Purple)
Copper	Red
Iron	Blue

\*Recommended for archival permanence

### 6.2 MOUNTING

MULTIGRADE IV RC DELUXE and PORTFOLIO prints can be mounted, using either dry mounting tissue or double-sided adhesive tapes and tissues.

### 6.3 RETOUCHING

MULTIGRADE IV RC DELUXE and PORTFOLIO prints can be spotted and airbrushed using dye or watercolor. Knifing should be done with care, using a sharp pointed blade in a stippling action.

### 6.4 STORAGE

MULTIGRADE IV RC papers have good keeping properties and can be stored in a cool dry place without any significant change in photographic properties.

### 6.5 PRINT DISPLAY

Properly processed MULTIGRADE IV RC DELUXE or PORTFOLIO prints will have a more than adequate storage life for most purposes. Print life will be shortened, however, in adverse storage conditions, or if the print is exposed to oxidizing gases.

It is recommended that prints made for display are toned to protect them from the oxidizing gases that are found in many environments. Selenium toner is recommended as it has little effect on the image color of MULTIGRADE IV RC papers, but other protection methods including sulfide toning and laminating may be used.

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ILFORD PHOTO  
West 70 Century Road  
P.O. Box 288  
Paramus, New Jersey 07653  
(201) 265-6000

ILFORD ANITEC (CANADA) LIMITED  
2751 John Street  
Markham, Ontario  
Canada L3R 2Y8  
(905) 940-4455

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