

# PRODUCT INFORMATION BULLETIN

COLOR REVERSAL FILMS

## FUJICHROME PROVIA 400X Professional [RXP]

### 1. FEATURES AND USES

FUJICHROME PROVIA 400X Professional [RXP] is a daylight-type high-image-quality color reversal film with an ISO speed rating of 400. This film boasts one of the world's highest levels of grain quality and sharpness, while delivering the same vivid color reproduction and regulated gray balance as that of ISO 100 film. Furthermore, it produces fine results in push-/pull-processing for exposures ranging from  $-1/2$  stop (EI 280) to  $+2$  stops (EI 1600). These qualities make this a highly versatile film for general applications, including landscape, nature, snapshot and portrait photography.

#### Features

- Brilliant Color Reproduction** ..... Brilliant ISO 100-level color reproduction through the incorporation of new-generation couplers and Multi-Color-Correcting Layer Technology
- Fine Grain** ..... RMS granularity of 11, one of the world's highest levels among ISO 400 color reversal films
- Rich Tone Reproduction** ..... Smooth tone reproduction from the highlights to the shadows and subtly differentiated gray gradation
- Excellent Long-exposure Suitability** ..... Minimal reciprocity-related speed reduction and color balance variation in long exposures
- Superb Push/Pull Processing Suitability** ..... Minimal color and gradation variation during push/pull processing from  $-1/2$  stop (EI280) to  $+2$  stop (EI1600), and up to  $+3$  stops (EI3200), depending on the subject, making this film ideal for low-light and other situations requiring high film sensitivity
- Enhanced Color Image Storage Permanence and Fade-resistance** ..... Dramatic improvement over RHPIII in color image storage permanence and color fading resistance as a result of new-generation couplers

\* RMS stands for "Root Mean Square", a widely used standard method for measuring the degree of grain in photographic film. The lower the RMS number, the smaller the apparent grain.

### 2. SPEED

Light Source	Speed	Filter
Daylight	ISO 400/27**	None
Tungsten Lamps (3200K)	ISO 125/22**	No. 80A**

\* Indicates the effective speed resulting from designated filter use.

\*\* Wratten filter

### 3. FILM SIZES, EMULSION NUMBER, BASE MATERIAL AND THICKNESS

Sizes	Emulsion Number	Base Material	Base Thickness
<b>• Rolls*</b> 135 ... 36-exp. 120 ... 12-exp. ... 12-exp. (5-roll packs)	#101-	Cellulose Triacetate	127 $\mu$ m --- 98 $\mu$ m

\*Some sizes are not available in certain markets.

### 4. EXPOSURE GUIDE FOR VARIOUS LIGHT CONDITIONS

Use a meter for exposure determination. If a meter is not available, refer to the following table.

Light Conditions	Seashore or Snow Scenes under Bright Sun	Bright Sunlight	Hazy Sunlight	Cloudy Bright	Cloudy Day or Open Shade
<b>Lens Aperture</b>	f/16	f/11	f/11	f/11	f/8
<b>Exposure Time (sec.)</b>	1/1000	1/1000	1/500	1/250	1/250

#### NOTES

- The foregoing settings are for 2 hours after sunrise and 2 hours before sunset.
- Provide a lens opening  $1/2$ -stop smaller during the summer and  $1/2$ -stop larger during the winter (except for snow scenes).
- Excessively bright (or dark) or backlighted subjects may require plus (or minus) 1-stop lens opening adjustments.

#### Daylight

Under normal daylight conditions, color balancing filters are not necessary, but the following exposure conditions may require the indicated filters.

- A UV filter No. 2C\* or other appropriate ultraviolet absorbing filter is recommended for scenes that are shone upon by strong ultraviolet light, such as seaside locations, snow scenes, and bright distant views.
- Excessively high or low color temperatures may require the following filters and exposure corrections.

Subject Conditions	Filter	Exposure Correction
High Color Temperature: Cloudy weather landscapes or portraits in open shade in clear weather.	No.81A*	+1/3 stop**
Low Color Temperature: Morning and evening twilight scenes and portraits.	No.82A* or No.82C*	+1/3 to +2/3 stop**

\* Wratten Filter

\*\* A "+" followed by a number indicates the required increase in lens opening.

### Electronic Flash

- Electronic flash produces light similar to daylight, so filters are not needed. However, the possibility of undesirable effects on color balance, due to various factors (differences in equipment, use duration, etc.) should be taken into consideration. Test exposures are recommended.
- The use of a flash meter is advisable, but the following formula can also be used to obtain satisfactory lens opening.

$$\text{Aperture (F-number)} = \frac{\text{Lens Electronic Flash Guide Number (at ISO 400)}}{\text{Electronic Flash-to-Subject Distance (meters)}}$$

- Set the film speed at ISO 400. Since the amount of light reflected onto the subject from surrounding surfaces will differ with the conditions, refer to the flash unit instructions.

### Daylight Photoflood / Photo-Reflector Lamps

- Daylight-type photoflood or photo-reflector lamp output may be lower than that indicated by the exposure meter. So it is advisable to compensate for this by increasing exposure time or lens opening. Whenever possible, test exposures are recommended.
- Other factors requiring consideration when determining the exposure time are lamp configuration, use duration and line voltage, as they may affect lamp output and color balance.

### Fluorescent Lamps

- The use of the following combinations of color compensating filters is advisable when photographing under fluorescent lighting.
- For exacting work, however, test exposures are recommended because lamp brand and age may affect light output and color balance.

Fluorescent Lamp Type	White (W)	Daylight (D)	Cool White (CW)	Warm White (WW)
Color Compensating Filters*	20M	40R	25M+5R	40B+5M
Exposure Corrections**	+2/3 stop	+1 stop	+1 stop	+1 2/3 stops

(Exposure time: 1/2 sec.)

\* Wratten Color Compensating Filters are recommended.

\*\* Exposure correction values when using a filter relative to unfiltered exposure results. A "+" followed by a number indicates the required increase in lens opening.

### NOTES

- Use a shutter speed slower than 1/30 second.
- For shutter speeds of 2 minutes or more, exposure adjustments will be necessary to compensate for reciprocity law failure.

### Tungsten Lamps

- A Wratten Filter No.80A is required when using 3200K tungsten lighting. A 1 2/3-stop larger lens opening is also required.
- If household tungsten lighting (room lamps, etc.) constitutes the main source of illumination, in addition to the above filter a Wratten Filter No.82A is required, plus an aperture increase of 1/3 stop (total 2 stops).

### Mixed Light Sources

Under mixed light conditions, the basic filter configuration should suit the main light source. In the case of cameras with TTL metering, there is no need for additional exposure compensation for any CC filter(s) used.

## 5. LONG AND MULTIPLE EXPOSURE COMPENSATION

No exposure correction or color balance compensation is required for exposures within a shutter speed range of 1/4000 second to 1 minute. However, for exposures of 2 minutes or longer, 'reciprocity law failure'-related color balance and exposure compensations are required.

Exposure Time	1/4000 sec. – 1 min.	2 min.	4–8 min.
Color Compensating Filter	None	2.5R	5R
Exposure Corrections*		+ 1/2 stop	+ 1 stop

\* Exposure correction values when using a filter relative to unfiltered exposure results. A "+" followed by a number indicates the required increase in the lens opening.

**Note** : The above figures are based on the use of standard processing for films with average emulsions. These figures should therefore be used as a rough guide only. For more accurate results, it is recommended that test exposures be made under the actual shooting conditions.

**7. EXPOSURE PRECAUTIONS**

With artificial light, such as electronic flash, photoflood, fluorescent, tungsten, high intensity discharge lamp (metal halide, sodium, mercury vapor), etc., the lamp output and color temperature may be affected by such factors as brand, age of equipment and line voltage. Reflectors and diffusers can also influence light intensity and color temperature.

**8. UNPROCESSED FILM HANDLING / STORAGE****HANDLING**

- Expose film before the expiration date indicated on the film package and process as soon as possible after exposure.
- Roll film should be loaded and unloaded quickly and away from direct sunlight.
- Film loaded in cameras should be exposed and processed promptly.
- X-ray inspection machines used to inspect checked-in baggage at airports can cause fogging of film. Put both exposed and unexposed film into carry-on baggage (preferably in a transparent plastic bag or a net bag that allows the film to be seen). Because of the increasing number of airports using strong X-ray machines for carry-on baggage, it is recommended that you remove film from your carry-on baggage and request a visual (manual) inspection of your film.
- Film fogging may occur near X-ray equipment used in hospitals, factories, laboratories and other places where radiation is used. Always keep film away from sources of radiation.

**STORAGE**

Storing exposed or unexposed film under hot and humid conditions may adversely affect the speed, color balance and physical properties of the film. Although it is best to store film at a low temperature, for practical purposes, film should be stored as follows:

<b>Short-term Storage</b>	Store at 15°C or below
<b>Long-term Storage</b>	Store at 0°C or below

- New building materials, newly manufactured furniture, paints and bonding agents may produce gases which could affect photographic film. Do not store film, lightproof boxes containing film or cameras or film holders loaded with film near these materials.
- Film should be sealed in plastic bags\* prior to cold storage. When taken out of cold storage, film should be allowed to reach room temperature before opening by letting it stand over 3 hours (for refrigerated film) or over 6 hours (for frozen film). Opening film while it is still cold may cause condensation to form on the film surface, causing color changes or the emulsion to become more susceptible to scratches.

\* Polyester, polystyrene, polyethylene, polypropylene, etc.

**9. PROCESSING**

This film is designed for processing by Process E-6 or its equivalent, as well as Fujifilm Process CR-56.

**10. PROCESSED FILM HANDLING AND STORAGE**

Since the purpose of film is often to provide a long-term record of memorable events, as much effort as possible has been made to use materials that exhibit the least amount of change over time, but the effects of light, heat, atmospheric oxygen, contaminant gases, humidity and mold cannot be completely avoided. It is possible, however, to minimize change in the photographic image or base material by maintaining appropriate storage conditions, such as those used by museums and art galleries. Temperature and humidity control is the most important key to minimizing the change that occurs in film. Films stored in the dark under the following conditions may be expected to show almost no change over time.

Storage Period with Almost No Change	Temperature	Relative Humidity
More than 20 years	Below 10°C	30%–50%
10–20 years	Below 25°C	30%–50%

- (1) Color reversal film should be mounted or inserted into sleeves\* for storage.

\* Made of polyester, polystyrene, polyethylene, polypropylene, etc.

- (2) Processed film should be stored at a place as far away as possible from high temperatures, direct sunlight and other strong light and direct illumination. The following conditions are not desirable for the storage of film and should be avoided in the case of long-term storage:

- Storage in a closet lying against a wall that is exposed to cold, outside air (where condensation may form).
- Storage in an attic or on top of a closet or cabinet near the ceiling (where high temperatures may form).

**11. VIEWING LIGHT SOURCES**

Use a standard viewer. Visual responses will differ with light source quality and brightness. Therefore, employ a viewer which meets the ISO/ANSI standard.\*

\* The ISO standard (ISO/DP3664-2000) specifies an illuminated viewer surface with a color temperature derived from a CIE illuminant D50 (D: Daylight) with a reciprocal color temperature of 5000K, an average brightness of 1270cd/m<sup>2</sup> ± 320cd/m<sup>2</sup>, a brightness uniformity of more than 75 and an average color rendition assessment value of more than Ra90. Transparency viewers should meet these standards.




**12. PRINTS AND DUPLICATES**




Prints can be directly made from this film to FUJICHROME papers or color papers for digital output. High-quality duplicates can be made on FUJICHROME DUPLICATING FILM CDU TYPE II.

**13. RETOUCHING**

Changes in density and color balance can be made by using readily available retouching dyes and bleaching chemicals. However, due to this film's improved image permanence (color fading resistance), the color dyes of this film are harder to remove than those of the current RHP III.

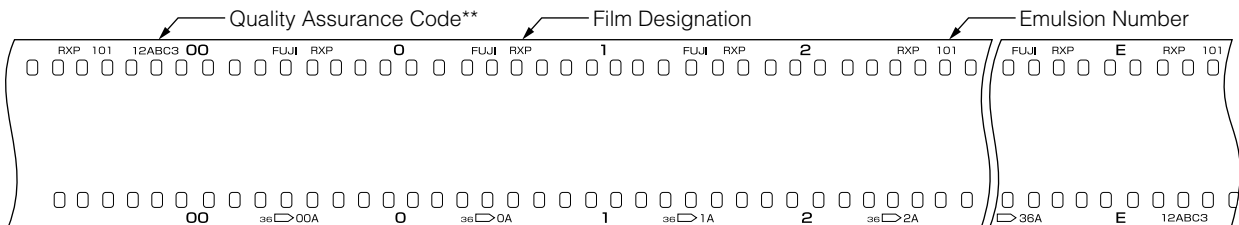
**14. PACKAGING SPECIFICATIONS**

Size	Item	Contents
135	Film Box	New Design Identification Color : Black  
	Plastic Case	Same as the current product.
	Cartridge	New Design Identification Color : Black  
120	Film Box	New Design Identification Color : Black   5 roll pack

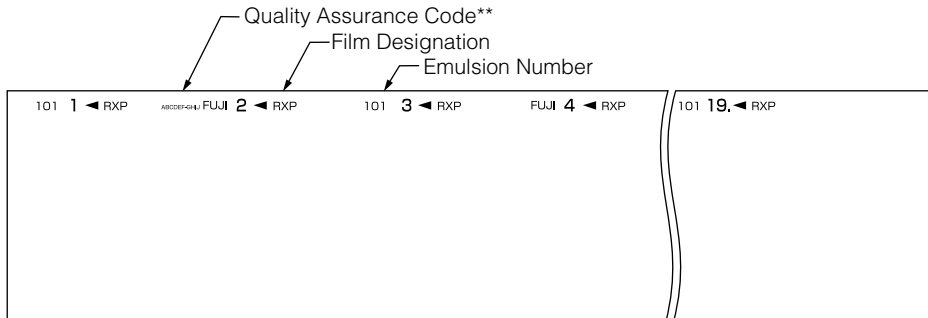
Size	Item	Contents		
120	Envelope	PROVIA 400X and RXP printed 		
	Backing Paper	New Design	(Before Exposure) 	(After Exposure) 

**15. PROCESSED FILM EDGE MARKINGS\***

• 135 Size



• 120 Size



**NOTES**

- \* The emulsion is on the opposite side. (Base side facing you)
- \*\* This code represents an identification marking enabling Fujifilm's manufacturing quality control system to assure individual quality.

**16. TECHNOLOGIES INCORPORATED IN PROVIA 400X**

**1. ESC (Epitaxial Sigma Crystal) Technology**

The newly developed Epitaxial Sigma Crystal technology fuses fine grain of a different composition to the apex of aspect-ratio-enhanced Sigma grain to enhance the fineness of the emulsion grain. The result is the attainment of an ISO-400 film with an extremely high granularity (RMS11) approaching that of ISO-100 reversal film.

**2. PSHC (Pure, Stable & High-performance dye-forming Coupler) Technology**

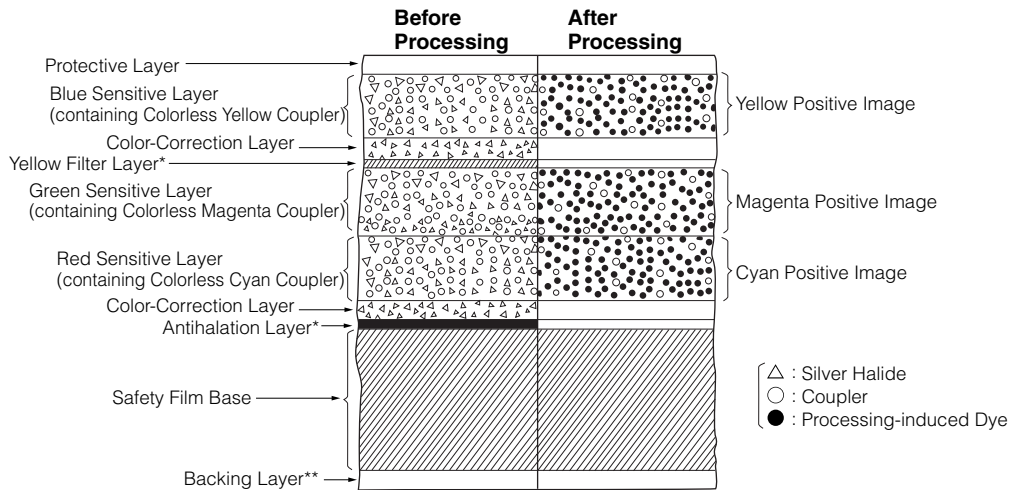
Through the adoption of the high-color-saturation yellow, magenta and cyan couplers used in Velvia 100/100F

and ASTIA 100F and other films, PROVIA 400X is able to produce colors of extremely high purity. Furthermore, the couplers' superb color material durability has enabled a dramatic improvement in image permanence over the previous RHP III.

**3. MCCL (Multi-Color-Correction Layer) Technology**

Through the incorporation of Fujifilm's proprietary Multi-Color-Correction Layer technology used in Velvia 100/100F and ASTIA 100F to control the inter-image effect, PROVIA 400X is able to provide a color saturation level suitable for landscape photography, as well as skin tones suited to portrait photography.

**17. FILM STRUCTURE**



\* These layers become colorless and transparent after processing.

\*\* 135-size film does not have a backing layer.

**18. DIFFUSE RMS GRANULARITY VALUE ..... 11**

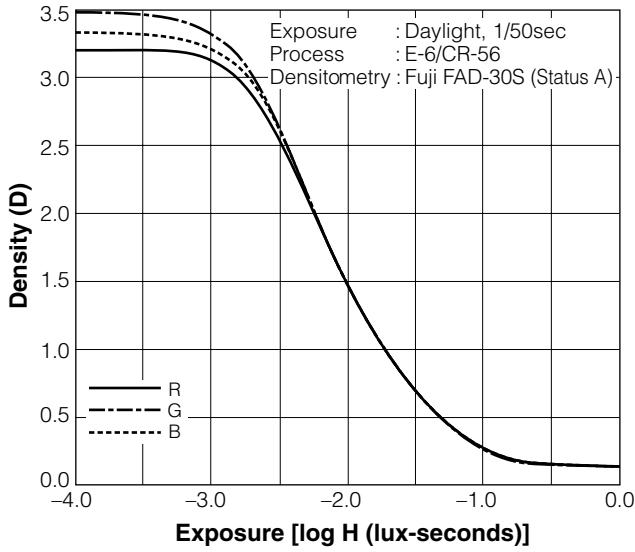
Micro-Densitometer Measurement Aperture : 48 μm in diameter  
Sample Density: +1.0

**19. RESOLVING POWER**

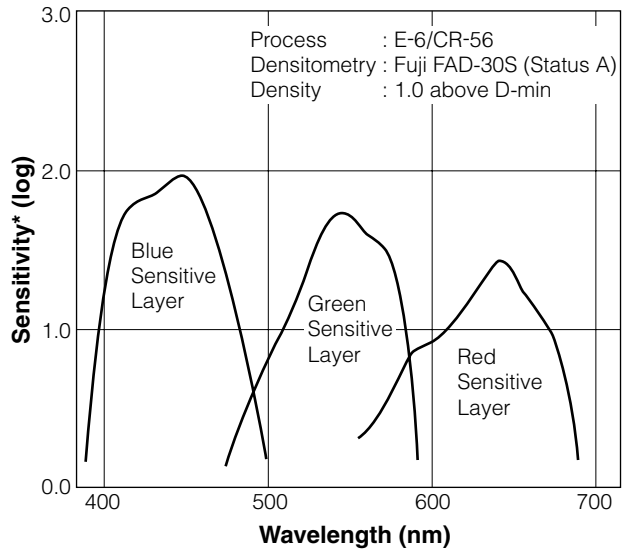
Test-Object Contrast: 1.6:1 ..... **55** lines/mm  
Test-Object Contrast: 1000:1 ..... **135** lines/mm

\* Based on Fujifilm measurements. Due to difference in measurement conditions, comparison with color negative film is not possible.

**20. CHARACTERISTIC CURVES**

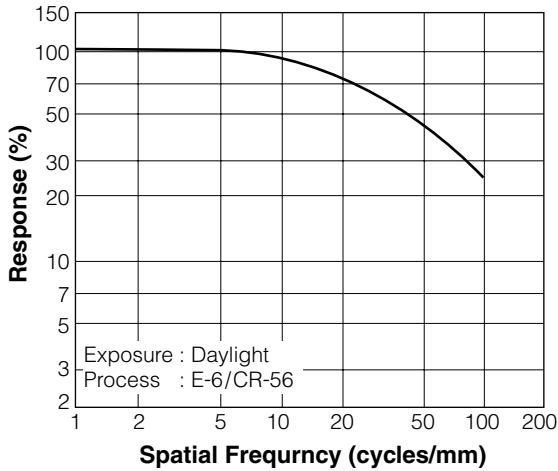


**21. SPECTRAL SENSITIVITY CURVES**

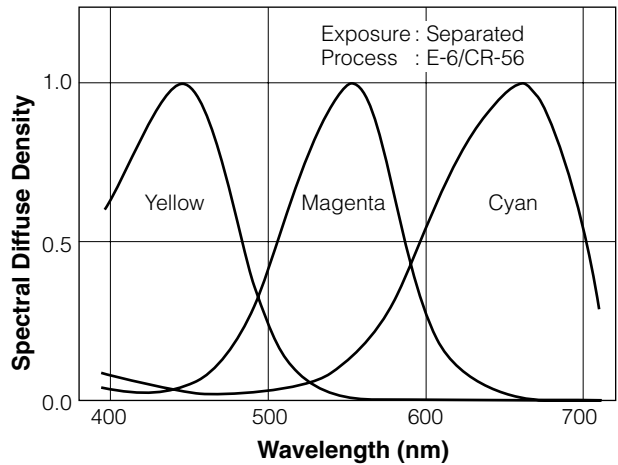


\* Sensitivity equals the reciprocal of the exposure (J/cm<sup>2</sup>) required to produce a specified density.

**22. MTF CURVE**



**23. SPECTRAL DYE DENSITY CURVES**



**NOTICE** The data published herein were derived from materials taken from general production runs. However, as Fujifilm is constantly upgrading the quality of its products, changes in specifications may occur without prior notice.