

PRODUCT INFORMATION BULLETIN

COLOR NEGATIVE FILMS

FUJICOLOR TRUE DEFINITION 400 [CH]

1. FEATURES AND USES

FUJICOLOR TRUE DEFINITION 400 is a new daylight type ISO400 color negative film that incorporates the New Fine Color Film Technology featuring new gradation design along with 4th Color Layer Technology and Super Fine- Σ (Sigma) Grain Technology. Newly developed Fine Color Film Technology is a technology which realizes natural and smooth gradation that captures precise detail over a wide exposure range with brilliant color maintained.

Features	Results
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| <ul style="list-style-type: none"> • Natural Skin Tones | <ul style="list-style-type: none"> • Natural skin tone with continuously smooth gradation from the high-lights to shadows without washed-out flash pictures. |
| <ul style="list-style-type: none"> • Soft Gradation | <ul style="list-style-type: none"> • Rich highlight-to-shadow tone reproduction that allows for fine details to be reproduced. |
| <ul style="list-style-type: none"> • High Speed and Wide Exposure Latitude | <ul style="list-style-type: none"> • High sensitivity that allows images to be captured effectively even under low light conditions. |
| <ul style="list-style-type: none"> • Excellent Sharpness | <ul style="list-style-type: none"> • Extremely sharp depiction of all aspects of the image including texture details |

It requires no color-compensating filters when used under daylight conditions or with an electronic flash.

2. ISO FILM SPEED

Light Source	ISO Film Speed	Color Balancing Filter
Daylight & Electronic Flash	400/27°	None
Tungsten Light (3200K)	100/21** equivalent	Wratten No. 80A (or LBB-12**)

* Indicates the effective speed resulting from designated filter use.

** Fuji Light Balancing filter

3. FILM SIZES, PRODUCTION NUMBER, BASE MATERIAL AND THICKNESS

Size and Package Configuration		Production Number
Roll	135 ... 24-exp.	DO1A and above

	Base Material	Thickness
Roll	Cellulose Triacetate	122 μ m (135)

4. EXPOSURE GUIDE

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

Daylight Exposure Guide Table

Light Conditions	Bright Sunlight	Hazy Sunlight	Cloudy Bright	Cloudy Day or Open Shade
Lens Aperture	f/16	f/16	f/11	f/8
Shutter Speed (sec.)	1/500	1/250		

- NOTES**
- The foregoing settings are for 3 hours after sunrise and 3 hours before sunset.
 - Provide lens openings 1/2-stop smaller during the summer and 1/2-stop larger during the winter.
 - Excessively bright (or dark) or backlighted subjects may require plus (or minus) 1 or 2-stop lens opening adjustments.

Low Light Exposure Guide Table

Light Conditions	Fine Weather Daytime Indoor Scenes	Nighttime Indoor Scenes (under Fluorescent Light)	Evening Scenes	Night Scenes
Lens Aperture	f/2.8 to 4	f/2 to 2.8	f/2.8 to 4	f/2 to 2.8
Shutter Speed (sec.)	1/60	1/30	1/60	1/30

NOTE Since light intensities for indoor and night scenes vary widely from location to location, the data above should be used only as a guide.

5. EXPOSURE FOR VARIOUS LIGHT CONDITIONS

Daylight

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

Subject Conditions	Filter
Fair weather / open shade and shaded landscapes	Wratten filter No. 2C (SC-39*)
Bright distant scenes, snow landscapes, seaside scenes, aerial scenes and open landscapes	Wratten filter No. 1A (SC-40M*)

* Fuji Sharp-cut Filter (Ultraviolet)

For excessively high or low color temperatures, use of the color balancing filters is recommended.

NOTE: When artificial illumination is being used as the main or auxiliary light source either indoors or outdoors under conditions in which sunlight is present, the use of either an electronic flash or blue flash bulbs is recommended.

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 (the type of flash used and amount of time used, etc.) should be taken into consideration. Test exposures are recommended.
- If shutter speeds slower than 1/60 second are used, light from non-flash sources, such as room lighting, may cause color imbalances. Make test exposures.
- The use of a flash meter is advisable, but the following formula can also be used to obtain satisfactory lens opening.

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

When using an auto flash unit, the ISO film speed setting should be set to 400. Since the amount of light on the subject may vary according to amount of light reflected from surrounding surfaces and other factors, follow the instructions provided with the flash unit.

Flash Bulbs

With blue flash bulb exposures, compensating filters are unnecessary. With clear flash bulbs, however, use a Wratten filter No. 80C (Fuji LBB-8* filter) and increase the lens opening by +1 stop. However, since the light quality may vary with the bulb type and the manufacturer and the amount of light may vary with the lighting equipment and diffusion technique, test exposures should be made with the equipment being used.

* Fuji Light Balancing Filter

Daylight Photoflood/Photo-Reflector Lamps

- Daylight-type photoflood or photo-reflector lamp output may be lower than that indicated by the exposure meter. It is recommended to compensate for the difference by increasing the exposure time (by lowering the shutter speed) or by increasing the lens opening. Whenever possible, test exposures are recommended.
- Other factors that should be considered when determining the exposure settings are lamp configuration, length of time used and line voltage, as they may affect lamp output and color balance.

Fluorescent Lamps & High-Intensity Discharge Lamps

- For the best results, the following combinations of color compensating filters are recommended. However, for exacting work, test exposures are advisable.

Lamp Type	Fluorescent				High-Intensity Discharge	
	Daylight (D)	Cool White (C.W)	White (W)	Warm White (W.W)	Deluxe White Mercury	Clear Mercury
Color Compensating Filters*	10M +10Y	—	10C	30C +30M	10C	40M +40Y
Exposure Corrections**	+1/3	—	+1/3	+1	+1/3	+1 1/3

* Fuji Color Compensating Filters (or Wratten Color Compensating Filters)

** Exposure correction values include filter exposure factors. These values are added to unfiltered exposure meter readings. A "+" followed by a number indicates the required increase in lens opening.

- When the fluorescent lamp characteristics are unknown, to obtain generally acceptable results, use a 30M compensating filter and open the lens one stop (+1).

NOTE Different compensation may be required according to special lamp types and length of use, so test exposures are recommended, whenever possible.

- Shutter speeds of 1/125 second for high-intensity discharge lamps and 1/30 second or larger, for fluorescent lamps, will avoid AC power-induced changes in brightness and color being recorded on the film.

Tungsten Lamps

When using 3200K tungsten lighting, use a Wratten filter No. 80A (Fuji LBB-12* filter) and increase the lens opening by +2 stops. In the case of cameras with TTL metering, there is no need for additional exposure compensation.

* Fuji Light Balancing Filter

6. LONG EXPOSURE COMPENSATION

No exposure or color balance compensation is required for exposures within a 1/4000 to 2 second shutter speed range. However, for exposures of 4 seconds or longer, provide the compensations indicated below.

Exposure Time (sec.)	1/4000 to 2	4	16	64
Exposure Corrections*	Unnecessary	+ 1/3	+ 2/3	+ 1

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

Except for special effects, the normal intensity ratio for main-to-fill subject lighting should remain within 1:4 limits.

7. EXPOSURE PRECAUTIONS

When using an accessory such as a reflector umbrella, reflector or diffuser to control light intensity or diffuse the light, make sure that no change has occurred in the color or composition of the accessory's materials or reflective surface, and that the color of the light has not been altered by the material.

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.
- When removing film stored at low temperatures (in a refrigerator or freezer, etc.), allow it to reach room temperature before opening it. 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.
- Roll film should be loaded and unloaded quickly and away from direct sunlight.
- Film loaded in cameras should be exposed and processed promptly.
- X-rays 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:

Short-term Storage	Store at a place (cool and dark) away from direct sunlight or high temperatures and humidity.
Long-term Storage	Store at 10°C (50°F) 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).

* Polyester, polystyrene, polyethylene, polypropylene, etc.

9. PROCESSING

This film is intended for processing by Fujifilm Processes CN-16, CN-16Q, CN-16FA, CN-16L, CN-16S or Process C-41.

9-1 Replenishment Rate

The following table shows the replenishment rates for each type of Fujifilm Processes.

CN-16Q		CN-16FA	
Processing Solution	Replenishment Rate*	Processing Solution	Replenishment Rate*
NQ1-R	43	N1-R	22
NQ2-R	20	N2-R	5
NQ3-R	30	N3-R	16
NQS	30	NS	34
NQ4-R	20	N4-R	20

CN-16L		CN-16S	
Processing Solution	Replenishment Rate*	Processing Solution	Replenishment Rate*
N1-R	20	N1-R	15
N2-R	5	N2-R	5
N3-R	8	N3-R	7.5
NS	17	N4-R	30
N4-R	15		

*Replenishment Rate Replenisher volume (mL) per single roll (135/24 exp.)

9-2 Photographic and Processing Characteristics

Almost the same as those for the SUPERIA X-TRA 400.

10. PRINTER CONDITIONS

This film can be printed on the same printer setup with results similar to SUPERIA X-TRA400. However, depending on the printer type, a slight cyan cast might appear. If this occurs, adjustment of printer conditions may be necessary.

11. CONTROL STRIPS

Use FUJICOLOR NEGATIVE FILM CONTROL STRIPS to manage processing performance.

12. PROCESSED FILM HANDLING AND STORAGE

Since the purpose of film is 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 negative film should be inserted into sleeves for storage. Furthermore, it is recommended that film, as well as prints, be placed into non-airtight* containers made of paper, plastic**, or metal designed for the storage of photographs.

* To prevent film base (especially TAC base) decomposition, it is essential that the container or case be allowed to air out during one dry day each year.

** 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:

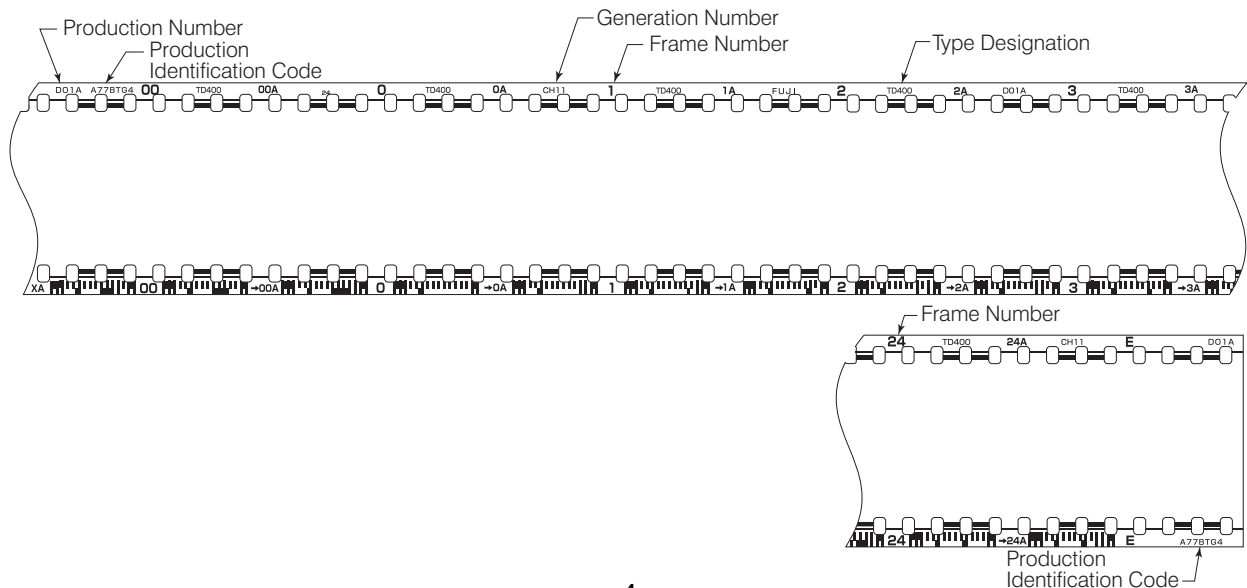
- Storage in a closet lying against a wall that is exposed to cold, outside air (where condensation may form).
- Storage in an attic or on top of a closet or cabinet near the ceiling (where high temperatures may form).

13. PROCESSED FILM EDGE MARKINGS AND FIGURES

Edge Markings

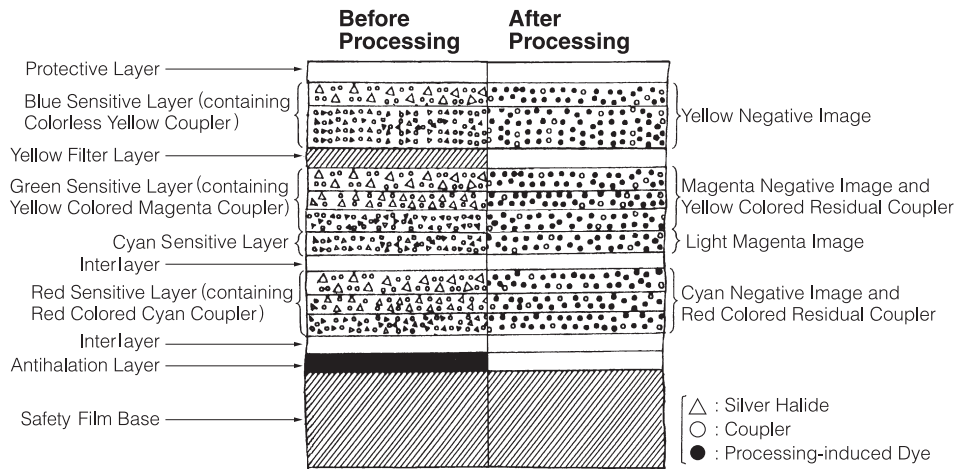
Item	
• Edge Stripe	One red solid line and one green short broken line on both sides
• Type Designation	TD400
• Generation Number	CH11
• Latent Image Bar Code	12-0
• FUJIFILM Identification Code	
Negative Carrier	
: 135B	0018
: 135C/D/J/K/S	24

• 135 Size (24 Exp.)



14.

FILM STRUCTURE



15. DIFFUSE RMS GRANULARITY VALUE

..... 5*

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

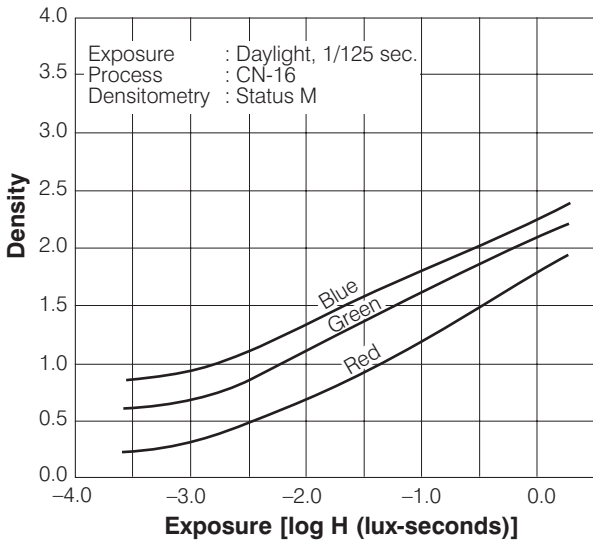
* Based on Fujifilm measurements. Due to difference in measurement conditions, comparison with color reversal film is not possible.

16.

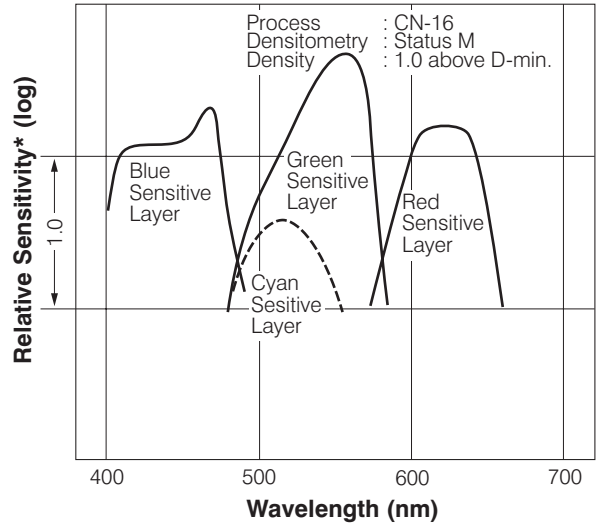
RESOLVING POWER

Test-Object Contrast: 1.6:1 50 lines/mm
 Test-Object Contrast: 1000:1 125 lines/mm

17. CHARACTERISTIC CURVES

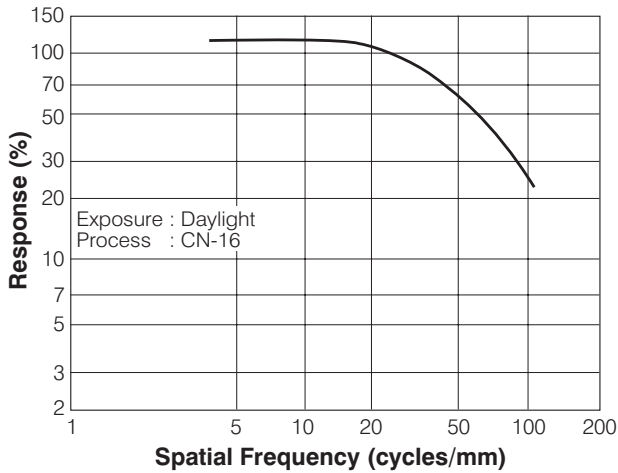


18. SPECTRAL SENSITIVITY CURVES

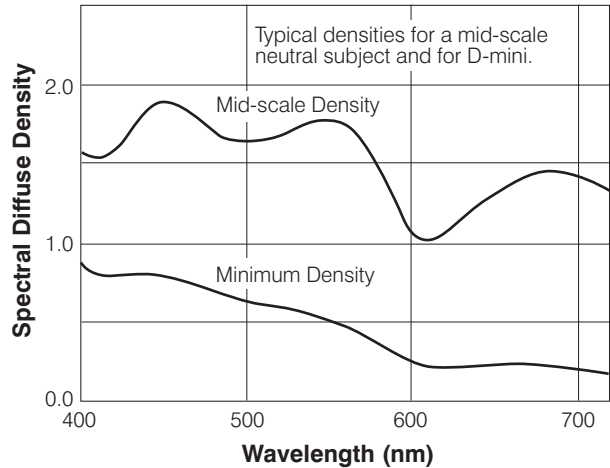


* Sensitivity equals the reciprocal of the exposure (J/cm²) required to produce a specified density.

19. MTF CURVE



20. SPECTRAL DYE DENSITY CURVES



NOTICE The data herein published were derived from materials taken from general production runs. However, changes in specifications may occur without prior notice.