# KODAK PLUS-X Pan and KODAK PLUS-X Pan Professional Films

## DESCRIPTION

### KODAK PLUS-X Pan Film / PX
### KODAK PLUS-X Pan Professional / PXP

KODAK PLUS-X Pan and PLUS-X Pan Professional Films are medium-speed (ISO 125 / 22˚) panchromatic films that are good choices for general-purpose outdoor or studio photography. They feature extremely fine grain and excellent sharpness.

PLUS-X Pan Film (PX) is available in 135 size and 35 mm long rolls on a 5-mil gray acetate base.

PLUS-X Pan Professional Film (PXP) is available in 120 and 220 size on a 3.6-mil acetate base. This film (PXP) has a retouching surface on the emulsion side.

### KODAK PLUS-X Pan Professional Film / ESTAR Base / PXE, and sheet / ESTAR Thick Base / PXT

KODAK PLUS-X Pan Professional Films (PXE and PXT) are medium-speed (ISO 125 / 22˚) films recommended for general studio use, particularly when a high degree of enlargement is needed. They offer excellent separation of highlight tones and very fine grain. You can retouch the emulsion or the base side.

PLUS-X Pan Professional Film (PXE) is available in 70 mm long rolls on a 4-mil ESTAR Base.

PLUS-X Pan Professional Film (PXT) is available in sheet sizes on a 7-mil ESTAR Thick Base.

| FEATURES | BENEFITS |
|---|---|
| • PLUS-X Pan and PLUS-X Pan Professional Films feature extremely fine grain.<br>• Sheet and 70 mm PLUS-X Pan Professional Films feature very fine grain. | • Excellent for producing high-quality images |
| • Wide exposure latitude | • Rich tonality maintained with overexposure and underexposure |
| • Very high sharpness | • Excellent for applications that require a high degree of enlargement |
| • High resolving power | • Good rendition of detail |

## SIZES AVAILABLE

Sizes and CAT numbers may differ from country to country. See your dealer who supplies KODAK PROFESSIONAL Products.

**KODAK PLUS-X Pan Film**

| Roll | Base | Letter Code | CAT No. |
|---|---|---|---|
| 135-24 | 5-mil gray acetate | PX | 159 2591 |
| 135-36 | 5-mil gray acetate | PX | 165 3971 |

| Roll mm x ft | Base | Spec Code | Letter Code | CAT No. |
|---|---|---|---|---|
| 35 x 50 | 5-mil gray acetate | 401 | PX | 101 7383 |
| 35 x 100 | 5-mil gray acetate | 402 | PX | 105 5672 |

**KODAK PLUS-X Pan Professional Film**

| Roll | Base | Letter Code | CAT No. |
|---|---|---|---|
| 120 pro-pack | 3.6 mil acetate | PXP | 857 4121 |
| 220 pro-pack | | | 871 7910 |

**KODAK PLUS-X Pan Professional Film / ESTAR Base**

| Size mm x ft | Base | Spec Code | Letter Code | CAT No. |
|---|---|---|---|---|
| 70 x 100 | ESTAR | 473 | PXE | 165 0480 |

**KODAK PLUS-X Pan Professional Film / ESTAR Thick Base**

| Sheets Per Package | Size (inches) | Film Notch | Base | Letter Code | CAT No. |
|---|---|---|---|---|---|
| 25 | 4 x 5 | | ESTAR Thick | PXT | 144 3167 |
| 100 | 4 x 5 | | | | 144 3423 |
| 100 | 5 x 7 | | | | 144 3118 |
| 25 | 8 x 10 | | | | 144 3159 |
| 50 | 8 x 10 | | | | 144 3217 |

## STORAGE AND HANDLING

Load and unload your camera in subdued light.

High temperatures or high humidity may produce unwanted quality changes. Store *unexposed* film at 75˚F (24˚C) or lower in the original package. Always store film (exposed or unexposed) in a cool, dry place. For best results, process film as soon as possible after exposure.

Protect *processed* film from strong light, and store it in a cool, dry place. For more information on storing negatives, see KODAK Publication No. E-30, *Storage and Care of Photographic Materials—Before and After Processing.*

## EXPOSURE

### Daylight

Use the exposures in the table below for frontlighted subjects from 2 hours after sunrise to 2 hours before sunset.

| Lighting Conditions | Shutter Speed (Second) | Lens Opening |
|---|---|---|
| Bright or Hazy Sun on Light Sand or Snow | 1/250 | *f*/16 |
| Bright or Hazy Sun (Distinct Shadows) | 1/250 | *f*/11* |
| Weak, Hazy Sun (Soft Shadows) | 1/250 | *f*/8 |
| Cloudy Bright (No Shadows) | 1/250 | *f*/5.6 |
| Heavy Overcast or Open Shade† | 1/250 | *f*/4 |

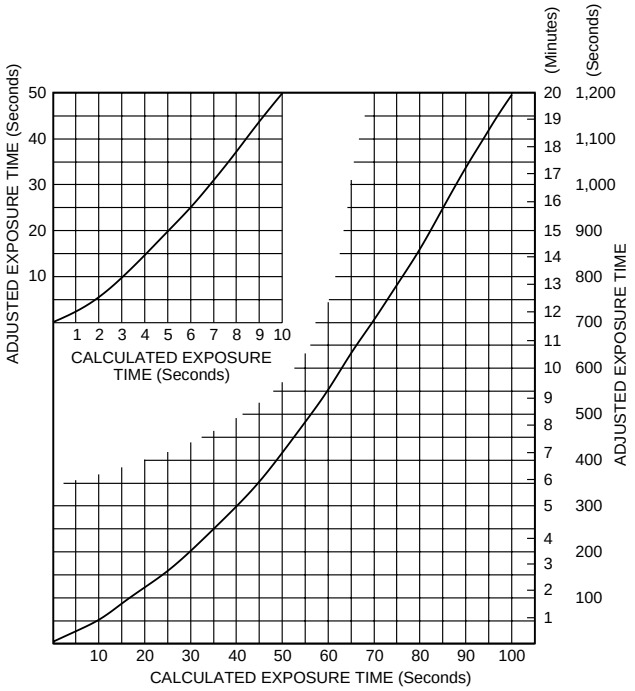
* Use *f*/5.6 at 1/250 for backlit close-up subjects.
† Subject shaded from the sun but lit by a large area of clear sky.

### Exposure and Development Adjustments for Long and Short Exposures

At the exposure times in the table below, compensate for the reciprocity characteristics of this film by increasing exposure and adjusting the development as shown.

| If Indicated Exposure Time Is (Seconds) | Use This Lens-Aperture Adjustment | OR | This Adjusted Exposure Time (Seconds) | AND Use This Development Adjustment |
|---|---|---|---|---|
| 1/100,000 | +1 stop | | Adjust aperture | +20% |
| 1/10,000 | +½ stop | | Adjust aperture | +15% |
| 1/1,000 | None | | None | +10% |
| 1/100 | None | | None | None |
| 1/10 | None | | None | None |
| 1 | +1 stop | | 2 | –10% |
| 10 | +2 stops | | 50 | –20% |
| 100 | +3 stops | | 1200 | –30% |

It may be difficult to use the table to estimate the adjusted times for calculated exposure times between 1 and 100 seconds. The graphs that follow will help you find the adjusted times for calculated exposure times between those given in the table.

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### Filter Corrections

Multiply the normal exposure time by the filter factor.

| KODAK WRATTEN Gelatin Filter | Daylight | Tungsten |
|---|---|---|
| | Multiply Exposure By (Filter Factor) | Multiply Exposure By (Filter Factor) |
| No. 8 (yellow) | 2 | 1.5 |
| No. 11 (yellowish green) | 4 | 4 |
| No. 15 (deep yellow) | 2.5 | 1.5 |
| No. 25 (red) | 6 | 4 |
| No. 29 (deep red)* | 25 | 12 |
| No. 47 (blue)* | 6 | 12 |
| No. 58 (green)* | 8 | 8 |
| Polarizing Filter | 2.5 | 2.5 |

* Filter recommended for making separation negatives.

## DARKROOM RECOMMENDATIONS

Do not use a safelight. Handle unprocessed film in total darkness.

Using a safelight *will* affect your results. *If absolutely necessary*, after development is half complete, you can use a safelight equipped with a KODAK 3 Safelight Filter (dark green) with a 15-watt bulb for a few seconds. Keep the safelight at least 4 feet (1.2 metres) from the film. Run tests to determine that safelight use gives acceptable results for your application.

For information on safelight testing, see KODAK Publication K-4, *How Safe Is Your Safelight?*

## MANUAL PROCESSING

### General Recommendations

Handle unprocessed film in total darkness.

These starting-point recommendations are intended to produce a contrast index of 0.56. Make tests to determine the best development time for your application.

**Note:** Development times shorter than 5 minutes may produce unsatisfactory uniformity.

### Small-Tank Processing (8- or 16-ounce tank) —Rolls

With small single- or double-reel tanks, drop the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank on the top of the work surface to dislodge any air bubbles. Provide initial agitation of 5 to 7 inversion cycles in 5 seconds; i.e., extend your arm and vigorously twist your wrist 180 degrees.

Then repeat this agitation procedure at 30-second intervals for the rest of the development time.

### Large-Tank Processing (½ to 3½-gallon tank) —Rolls and Sheets

Agitate continuously for the first 15 to 30 seconds by raising and lowering the basket, rack, or spindle ½ inch. Do not agitate the basket, rack, or spindle for the remainder of the first minute. Then agitate once per minute by lifting the basket, rack, or spindle out of the developer, tilting it approximately 30 degrees, draining it for 5 to 10 seconds, and reimmersing it. Alternate the direction of tilting the basket, rack, or spindle.

**KODAK PLUS-X Pan Film / PX**
**KODAK PLUS-X Pan Professional Film / PXP**

| KODAK Developer or Developer and Replenisher | Development Time (Minutes) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Small Tank* | | | | | Large Tank† | | | | |
| | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) |
| T-MAX | 6½ | 5½ | 5½ | 5 | 5 | NR | NR | NR | NR | NR |
| T-MAX RS | 6½ | 5½ | 4½ | 4 | 3½ | 9 | 8 | 7 | 6 | 5½ |
| XTOL (135 PX) | 6½ | 5¼ | 4¾ | — | 3¾ | 7½ | 6½ | 6 | — | 4 |
| XTOL (120 PXP) | 6¾ | 5½ | 5 | — | 3¾ | 8½ | 6¾ | 6 | — | 4½ |
| HC-110 (Dil B) | 6 | 5 | 4½ | 4 | 3½ | 6½ | 5½ | 5 | 4¾ | 4 |
| D-76 | 6½ | 5½ | 5 | 4½ | 3¾ | 7½ | 6½ | 6 | 5½ | 4½ |
| D-76 (1:1) | 8 | 7 | 6½ | 6 | 5 | — | — | — | — | — |
| MICRODOL-X | 8 | 7 | 6½ | 6 | 5½ | 10 | 9 | 8 | 7½ | 7 |
| MICRODOL-X (1:3) | NR | NR | 11 | 10 | 9½ | NR | NR | 14 | 13 | 11 |

* With agitation at 30-second intervals. Development times shorter than 5 minutes may produce unsatisfactory uniformity.
† With manual agitation at 1-minute intervals. Development times shorter than 5 minutes may produce unsatisfactory uniformity.
NR = Not Recommended

**Note:** Use only KODAK HC-110 Developer (Dilution B) to process long rolls of PLUS-X Pan Film on spiral reels. Develop for 6 minutes at 68˚F (20˚C) or 4¼ minutes at 75˚F (24˚C).

## MANUAL PROCESSING (continued)

### Tray and Large-Tank Processing—Sheets

Provide continuous agitation; rotate the sheets 90 degrees as you interleave them. Prewetting sheet film may improve tray process uniformity.

| KODAK PLUS-X Pan Professional Film / PXE and PXT | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| KODAK Developer or Developer and Replenisher | Development Time (Minutes) | | | | | | | | | |
| | Tray* or Large Tank† | | | | | Large Tank‡ | | | | |
| | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) |
| T-MAX RS | 10 | 9 | 7½ | 6½ | 5 | 10 | 9 | 8 | 7½ | 7 |
| XTOL | 7½ | 6¼ | 5¾ | — | 4½ | 8½ | 7¼ | 6½ | — | 4¾ |
| HC-110 (Dil B) | 6 | 5 | 4¾ | 4½ | 4 | 8 | 7 | 6½ | 6 | 5½ |
| D-76 | 7 | 6 | 5½ | 5 | 4½ | 9 | 8 | 7½ | 7 | 6 |
| D-76 (1:1) | 8 | 7 | 6½ | 6 | 5 | — | — | — | — | — |
| MICRODOL-X | 9 | 8 | 7½ | 7 | 6 | 11 | 10 | 9½ | 9 | 8 |
| DK-50 (1:1) | 5 | 4½ | 4¼ | 4 | 3½ | 6½ | 6 | 5¾ | 5½ | 5 |

* With continuous agitation.
† With gaseous-burst agitation (1 second every 10 seconds) that provides pressure to raise the solution level inch (16 mm). Development times shorter than 5 minutes may produce unsatisfactory uniformity.
‡ With manual agitation at 1-minute intervals.

**Note:** If you use KODAK HC-110 Developer (Dilution B) to process long rolls of PLUS-X Pan Professional Film 2147 on spiral reels, develop for 8 minutes at 68˚F (20˚C) or 6 minutes at 75˚F (24˚C). With KODAK Developer DK-50, develop for 6½ minutes at 68˚F (20˚C) or 4½ minutes at 75˚F (24˚C).

# ROTARY-TUBE PROCESSING

## Rotary-Tube Processors

Follow the agitation recommendations for your processor. The times given below are starting-point recommendations. Make tests to determine if results at this rating are acceptable for your needs.

| KODAK PLUS-X Pan Film / PX | | | | | |
|---|---|---|---|---|---|
| **KODAK Developer or Developer and Replenisher** | **Development Time (Minutes)** | | | | |
| | **65°F (18°C)** | **68°F (20°C)** | **70°F (21°C)** | **72°F (22°C)** | **75°F (24°C)** |
| T-MAX | — | 5½ | 5 | 4½ | 3½ |
| T-MAX RS | — | 4½ | 4½ | 4 | 4 |
| XTOL | 5½ | 4½ | 4 | — | 3 |
| HC-110 (Dil B) | 8 | 7 | 6 | 5 | 4 |
| D-76 | 5½ | 5 | 4 | 3½ | 3 |

| KODAK PLUS-X Pan Professional Film / PXP | | | | | |
|---|---|---|---|---|---|
| **KODAK Developer or Developer and Replenisher** | **Development Time (Minutes)** | | | | |
| | **65°F (18°C)** | **68°F (20°C)** | **70°F (21°C)** | **72°F (22°C)** | **75°F (24°C)** |
| T-MAX | — | 5½ | 5 | 4½ | 3½ |
| T-MAX RS | — | 4½ | 4½ | 4 | 4 |
| XTOL | 5¾ | 4½ | 4 | — | 3 |
| HC-110 (Dil B) | NR | NR | 10 | 9 | 8 |
| D-76 | 7 | 6 | 5 | 4½ | 4½ |

NR = Not Recommended

| KODAK PLUS-X Pan Professional Film / PXE and PXT | | | | | |
|---|---|---|---|---|---|
| **KODAK Developer or Developer and Replenisher** | **Development Time (Minutes)** | | | | |
| | **65°F (18°C)** | **68°F (20°C)** | **70°F (21°C)** | **72°F (22°C)** | **75°F (24°C)** |
| T-MAX RS | 8 | 6½ | 5½ | 5 | 4½ |
| XTOL (with PXT)* | 5½ | 4½ | 4 | — | 3 |

* For PLUS-X Pan Professional Film / PXT

## PUSH PROCESSING

Push processing allows you to expose the film at higher film-speed numbers for conditions such as low-level light, stop action, or existing light. However, there will be a loss of shadow detail and an increase in graininess.

Because of the film's exposure latitude, you can underexpose by one stop at EI 250 and use normal processing times. Prints will show a slight loss in shadow detail.

You can underexpose by two stops at EI 500 if you increase development time by push processing. Prints will show an increase in contrast and graininess with further loss of shadow detail. However, the results will be acceptable for many applications. We recommend exposing a test roll to determine the film speed that will give the best results for your application.

**Note:** KODAK T-MAX RS Developer and Replenisher and KODAK T-MAX Developer produce more enhanced shadow detail than current popular push-processing developers when you process film normally or push it two stops.

| KODAK PLUS-X Pan Film / PX<br>KODAK PLUS-X Pan Professional Film / PXP | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| KODAK Developer or Developer and Replenisher | EI 500 (2-Stop Push Process)<br>Development Time (Minutes) | | | | | | | | | |
| | Small Tank | | | | | Large Tank | | | | |
| | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) |
| T-MAX | NR | NR | NR | NR | 9 | — | — | — | — | — |
| T-MAX RS | — | 9 | 8½ | 7½ | 6½ | NR | NR | NR | NR | 8 |
| XTOL (135 PX) | 9¼ | 8 | 7¼ | — | 5½ | — | — | — | — | — |
| XTOL (120 PXP) | 11 | 8½ | 7½ | — | 5¾ | — | — | — | — | — |

NR = Not Recommended

### Rotary-Tube

| KODAK Developer or Developer and Replenisher | KODAK PLUS-X Pan Film / PX | | | | | KODAK PLUS-X Pan Professional Film / PXP | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | EI 500 (2-Stop Push Process)<br>Development Time (Minutes) | | | | | | | | | |
| | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) |
| T-MAX* | NR | 9 | 8 | 7 | 6 | NR | 9 | 8 | 7 | 6 |
| T-MAX RS | NR | 9 | 8 | 7½ | 7 | NR | 9 | 8 | 7½ | 7 |
| XTOL | 7¾ | 6½ | 6 | — | 4½ | 8½ | 7 | 6 | — | 4½ |
| D-76 | 8½ | 7½ | 6½ | 6 | 5½ | — | — | — | — | — |

* Use T-MAX Developer only for roll films.

NR = Not Recommended

| KODAK PLUS-X Pan Professional Film / PXE and PXT | | | | | |
|---|---|---|---|---|---|
| KODAK Developer or Developer and Replenisher | EI 500 (2-Stop Push Process)<br>Development Time (Minutes) | | | | |
| | 65°F (18°C) | 68°F (20°C) | 70°F (21°C) | 72°F (22°C) | 75°F (24°C) |
| T-MAX RS | 11½ | 10½ | 10 | 9 | 8 |
| XTOL | 9½ | 8 | 7 | — | 5¼ |

## FINAL STEPS IN TANK, TRAY, AND ROTARY-TUBE PROCESSING—

65 to 75˚F (18 to 24˚C)

| Step/Solution | Time (min:sec) |
|---|---|
| **Rinse**—with agitation: | |
| KODAK Indicator Stop Bath | 0:30 |
| **Fix**—with frequent agitation: | |
| KODAK Fixer | 5:00 to 10:00 |
| KODAK Rapid Fixer | 2:00 to 4:00 |
| KODAFIX Solution | 2:00 to 4:00 |
| **Wash:** | |
| Running water<br>—OR—<br>Rinse with water<br>KODAK Hypo Clearing Agent<br>Running water | 20:00 to 30:00<br><br>0:30<br>1:00 to 2:00<br>5:00 |
| **Final rinse:** | |
| KODAK PHOTO-FLO Solution | 0:30 |
| **Dry**—in a dust-free place | |

## IMAGE-STRUCTURE CHARACTERISTICS

The data in this section is based on development to a contrast index of 0.56:

- **KODAK PLUS-X Pan Film / PX**

  KODAK HC-110 Developer (Dilution B), 70˚F (21˚C), 5 minutes in a large tank, manual agitation at 1-minute intervals

- **KODAK PLUS-X Pan Professional Film / PXP**

  KODAK HC-110 Developer (Dilution B), 70˚F (21˚C), 5 minutes in a large tank, manual agitation at 1-minute intervals

- **KODAK PLUS-X Pan Professional Film / PXE and sheet / PXT**

  KODAK HC-110 Developer (Dilution B), 68˚F (20˚C), 6½ minutes in large tank, with manual agitation at 1-minute intervals

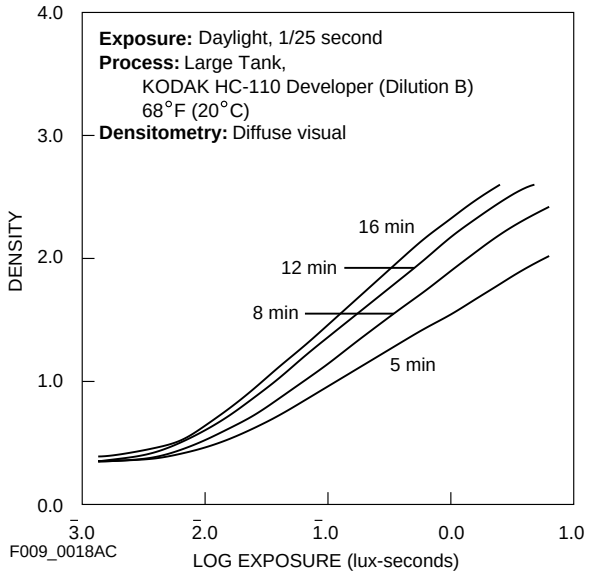
**KODAK PLUS-X Pan Film / PX**
**KODAK PLUS-X Pan Professional Film / PXP**
**Diffuse rms Granularity*** 10 Extremely Fine

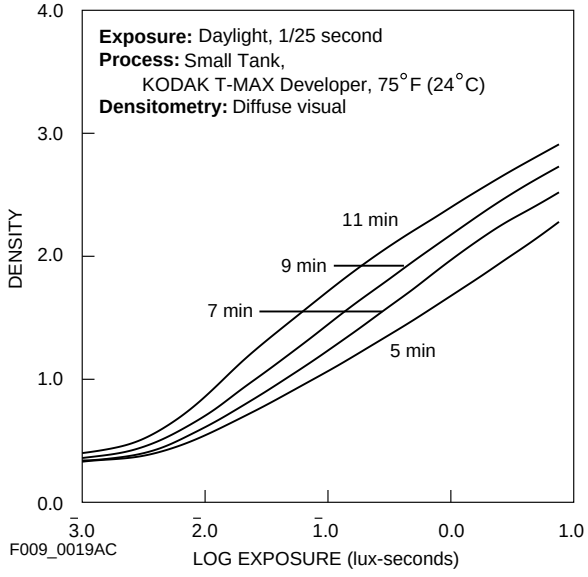
**KODAK PLUS-X Pan Professional Film / PXE and PXT**
**Diffuse rms Granularity*** 14 Very Fine

* Read at a net diffuse density of 1.0, using a 48-micrometre aperture, 12X magnification.

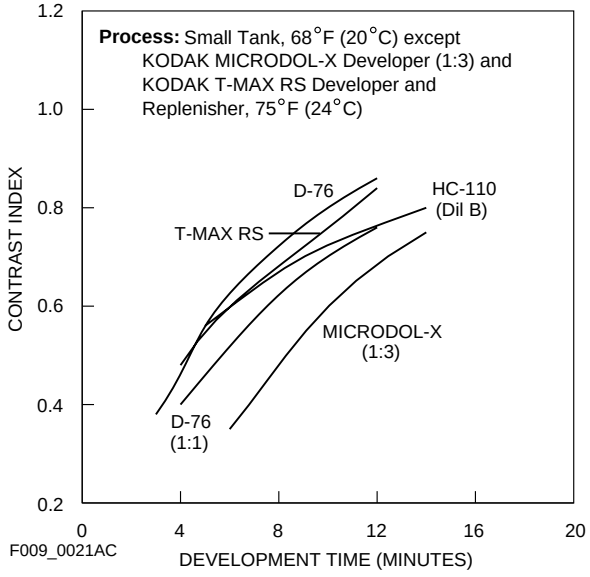
# KODAK PLUS-X Pan Film / PX

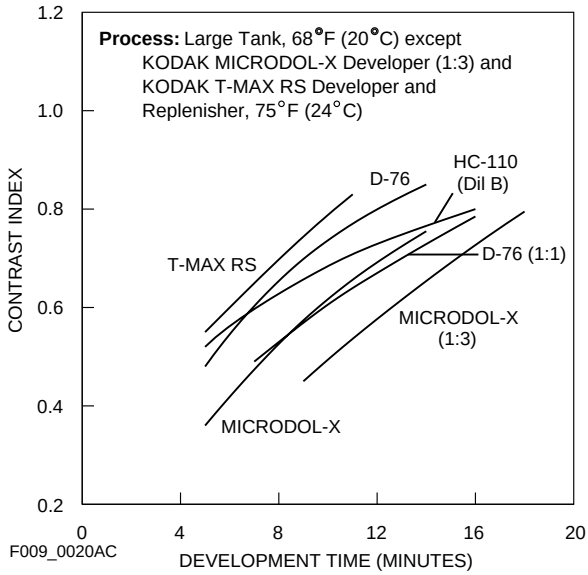
## Characteristic Curves



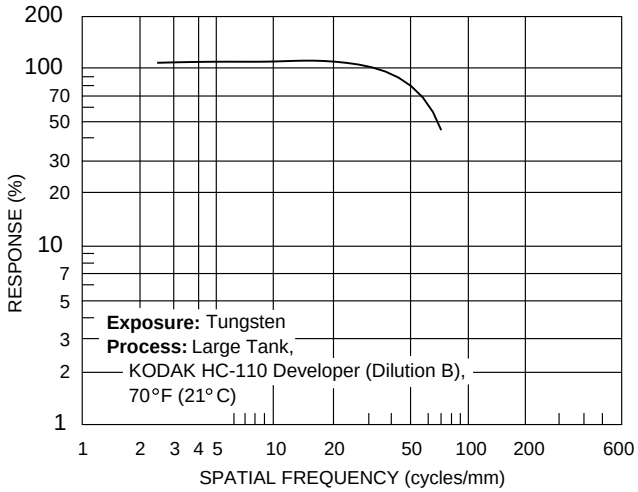




## Contrast-Index Curves



## Modulation-Transfer Curve

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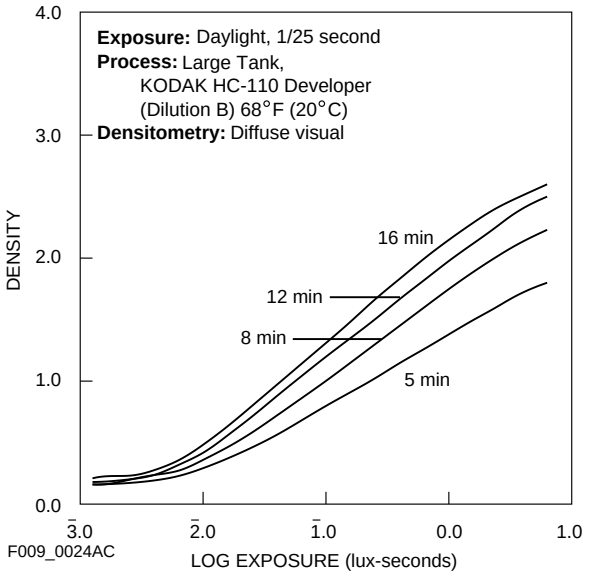
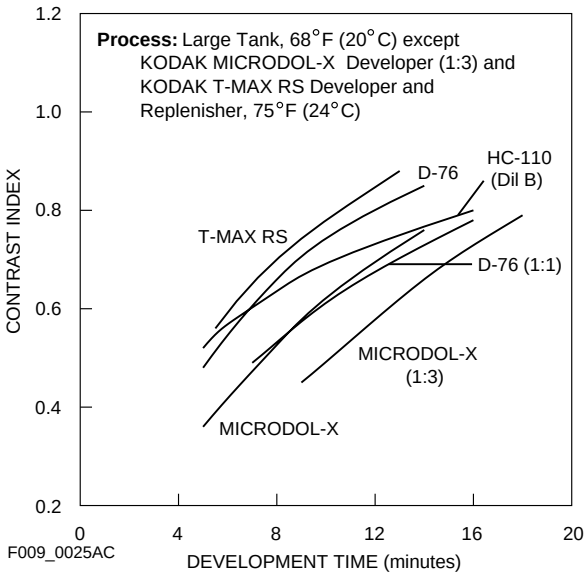
**NOTICE:** The sensitometric curves and data in this publication represent product tested under the conditions of exposure and processing specified. They are representative of production coatings, and therefore do not apply directly to a particular box or roll of photographic material. They do not represent standards or specifications that must be met by Eastman Kodak Company. The company reserves the right to change and improve product characteristics at any time.

## KODAK PLUS-X Pan Professional Film / PXP

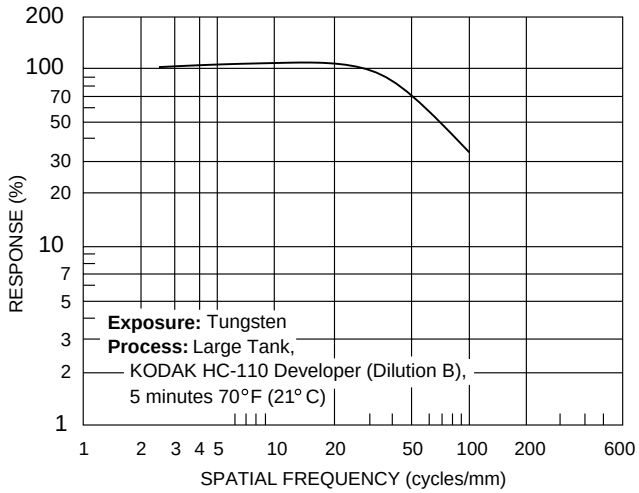
### Characteristic Curves




### Contrast-Index Curves




### Modulation-Transfer Curve

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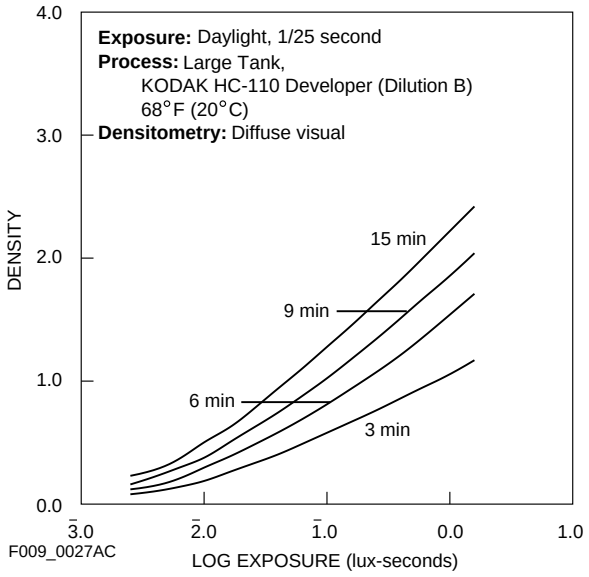
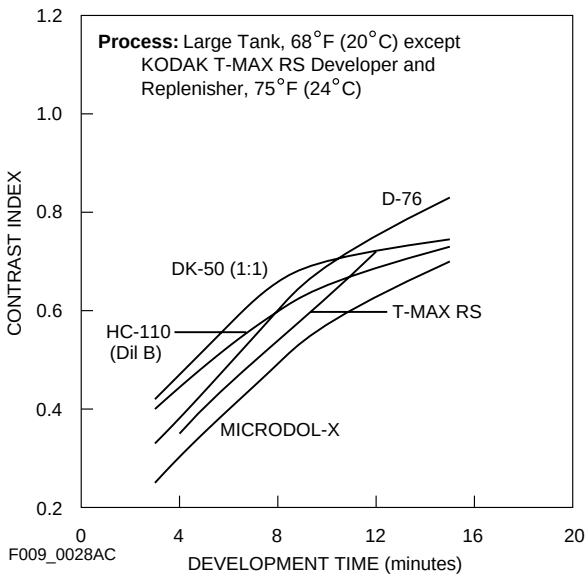
## KODAK PLUS-X Pan Professional Film / PXE and PXT

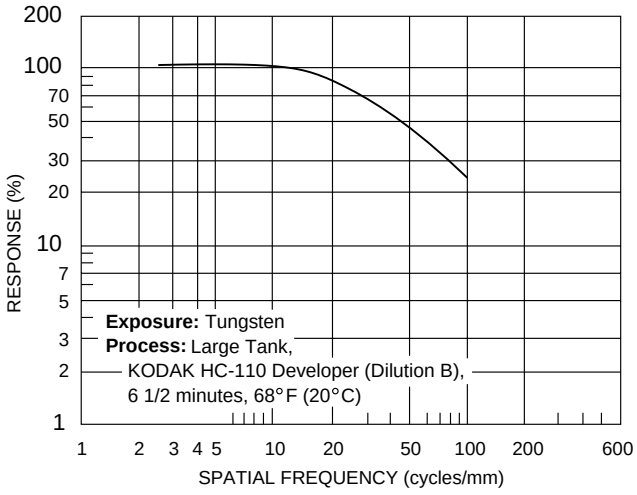
### Characteristic Curves




### Contrast-Index Curves




### Modulation-Transfer Curves

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## MORE INFORMATION

Kodak has many publications to assist you with information on Kodak products, equipment, and materials. The following publications are available from Kodak through the order form in KODAK Publication No. L-1, *KODAK Index to Photographic Information*. To obtain a copy of L-1, send your request with $1 to Eastman Kodak Company, Department 412-L, Rochester, New York 14650-0532.

| | |
|---|---|
| E-30 | *Storage and Care of KODAK Photographic Materials—Before and After Processing* |
| E-103BF | *KODAK Black-and-White Films (Matrix)* |
| E-103CF | *Chemicals for KODAK Black-and-White Films (Matrix)* |
| J-24 | *KODAK HC-110 Developer* |
| J-78 | *KODAK Developers D-76* |
| J-86 | *KODAK T-MAX Developers* |
| K-4 | *How Safe Is Your Safelight?* |

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*If you have questions about Kodak products, call Kodak.*
*In the U.S.A.:*
*1-800-242-2424, Ext. 19, Monday–Friday*
*9 a.m.–7 p.m. (Eastern time)*
*In Canada:*
*1-800-465-6325, Monday–Friday*
*8 a.m.–5 p.m. (Eastern time)*
*Or contact Kodak on-line at:*
*http://www.kodak.com/go/professional*

**Note:** The Kodak materials described in this publication for use with KODAK PLUS-X Pan and PLUS-X Pan Professional Films are available from dealers who supply KODAK PROFESSIONAL Products. You can use other materials, but you may not obtain similar results.

Kodak Professional Division
EASTMAN KODAK COMPANY

Kodak Professional

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