Kodak

Imagelink

HQ 1461/2461/3461 Microfilms
FS 1455/3455 Microfilms
UC 3454 Microfilm

D-30

Datasheet

September 2009

Kodak Imagelink Microfilms

Kodak Imagelink Microfilms are specially designed to produce high-quality images from a wide variety of source documents. These microfilms offer superior performance, handling, and digital-ready images. They provide clear, bright, sharp images on reader screens; crisp, clean prints; and provide the resolution required to fax or scan images for electronic transmission.

Information regarding the following *Imagelink* Microfilms are included in this document:

- *Kodak Imagelink* HQ 1461/2461/3461 Microfilms
- *Kodak Imagelink* FS 1455/3455 Microfilms
- *Kodak Imagelink* UC 3454 Microfilm

Product applications

Micrographic media such as *Kodak Imagelink* Microfilms form the basis of every true imaging system. These films provide unparalleled data and image integrity, as well as portability from one system to another ensuring low-risk storage of valuable information which can be retrieved for years to come.

***Kodak Imagelink* HQ Microfilms** are used in a wide variety of micrographic applications and used in rotary and planetary microfilmers with standard fluorescent or tungsten light emissions.

***Kodak Imagelink* FS Microfilms** are used in micrographic equipment with reduced light emissions or with very short exposure times.

***Kodak Imagelink* UC and FS Microfilms** are used in a wide variety of check imaging applications and equipment.

All *Kodak Imagelink* Microfilms provide excellent overall image quality and enhanced performance in retrieval devices such as the *Kodak Imagelink* Digital Workstation, *Kodak Digital Science* Intelligent Microimage Scanner, *Kodak* i7300 Scanner and other common optical and digital retrieval devices.

Common features

The following features are common to all *Kodak Imagelink* Microfilms:

- Manufactured to ISO and ANSI standards for LE-500 films.
- **Low printing density** — clear master characters (D-min) allow for higher throughput rates of duplicators.
- **Excellent overall image quality** — medium contrast and high resolution provide sharp characters and accurately reproduce fine lines and light images.
- **Excellent halation protection** — backside reflections and image flare eliminated for sharper, crisper images. More images per roll, less fog during loading and unloading of cameras.
- **Superior latent image keeping** — image density has minimal degradation between time or exposure and delayed processing.
- **Color sensitivity** — provides excellent capture or multicolored documents (checks) and inks, and light emissions.
- **Process insensitive** — image quality and background density are not significantly affected by typical operational variations in processing.
- **Roll-to-roll and emulsion batch-to-batch consistency** — minimizes the need for camera adjustments or operator intervention between rolls or batches of film.
- **Process-surviving anti-static backing** — even after processing, static protection is maintained, reducing dirt and static problems in retrieval, scanning and duplicating equipment for excellent image quality and reliability over the long haul.

Physical properties

Nominal thickness data (mils)

Microfilm	Base* (mils *Estar*)	Emulsion (mils) + backing*	Total†
HQ 1461	5.0	0.2	5.2
HQ 2461	4.0	0.2	4.2
HQ 3461	2.5	0.2	2.7
FS 1455	5.0	0.2	5.2
FS 3455	2.5	0.2	2.7
UC 3454	2.5	0.2	2.7

* Static-resistance — process-survivable

† Unprocessed

Photographic properties

Spectral sensitivity: Panchromatic

Resolving power: Based on recommended process.

Microfilm	Test Object Contrast	Lines/mm
HQ	1.6:1 (ISO-RPL) 1000:1 (ISO-RP)	250 800
FS	1.6:1 (ISO-RPL) 1000:1 (ISO-RP)	200 630
UC	1.6:1 (ISO-RPL) 1000:1 (ISO-RP)	200 630

These values were determined according to a method similar to ANSI/ISO 6328-1982, *Determining the Resolving Power of Photographic Materials*, except the light source used was a high-pressure mercury arc.

Processor set up

Specifications for *Kodak Imagelink* Microfilms HQ, FS and UC

	Developer		Fixer		Dry	Dilution	
	Time	Temp	Time	Temp	Temp	Dev	Fix
Kodak Prostar	13.5 sec.	100°F 37.8°C	13.5 sec.	96°F 35.6°C	135°F 57.2°C	Ready to Use	
Medium tank†	23 sec.	90°F 32.2°C	23 sec.	85°F 29.4°C	160°F 71.1°C	1:2 1.115-1.125◆	1.2 1.110-1.120◆
Deep tank†	48 sec.	85°F 29.4°C	32 sec.*	85°F 29.4°C	160°F 71.1°C	1:7 1.045-1.055◆	1:3 1.080-1.105◆

* Dependent on tank size.

◆ Specific gravity of working solution.

† The above dwell times and temperatures are starting points only. Specific systems or customer needs may demand variation from these values based on photographic aims. Dwell time is determined by timing film speed from entrance roller to exit roller while running in the processor.

Processing information

Processors and processing chemicals

Kodak Imagelink Microfilms can be processed in most typical continuous-strand medium- and deep-tank processors using common *Kodak* Processing Chemicals and parameters. However, they are compatible with all standard microfilm processing equipment and high quality microfilm chemicals, although results may vary.

IMPORTANT: For best results and to avoid aeration, always add chemical concentrate to water, not water to concentrate.

Replenishment rates

Use the chart and formula provided to determine the developer and fixer replenishment rates (mL/min) by multiplying transport speed (ft/min) (which is determined by dividing the path length of the developer tank in feet by the dwell time in seconds and multiplying by 60; see example) and the appropriate processor replenishment specification (mL/linear ft).

Transport speed (ft/min)	X	Replenishment/ feet of film (mL/Lft)	=	Replenishment rate (mL/min)

NOTE: 1 mL/min = 1 cc/min

Example

For Processor: Allen M-70 Processor

Type of Film: 16 mm (HQ Microfilm)

Dwell: 43 seconds

Developer Film Path: 154 feet

See table below for:

Replenishment (Dev): 1
Replenishment (Fix): 1.25

Calculated transport speed:

$\frac{154 \text{ ft}}{43 \text{ sec}} \times \frac{60 \text{ sec}}{1 \text{ min}} = 215 \text{ ft/min}$ (transport speed)

$\frac{215 \text{ ft}}{\text{min}} \times \frac{1.0 \text{ mL}}{\text{ft}} = 215 \text{ mL/min}^*$ (developer replenishment)

$\frac{215 \text{ ft}}{\text{min}} \times \frac{1.25 \text{ mL}}{\text{ft}} = 268 \text{ mL/min}^*$ (fixer replenishment)

Replenishment mL/linear ft						
	16 mm		35 mm		105 mm	
	Dev	Fix	Dev	Fix	Dev	Fix
Kodak Prostar	0.75	0.75	1.5	1.5	N/A	N/A
Medium Tank	0.80	0.75	1.6	1.5	2.0	3.0
Deep Tank	1.00	1.25	2.0	2.5	6.0	7.5

Photographic aims

D-min: 0.04 or lower.

Process handling and storage

Handling

Handle and process imaged film in total darkness. However, you can load and unload cameras and load processors with the following light-tight film holders:

Closed cartridges — room-light loading

Flanged spools — subdued-light loading

Unflanged spools — total darkness

WARNING: These films may be handled under safelight conditions only for a limited time. Testing under actual use conditions should be performed. If a safelight is required for safety reasons, use *Kodak* No. 3 Green Safelight Filter with a maximum 7.5-watt bulb at a minimum of 8 feet away.

Storage

Keep unopened packages of films at 70°F (21°C) at 50% relative humidity or below, and protected from radiation and x-rays. To avoid moisture condensation on film that has been refrigerated, do not open the package until the film has warmed throughout to a room temperature (1 to 1 1/2 hours for 16 mm film, 2 to 3 hours for 35 mm film and 4 to 6 hours for 105 mm film).

Image stability and keeping

These films are manufactured to ANSI and ISO specifications for extended term storage use. When processed as recommended, these films meet both ANSI and ISO specifications for films intended for long-term storage. These films have a Life Expectancy LE-500 rating.

ANSI/NAPMISO 18901.2002 *Imaging Materials — Processed Silver-Gelatin Type Black-and-White Film — Specifications for Stability or* ISO 10602, *Photography — Processed Silver-Gelatin Type Black-and-White Film — Specifications for Stability,* state that for films with a Life Expectancy LE-500, the maximum permissible concentration of thiosulfate ion is 0.014 grams per square meter (1.4 micrograms per square centimeter). Thiosulfate limits for Class 1 grain apply to this film.

It is recommended that customers establish their own compliance with extended-term storage requirements and optimum storage conditions, as outlined in ANSI/IT 9.11-1993 and *Kodak* Publication D-31, *Storage and Preservation of Microfilms.*

ANSI/NAPM ISO 18911:2000, Imaging materials — Processed Safety Photographic Films — Storage Practices, and ISO 5466- 1996, *Photography — Processed Safety Photographic Films — Storage Practices,* give appropriate conditions for extended-term (permanent) and long-term storage films.

NOTE: Refer to the latest revision of each ANSI or ISO Standard specified.

Diffuse RMS granularity

Determined at a net diffuse visual density of 1.00, using the aperture indicated.

Film	48-Micrometer Aperture
HQ	6
FS	7
UC	7

This value represents 1,000 times the standard deviation of density produced by the granular structure of the material when a uniformly exposed and developed sample is scanned with a densitometer calibrated to read American Standard diffuse visual density, and having a circular measuring aperture with the indicated diameter.

Granularity is an objective measurement of the spatial variation of sample density that generally correlates with graininess, which is the subjective effect of the image nonuniformity upon an observation when comparisons are made at the same density level.

Broadly speaking, granularity measurements with the 48-micrometer aperture will indicate the magnitude of the graininess sensation produced by viewing the diffusely illuminated sample with 12X monocular magnification.

NOTE: If the viewing conditions are changed from the specified conditions, the published RMS values may no longer correctly indicate the relative sensations of graininess produced by various samples.

Modulation transfer function: The MTF curve was determined using a method similar to that described in ANSI-PH2.39-1977 (R1990).

Meter setting or speed value

For these microfilms, the value for a 1/50-second tungsten exposure is calculated using the formula 45/H, where H is the exposure in lux-seconds required for a density of 1.20 above minimum density with indicated processing. This value can be used directly with incident-light meters.

NOTE: This meter-setting value was chosen to indicate a suitable exposure for microfilming applications. It cannot be compared directly with exposure indexes or other meter-setting numbers given for films used in conventional photography.

Reciprocity data

For these microfilms, no exposure corrections are required for exposure times of 1 to 1/1000-second when processed as recommended in a *Kodak Prostar* Processor.

With *xenon* exposure, it is recommended that the manufacturer of high intensity ultraviolet lamps be consulted for safety information pertaining to ultraviolet radiation and ventilation requirements due to ozone generation.

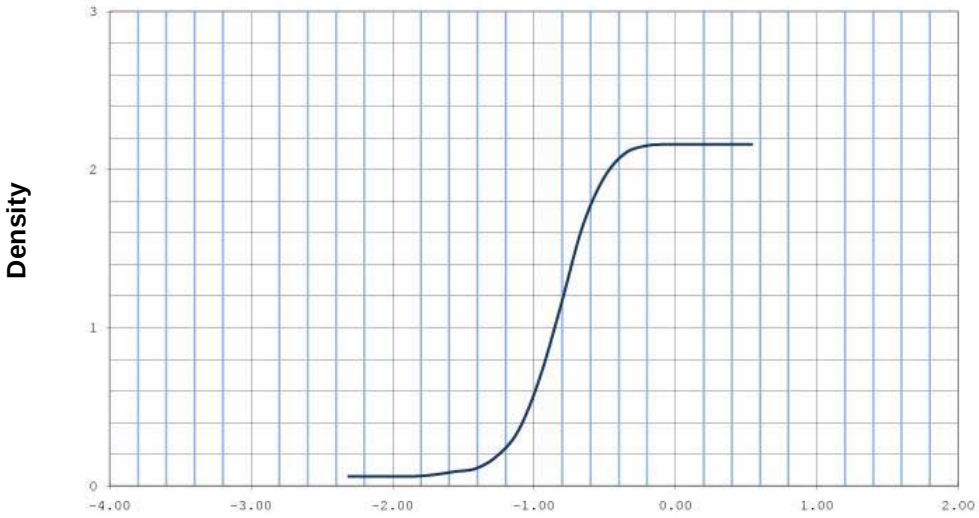
Microfilm	Reciprocity*			Speed Value
	1/10	1/100	1/1000	
HQ (T)	0	0	0	80
FS (T)	0	0	0	320
UC (T)	1/6	none	-1/6	160

T = Tungsten exposure

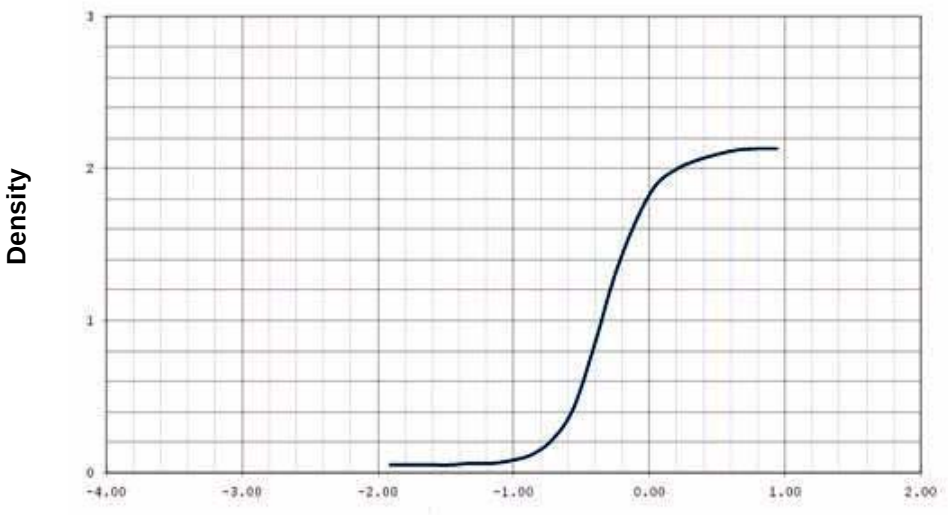
* Based on processing in a *Kodak Prostar* Processor, correct for reciprocity failure at a density of 1.20 above minimum density.

Characteristic curves

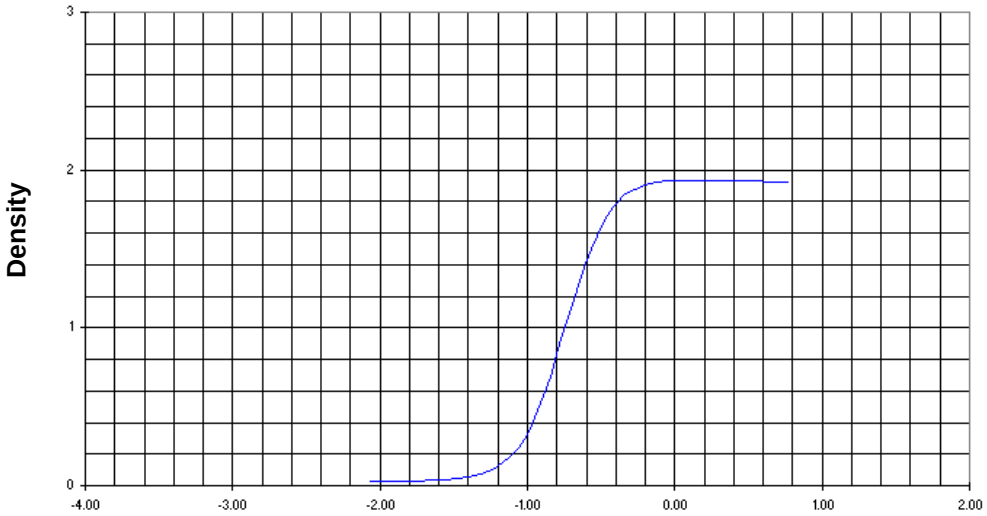
***Kodak Imagelink* FS Microfilm**
Kodak Prostar Plus Developer, 100°F, 10 fpm; Diffuse Visual, Tungsten Exposure, 1/50 sec



***Kodak Imagelink* HQ Microfilm**
Kodak Prostar Plus Developer, 100°F, 10 fpm; Diffuse Visual, Tungsten Exposure, 1/50 sec



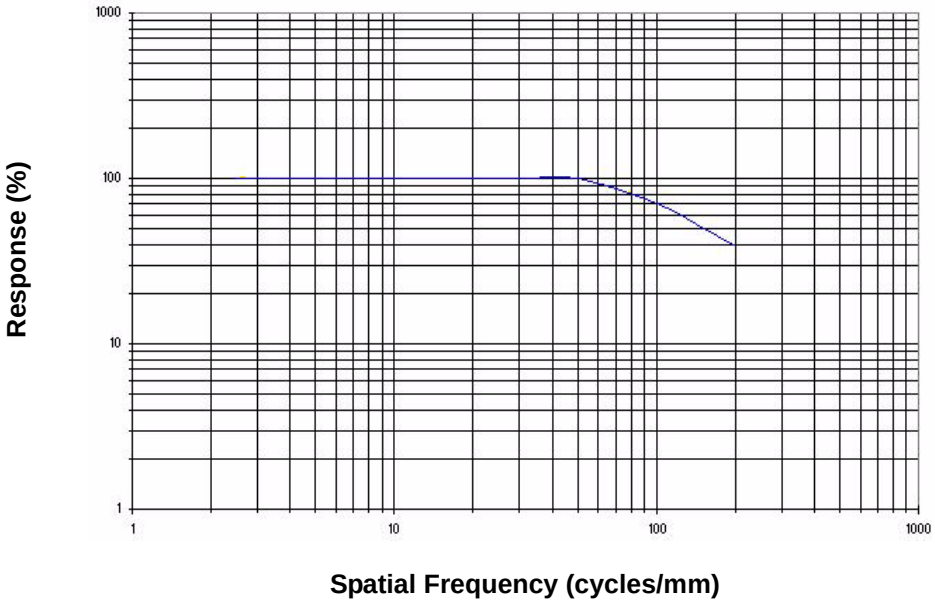
***Kodak Imagelink* UC Microfilm 3454**
85 microseconds (Electronic Flash)
Kodak Prostar Plus Developer and Fixer, 100°F, 10 fpm



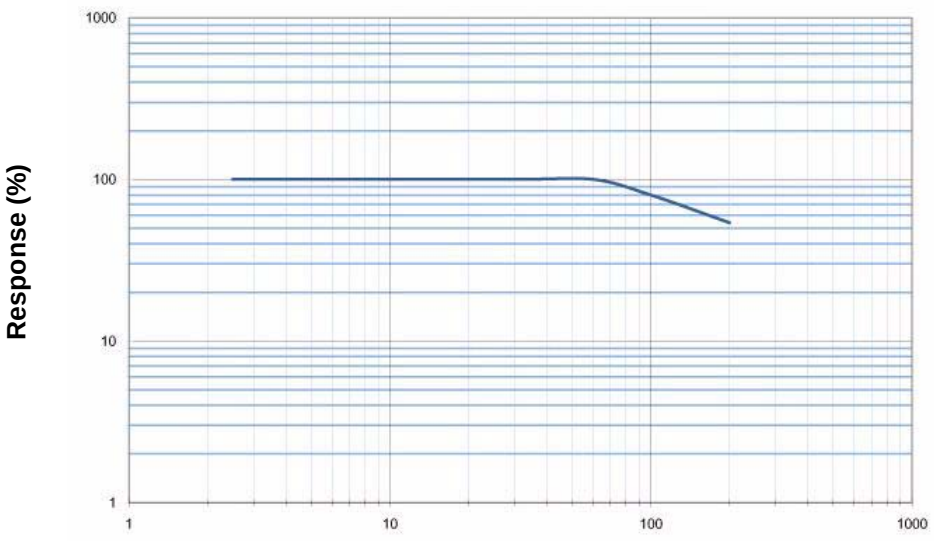
NOTE: While the data presented are typical of production coatings, they do not represent standards which must be met by Eastman Kodak Company. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.

Modulation Transfer Function curves

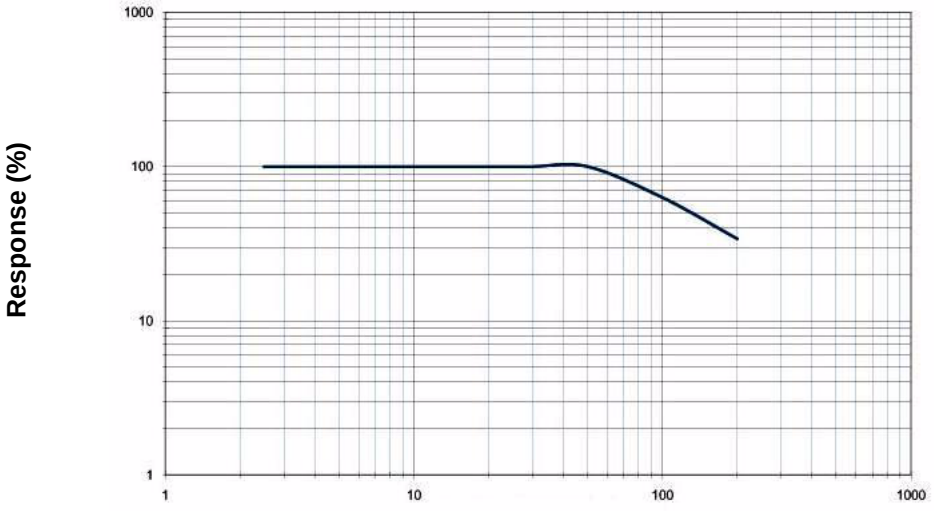
***Kodak Imagelink* FS Microfilm**
Tungsten; all recommended processes; Diffuse Visual



***Kodak Imagelink* HQ Microfilm**
Tungsten; all recommended processes; Diffuse Visual



***Kodak Imagelink* UC Microfilm 3454**
Tungsten; all recommended processes; Diffuse Visual



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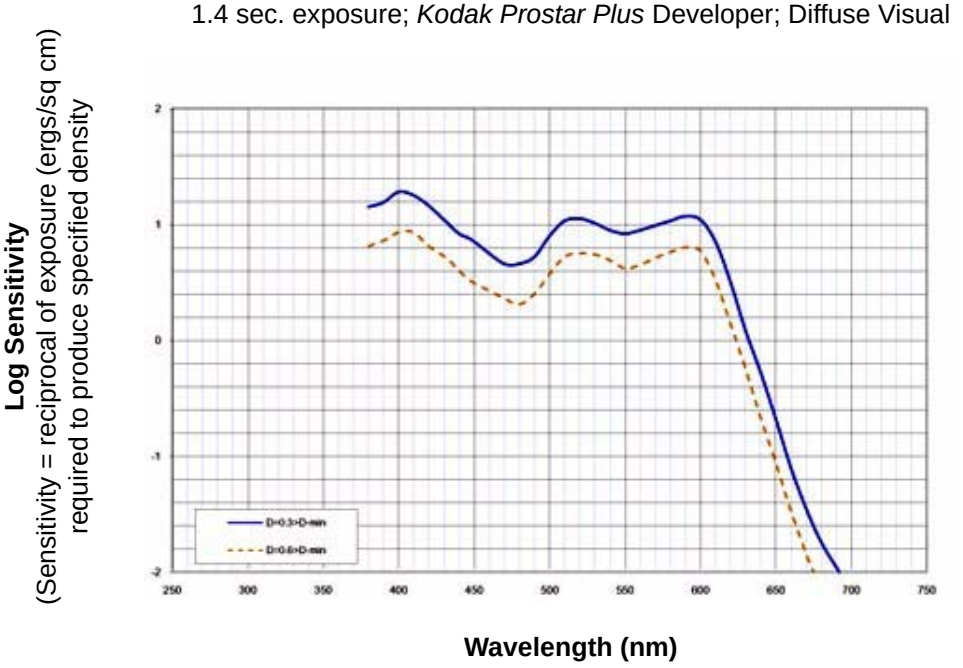
Spectral Sensitivity curves

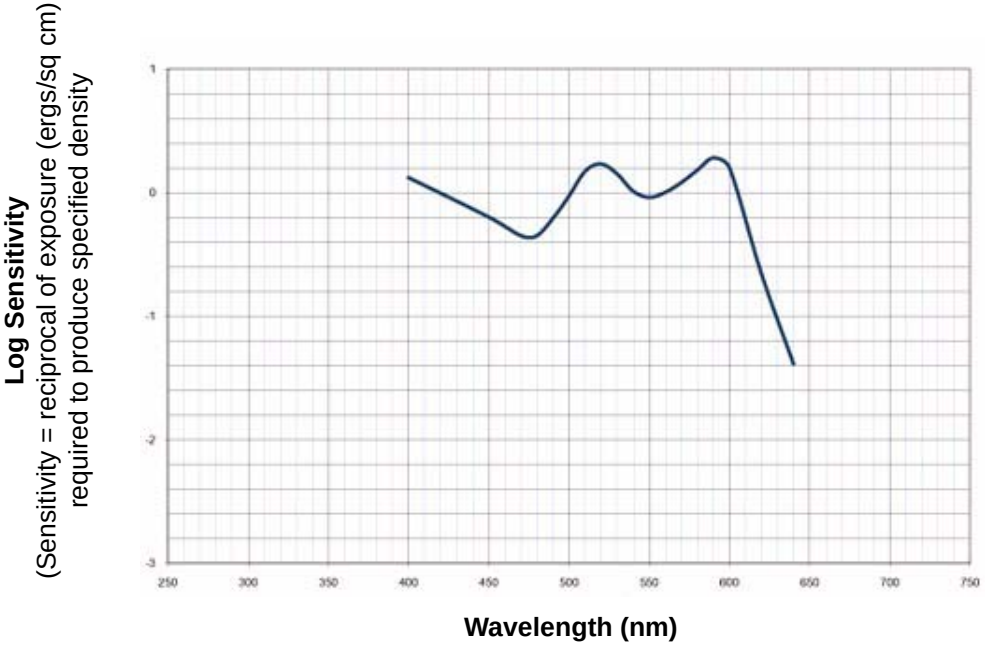
***Kodak Imagelink* FS Microfilm**

1.4 sec. exposure; *Kodak Prostar Plus* Developer; Diffuse Visual



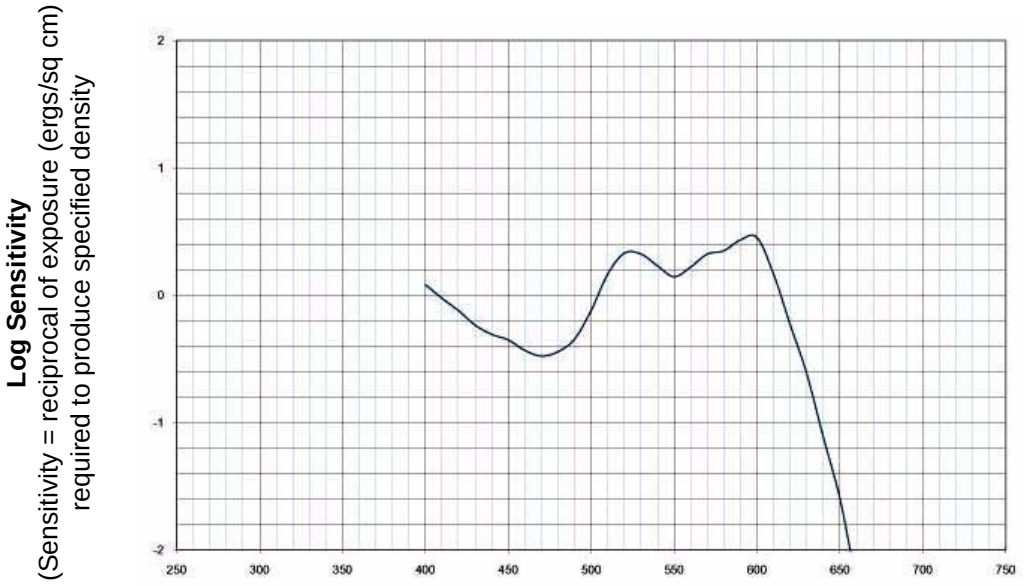
***Kodak Imagelink* HQ Microfilm**

1.4 sec. exposure; *Kodak Prostar Plus* Developer; Diffuse Visual



***Kodak Imagelink* UC Microfilm 3454**

1.4 sec. exposure; *Kodak Prostar Plus* Developer; Diffuse Visual



NOTE: While the data presented are typical of production coatings, they do not represent standards which must be met by Eastman Kodak Company. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.

Ordering information Microfilms

Contact your Regional Sales Manager if you have any questions.

Imagelink HQ Microfilm						
Code	**Mil**	**Format**	**Spec**	**Description**	**No/Case**	**CAT No.**
1461	5	16 mm x 100 ft	615	R-186 Black plastic spool	20	822 3232
		16 mm x 100 ft	478	Bell & Howell spool #000266A	20	881 2869
		35 mm x 100 ft	425	R-200 Black plastic spool	20	840 3594
		105 mm x 180 ft	832	S-126 Metal spool: in bag, box	4	834 6512
		105 mm x 200 ft	906	UU Core: Bulk in a bag	8	163 1027
2461	4	16 mm x 40 m	615	R-186 Black plastic spool	20	158 1263
		35 mm x 1000 ft	756	U-Core: Bag	10	808 5243
		35 mm x 40 m	425	R-200 Black plastic spool	20	803 7863
3461 Thin base	2.5	16 mm x 215 ft	615	R-186: Black plastic spool	20	845 1502
		16 mm x 215 ft	478	Bell & Howell spool #000266A	20	141 8573

Imagelink FS Microfilm						
Code	**Mil**	**Format**	**Spec**	**Description**	**No/Case**	**CAT No.**
1455	5	16 mm x 100 ft	615	R-186 Black plastic spool	20	833 0896
3455		16 mm x 215 ft	615	R-186 Black plastic spool	20	826 5779
		16 mm x 420 ft	407	Type B Plastic core	20	830 1475
		16 mm x 1025 ft	642J	Type T Plastic core	20	811 0520

Imagelink UC Microfilm						
Code	**Mil**	**Format**	**Spec**	**Description**	**No/Case**	**CAT No.**
3454	2.5	16 mm x 2000 ft	607	Type N Plastic core	10	124 8301
		16 mm x 1025 ft	407	Type B Plastic core	20	892 7881

Ordering information Chemicals

Material Safety Data Sheets (MSDSs) on the chemicals (only) are available by calling: 1-800-242-2424, ext. 43. MSDSs are also available at: www.Kodak.com/eknec. You will need to supply the Kodak catalog number of the chemicals for which you need MSDSs. Call the same number for MSDSs for the actual working solutions and caution labels for the processor tanks.

Chemical	CAT No.	Working Strength Solutions
Microfilm DEVELOPER and Replenisher — Concentrate		at 1:7 yields
1 gal — 4/case	177 8869	32 gal
50 gal — 1 drum	190 1917	400 gal
Microfilm FIXER and Replenisher — Concentrate		at 1:3 yields
1 gal — 4/case	817 7222	16 gal
50 gal — 1 drum	190 1164	200 gal
Kodak Prostar Processors		Ready-to-use solution
Prostar Plus Developer: 1 gal — 4/case	102 2490	4 gal
Prostar Plus Fixer: 1 gal — 4/case	102 2656	4 gal

Disclaimer

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 which must be met by Eastman Kodak Company. The company reserves the right to change and improve product characteristics at any time.

Kodak

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