



Computer Output Microfilm Data Sheet

KODAK COM DR Microfilm 2467 / ESTAR Base

Description

Kodak COM DR Microfilm 2467 (*Estar* Base) is a slow-speed film with a direct reversing emulsion that is blue-green sensitive. It has high spectral sensitivity in the 430 to 550 nm range.

Product applications

Kodak COM DR Microfilm 2467 is designed for use in blue phosphorous CRT (cathode ray tube) type computer output microfilmers (COMs). These devices photograph data displayed electronically rather than from printed documents. COM DR Microfilm is “drop-in” compatible with roll film COM equipment such as *Bell & Howell, DatagraphiX 4500, XR, 3M Beta COM*, and graphic COMs such as the *III Cal Comp*. COM DR Microfilm requires only conventional processing, and does **not** require the use of a “full reversal” processing system, which uses dichromate bleach.

Features

- **Manufactured to meet ISO and ANSI standards for an LE 500 film**
- **Excellent capture of CRT, formsflash, and cutmark**
Minimum adjustments are necessary to balance these exposures.

- **Uniform background provides crisp diazo copies**
- **Low printing density (D-min 0.04-0.05)**
Clearer master characters (D-min) allow for higher throughput rates of duplicators.
- **Good exposure and duplication latitude**
The combination of a low D-min and medium contrast yields a wider exposure tolerance and fewer exposure adjustments of duplicator exposure times.
- **Low process sensitivity**
Even as process conditions vary, DR microfilm maintains high image quality.
- **Invariant photographic speed**
From batch to batch, there is no need to adjust exposure output.
- **Halation protection**
Halation protection eliminates “image bloom” caused by reflected light. This is particularly important with headers and detailed form slides.
- **Process-surviving antistatic backing**
Even after processing, static protection is maintained to reduce dirt and dust buildup during duplication and handling.

Physical properties

- Hardened emulsion for high-temperature rapid processing and resistance to abrasion
- Antihalation undercoat
- Meets ANSI and ISO standards for archival storage media

Nominal Thickness Data (Unprocessed)	
Support	4.0 mils, <i>Estar</i> Base
Total Film Thickness	4.0 ±0.2 mils

Before-process storage and handling

Handling

Unprotected films should be handled in total darkness or under safelight conditions such as a *Kodak* No. 2 Safelight Filter / dark red, or a *Kodak* No. 1 Safelight Filter / red, with a 15-watt bulb at least four feet from the film. However, the following package configurations may be handled in room light:

- *Com-Pack* Cartridge
- Roomlight Load

Storage

For best storage, keep unprocessed film in the original, unopened package at 70°F (21°C), 50 percent 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 normal room temperature, about 3 hours if refrigerated, and 5 hours if frozen.

Photographic properties

- Fine grain
- Excellent dimensional stability
- Medium contrast
- Excellent latent-image keeping
- High resolving power

Resolving power: Based on recommended process.

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

Test-Object Contrast	Line pairs/mm
1.6:1 (ISO-RP)	100
1000:1 (ISO-RP)	400

These values were determined by a method similar to the one described in ISO Standard 6328-1982, "Photography - Photographic Materials - Determination of ISO Resolving Power", except the light source used was a high pressure mercury vapor arc.

Diffuse RMS granularity: 6

Read at net diffuse visual density of 0.30 using a 48-micrometre aperture. A more detailed discussion of granularity can be found in *Kodak* Publication F-20, "Understanding Graininess and Granularity".

Processing information

Processors and processing chemicals

COM DR 2467 Microfilm can be processed in most typical continuous-strand type medium and deep-tank processors such as *Allen F10*, *F-10R*, *F-20*, *F-20R*, *Houston Fearless 76*, *Oscar*, *Jamieson*, *Hollywood*, *Kodak Versamat 75*, and others utilizing *Kodak* COM Professional Developer and Replenisher DRC with *Kodak* Microfilm Fixer and Replenisher. COM DR 2467 Microfilm is 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.*

Photographic aims

D-max: 1.95 to 2.15*

D-min: 0.06 or lower

Processor transport speed and/or temperature may be varied to achieve D-max and D-min values. Process adjustments to achieve a D-max in the range of 1.95 to 2.15 or lower D-min may be required depending on unique processing situations. Initial D-max on startup of fresh developer may be slightly lower, but should stabilize in the 1.95 to 2.15 range.

*When starting with fresh chemicals, D-max may be slightly lower than 1.95 until the chemicals are seasoned.

Processor setup specifications

Concentrate developer - Kodak COM Professional Developer and Replenisher DRC (Typical Continuous-Strand Deep-Tank Processor)

Processing Step	Solutions (Dilution)	Time	Temp	Working Strength Specific Gravity	Replenishment		
					16 mm	35 mm	105 mm
Developer DRC ¹	1:3	35 sec	94–95°F (34–35°C)	1.080 to 1.090	1 - 3 mL/ft	3 - 5 mL/ft	7.5 - 10* mL/ft
Rinse	—	17.5 sec	90–95°F (32–35°C)	—	Flow rate per processor manufacturer recommendation		
Fixer ²	1:5	35 sec	90–95°F (32–35°C)	1.040 to 1.063	0.65 mL/ft	1.35 mL/ft	4 mL/ft
Wash	—	35 sec	90–95°F (32–35°C)	—	Flow rate per processor manufacturer recommendation		
Dry	—	—	160°F max (71°C)	—			

* Actual replenishment rate is determined by consideration of rate which achieves a stable D-max with average quantity of film processed.

¹ Kodak COM Professional Developer and Replenisher DRC

² Kodak Microfilm Fixer and Replenisher

Development time and transport speed

Development/transport times should be set by timing film speed (splice point) top of rack, roller-to-roller while running in processor. Transport speeds are based on actual dwell times, photographic aims and determined by timing film speed, top of rack, entrance roller to exit roller while running in the processor.

Replenishment rates

Once development time and transport rates are set to acquire desired photographic aims, replenishment rate settings are determined by multiplying the transport speed by the required replenishment rates for the appropriate film width being used. Replenishment may be reduced if significant quantities of leader are used. For instance, with *Kodak COM Professional Developer and Replenisher DRC*, practical experience indicates rates as low as 7.5 mL/ft of 105 mm film are adequate in deep tank processors. The use of control charts such as *Kodak Publication A-1631* is recommended for monitoring control.

$$\begin{array}{rcl} \text{Transport speed} & \times & \text{Replenishment/} \\ \text{(ft/min)} & & \text{ft of film} \\ & & \text{(mL/Lft)} \\ & = & \text{Replenishment} \\ & & \text{rate} \\ & & \text{(mL/min*)} \end{array}$$

*1 mL/min = 1 cc/min

These are starting point recommendations for deep-tank processors. Shallow-tank and medium-tank processors, or variable operating conditions in all processors, may require replenishment rate adjustments to maintain process activity levels.

An example follows:

For processor: *Allen F-10R*
Type of film: 105 mm COM DR
Dwell: 32 seconds
Developer Film Path: 6.5 feet

See table above for:

Replenishment (Dev): 7.5
Replenishment (Fix): 4

Calculated transport speed:

$$\frac{6.5 \text{ feet}}{32 \text{ sec}} \times \frac{60 \text{ sec}}{\text{min}} = 12 \text{ ft / min}$$

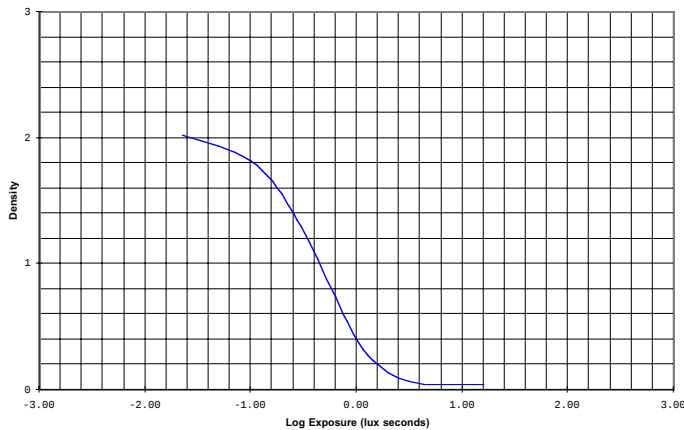
Replenishment results:

$$\frac{12 \text{ feet}}{\text{min}} \times \frac{7.5 \text{ mL}}{\text{feet}} = 90 \text{ mL / min*} \quad (\text{developer replenishment})$$

$$\frac{12 \text{ feet}}{\text{min}} \times \frac{4 \text{ mL}}{\text{feet}} = 48 \text{ mL / min*} \quad (\text{fixer replenishment})$$

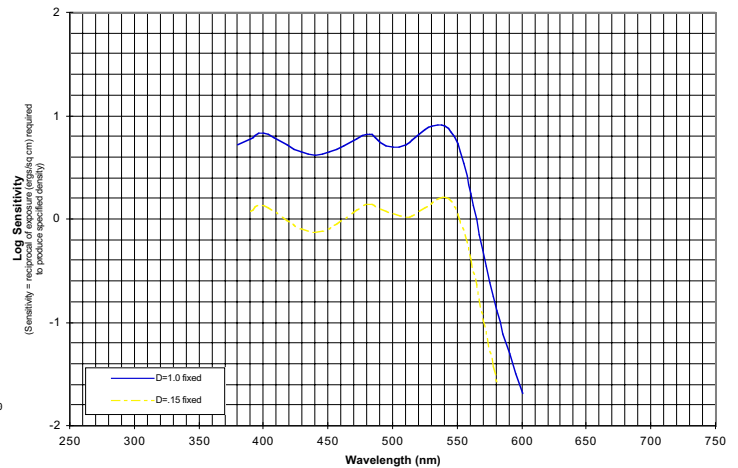
Characteristic curve

Kodak COM DR Microfilm 2467/Estar Base
Kodak COM Professional Developer & Replenisher DRC,
95 F (35 C), 3.6 fpm;
Diffuse visual



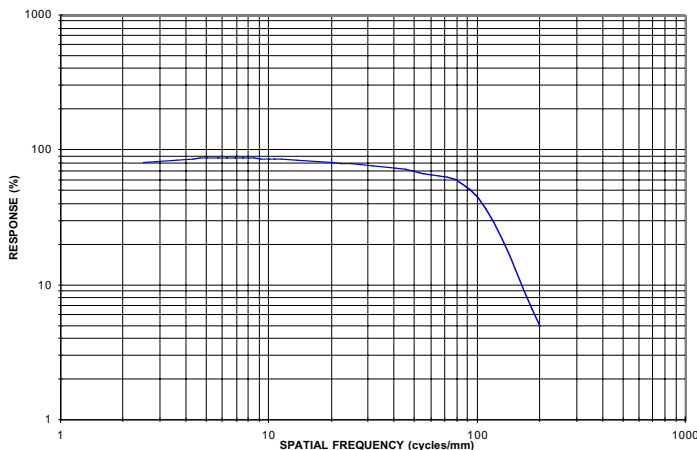
Spectral sensitivity curve

Kodak COM DR Microfilm 2467/Estar Base
Kodak COM Professional Developer and Replenisher DRC,
36 sec., 95 F (35 C);
1.4 sec. exposure



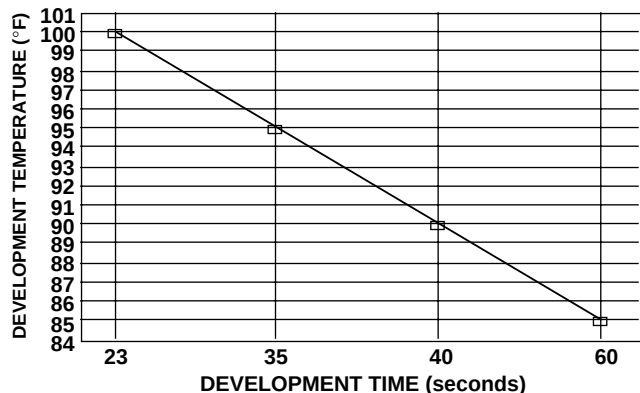
Modulation transfer function curve

Kodak COM DR Microfilm 2467/Estar Base
35% Modulation



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

Process cycle adjustment guide Equivalent time/temperature conditions



The above chart can be used to determine other development time/temperature combinations that provide equivalent photographic quality. Temperatures between 90 and 100°F (32 and 37.8°C) are optimum for total system performance.

Notice: 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.

After-process information

Keeping

This film is suitable for archival keeping when processed as recommended. However, due to possible variations in conditions, it is recommended that users establish their own compliance with existing archival-keeping requirements as outlined in pertinent standard ANSI/NAPM IT9.1-1996, ISO 10602 - 1995, and in *Kodak Booklet D-31*. This film is within thiosulfate limits for microfilm, when processed according to manufacturer's recommendations.

Ordering information: Microfilms

Film Format	Spec	Package	Core	COMs	CAT No.
16 mm x 75 m	642	Bulk Pack Emulsion IN	T 2-in. OD, 16 mm 1-in. round center	Bell & Howell	119 8894
16 mm x 150 m	642	Bulk Pack Emulsion IN	T 2-in. OD, 16 mm 1-in. round center	Bell & Howell <i>DX-4500</i>	899 2703 870 9925*
16 mm x 190 m	482	<i>Com-Pack</i> Cartridge Emulsion IN	T 2-in. OD, 16 mm 1-in. round center	<i>DatagraphiX-XR</i> <i>Agfa COM</i>	860 0959
16 mm x 200 m	640	Bulk Pack Emulsion OUT for reloadable cassettes only.	Z 3-in. OD, 16 mm 1-in. round center	<i>DatagraphiX</i> <i>XR</i>	885 5843*
16 mm x 380 m	649	Bulk Pack Emulsion IN Long length	Z 3-in. OD, 16 mm 1-in. round center	<i>DatagraphiX</i> <i>4500</i>	876 0225 875 0663*
35 mm x 150 m 35 mm x 75 m	756	Bulk Pack Emulsion IN	U 2-in. OD, 35 mm 1-in. round center	<i>Graphic COMs</i> <i>III, Dicomed</i>	862 2607 (150 m) 871 1947 (75 m)
105 mm x 75 m	827	Room Light Load Emulsion IN	UU 2-in. OD, 105 mm 1-in. round center	Bell & Howell <i>3M Beta COM</i> <i>Graphic-III</i> <i>Dicomed</i>	882-0847 858 6265*
105 mm x 75 m	890	Bulk Pack Emulsion OUT for reloadable cassettes only	UU 2-in. OD, 105 mm 1-in. round center	<i>DatagraphiX</i> <i>XR</i> (with reloadable cartridge only)	821 9727
105 mm x 75 m	906	Bulk Pack Emulsion IN	UU 2-in. OD, 105 mm 1-in. round center	Bell & Howell	893 7971 814 9957*
105 mm x 200 m	827	Room light load Emulsion IN	UU 2-in. OD, 105 mm 1-in. round center	<i>Agfa COM</i>	183 8812
105 mm x 200 m	890	Bulk Pack Emulsion OUT for reloadable cassettes only	UU 2-in. OD, 105 mm 1-in. round center	<i>DatagraphiX</i> (with reloadable cartridge only)	894 6766 173 0134*
105 mm x 200 m	906	Bulk Pack Emulsion IN	UU 2-in. OD, 105 mm 1-in. round center	<i>DatagraphiX-4500</i> <i>Agfa COM</i> (Model 2500- or 3000 only)	852 9802 890 5051*

* for Service Bureau use only

Ordering information: Chemicals

Chemical	CAT Number	Working Strength Solutions
COM Professional DEVELOPER AND Replenisher DRC		At 1:3 yields
1 gal—4/case	863 0683*	16 gal
55 gal—1 drum	865 9591*	220 gal
2 x 5 litres	524 4637§	40 litres
Microfilm FIXER AND Replenisher—Concentrate		At 1:5 yields
1 gal—4/case	817 7222	24 gal
5 gal—1 cube	190 1149	30 gal
50 gal—1 drum	190 1164	300 gal
2 x 5 litres	504 4706§	60 litres
2 x 5 litres	523 6245§	60 litres
60 litres	524 2086§	360 litres

* for Service Bureau use only

§ not available in the US

Material Safety Data Sheets (MSDSs) on the chemicals (only) are available by calling: 1-800-242-2424, extension 43. You will need to supply KODAK CAT numbers of the chemicals for which you need MSDSs. Material Safety Data Sheets for the actual working solutions and caution labels for the processor tanks are also available by calling the same number.

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