TECHNICAL DATA / **INDUSTRIAL MATERIALS GROUP**

KODAK ACCUMAX Photoplotter Film APR7

—High Complexity PCB Starts With the Right Phototools—

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Creating high complexity phototools starts with the right film. Now from Kodak, you get hard line edge quality and superior dimensional stability with KODAK ACCUMAX Photoplotter Film APR7. APR7 Film uses the latest Integrated Booster Technology (IBT processing) —technology pioneered by Kodak. APR7 Film is specifically designed for PCB phototool creation, and pre-conditioned by Kodak in a clean-room environment to make it "ready to use" right out of the box. Some of its outstanding features are:

- Extremely sharp line edge quality with the latest in Integrated Booster Technology processing (Recommended for processing in IBT compatible developers such as KODAK ACCUMAX Rapid Access Developer and Replenisher)
- Superior dimensional stability with Kodak's exclusive one-sided gel coating structure—delivers low humidity coefficient of linear expansion of 0.0009% per % RH
- Ready to use—pre-conditioned at the factory to better match the relative humidity of the photoplotter environment (50% RH)
- Durable emulsion structure for longer phototool life
- Improved fine-line image consistency
- Coated on specially manufactured low-inclusion ESTAR support (0.007-inch, 0.18 mm)
- Permanent anti-static performance to resist the attraction of dust and dirt
- Excellent scratch and abrasion resistant overcoat—resists photoabrasion
- Contains ultra-fine matte on the emulsion side to improve handling and vacuum draw-down to photo resist
- Dual red sensitivity at 633 nm and 670 nm for use with photoplotters using helium-neon (HN) or red-laser-diode (RLD) exposing sources

APR7 Film is designed for the use with the following photoplotters:

Manufacturer*	Model
UCAMCO / Barco	BG-7300, BG-7400, BG-3800, BG-3900, BG-7500, SilverWriter, Calibr8tor
Dainippon Screen	RG 7000, RG 7500, RG 8000, RG 8500
First EIE SA	RP 200, RP 300, RP 500, RP 700, RP 800
UCAMCO / Gerber	Crescent 30, Crescent 40
Lavenir	PULSAR 8000SE
Orbotech	LP 7008 and LP 9008, LP-9

* Products are trademarks of the respective manufacturer.

SUPPORT

Dimensionally stable support.

7-mil (0.18 mm)	ESTAR Thick Base

DARKROOM RECOMMENDATIONS

Darkrooms can be illuminated using an **EncapSulite T20/ND0.75 "cyan"** filter. The light should be at least 4 feet (1.2 metres) from any area where the film will be handled. Where possible, the safelights should be located as to maximize room lighting for safety but minimize direct exposure to the film surface itself. The farther away the lights are located from the film, the greater the margin of safety. This filter should provide up to 4 minutes of acceptable safelight performance, under the stated conditions.

European Office:

EncapSulite International Ltd.
Frau Karia Hoppe,
EncapSulite Sales
Postfach 900-3285
Koln 90 Germany

US Address:

EncapSulite
International Inc.
505 Julie Rivers Road
#170
Sugar Land, TX 77478-2848

STORAGE AND HANDLING

Keep unexposed film and processed film in a cool, dry place. Process film as soon as possible after exposure.

EXPOSURE

The exposure required is a function of both the photoplotter characteristics and development conditions. Optimum exposure must be determined by means of a trial exposure series following the equipment manufacturer's recommended procedures. The calibration test will determine optimum exposure for required line width and D-max. The resulting image quality and D-max can be influenced by variations in time and temperature of development. Many customers may find that a change to the recommended time and temperature will provide a more suitable result for their particular exposing conditions.

Note: For Gerber Crescent 30 and 40 models, use a neutral density filter of 1.7 to 1.8 ND.

RECIPROCITY

With recommended processing, the reciprocity speed change is negligible (1/3-photographic stop or less) within exposure range of 1/1000 second to 1 billionth second, there is no change in contrast.

PROCESSING

Notice: Observe precautionary information on product labels and on the Material Safety Data Sheets.

	Size	CAT No.	Dilution
KODAK ACCUMAX Rapid Access Developer and Replenisher	5 L concentrate	662 0009 (US, Canada, and Greater Asia)	1:2 with water
		527 2869 (Europe, Middle East, and Africa)	
KODAK Rapid Fixer and Replenisher	5 L concentrate	662 0017 (Us, Canada, and Greater Asia)	1:3 with water
		378 1192 (Europe, Middle East, and Africa)	

Recommended Starting Points

Developer Temperature	Time
ACCUMAX Rapid Access Developer	
35°C (95°F)*	**45 seconds***
38°C (100°F)	30 seconds
32°C (90°F)	60 seconds

*Optimum starting point recommendation for ACCUMAX Developer.

Fixer: Use a fixer temperature of 32 - 35°C (90 - 95°F).

Replenishment Rates:

Developer*	Fixer†
350 mL / sq m	540 mL / sq m

* Anti-oxidation replenishment rates should be set to achieve one tank turnover per week.

† As a starting point, do not add hardener to the fixer. If abrasion or transport problems occur in processing, a small amount of KODAK Rapid Fixer, Part B can be added(CAT No. 173 3013, 72-ounce bottle). Start with 8 mL of Part B per litre of well mixed, working strength fixer, and increase as necessary to a maximum of 25 mL per litre. Add Part B slowly and mix thoroughly.

Recommendations at Setup:

- ✔ Confirm processing time and temperature with calibrated stopwatch and digital thermometer. Adjust control settings to achieve the desired set points.
- ✔ Measure replenishment rates with a graduated cylinder or beaker. Adjust replenishment settings to deliver required volume of developer and fixer for sheet size being used.

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DIMENSIONAL STABILITY

Dimensional stability is an all-inclusive term. In photography, it applies to size changes caused by changes in humidity and in temperature, and by processing and aging.

Generally, humidity has the greatest impact on the dimensional change of phototools. There are two critical factors:

1. Humidity difference between the film package and the room environment
2. Humidity variability during the contact printing operation

APR7 Film is advantaged in both aspects. Because APR7 Film is pre-conditioned by Kodak to 50% RH, it is ready-to-use right out of the box. And the low humidity expansion coefficient of APR7 Film helps it resist size change due to humidity variability.

The dimensional properties of ESTAR Base may vary slightly in different directions within a sheet. Differences in size change between length and width should be within 10 percent of each other.

Thermal Coefficient of Linear Expansion:

Unprocessed or processed	0.001% per degree F 0.0018% per degree C

Humidity Coefficient of Linear Expansion:

Unprocessed	0.0011% per % RH
Processed	0.0009% per % RH

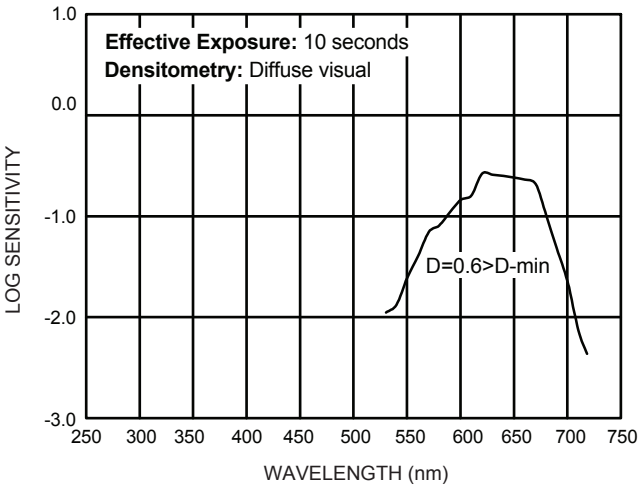
Processing Dimensional Change:

Dependent upon drying conditions.

Recommended dryer temperature starting point	35°C (95°F)

CURVES

Spectral Sensitivity Curve



*Sensitivity = reciprocal of exposure (erg/cm) required to produce specified density

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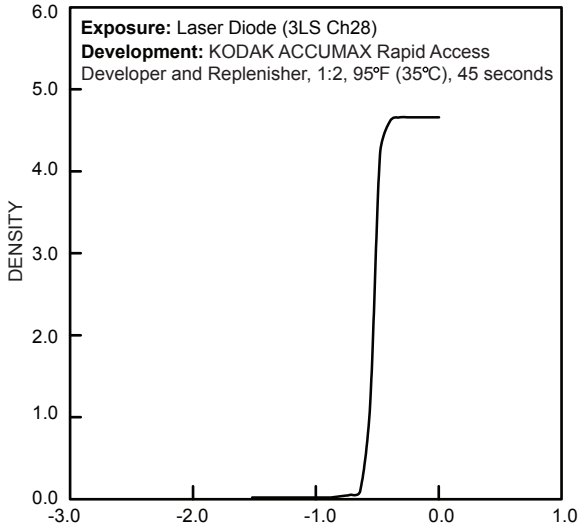
Characteristic Curve



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MORE INFORMATION

For the latest version of technical support publications for Kodak products, visit Kodak on-line at: **http://www.kodak.com/go/PCBproducts**
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) From outside the US/Canada: 1-585-724-4000

Note: The Kodak materials described in this publication for use with APR7 Film are available from dealers who supply Kodak products. You can use other materials, but you may not obtain similar results.

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Industrial Materials Group
EASTMAN KODAK COMPANY • ROCHESTER, NY 14650-0505

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