

KODAK INDUSTREX DR50 Film



FEATURES / CUSTOMER PRODUCT SPECIFICATIONS

- For critical radiography, especially with high voltage x-rays and gamma rays
- Can be used with direct x-rays or with lead foil screens
- Excellent for use in multi-film techniques
- For manual or machine processing
- Very high contrast, high definition, excellent sensitivity
- Very fine grain

THICKNESS

Base / Support	0.18 mm (7.0 mils)
Emulsion	25 microns (1.0 mil); 12.5 microns each side
Overcoat	10 microns (0.4 mil); 5 microns each side
Total	0.22 mm (8.4 mils)

CLASSIFICATION

KODAK INDUSTREX 431C Processor KODAK INDUSTREX Single Part Developer Replenisher, 8 minutes at 79° F (26° C)	
EN-584-1	C2
ASTM 1815-96	Class I
ISO 11699-1	T1

EXPOSURE CONDITIONS: 8 mm Copper Filtration, HL V 3.5 mm Copper (220 kV), Lead screens.

AVAILABLE PACKAGING FORMATS

Sheet Film

Non-Interleaved (NIF) (DR50-1): This form of packaging is generally supplied in packs of 100 sheets, and is for use when film is to be loaded into metal or plastic cassettes, or exposure holders, with or without lead screens.

SAFELIGHT RECOMMENDATIONS

Use a KODAK LED Safelight (660 nm red) or a red safelight filter (i.e. KODAK 1, 1A, or 2 Safelight Filter) in a suitable safelight lamp equipped with a 15-watt bulb. Keep the film at least 4 feet (1.2 metres) from the safelight.

Note: Other safelight filters (i.e. KODAK 8 and GBX-2 Safelight Filter) which block radiation at 550nm and shorter wavelengths are also suitable for use.

STORAGE AND HANDLING

Handle film carefully to avoid physical strains such as pressure, creasing, or buckling.

It is important to realize that meeting the chemical and physical requirements does not by itself ensure that records will not deteriorate. It is essential to provide proper storage conditions. ASTM E 1254 gives details of storage conditions. ISO 18911 and ISO 18902 give, for processed films, recommended storage conditions and specifications for the respective enclosure materials.

Unexposed

50 to 70° F (10 to 21° C), 30 to 50% RH. Properly shield from x-rays, gamma rays, or other penetrating radiation.

Exposed

Keep cool, dry, and properly shielded from penetrating radiation. Process as soon as possible after exposure.

Processed

60 to 80° F (15 to 27° C), 30 to 50% RH.

RELATIVE EXPOSURE

EXPOSURE CONDITIONS: 8 mm Copper Filtration, HVL 3.5 mm Copper (220 kV), Lead screens

KODAK INDUSTREX Films	KODAK INDUSTREX Processor KODAK INDUSTREX Chemicals
	8 min 79° F (26° C)
DR50*	1.0
SR45	0.9
M100	0.6
MX125	0.4
T200	0.3
AA400	0.16
HS800	0.07

* DR50 Film in 8 min 79° F (26° C) cycle is assigned a relative exposure of 1.

RELATIVE EXPOSURE FOR VARIOUS ENERGY LEVELS

For each exposure condition, DR50 Film is assigned a relative exposure of 1.00.

KODAK INDUSTREX Processor, 8 minute 79° F (26° C) cycle.

INDUSTREX Films	ISO 120Kv*	EN 220kV†	Iridium‡	Cobalt§
DR50	1.0	1.0	1.0	1.0
SR45	0.65	1.0	0.9	0.9
M100	0.45	0.6	0.5	0.5
MX125	0.35	0.4	0.3	0.3
T200	0.20	0.3	0.2	0.15
AA400	0.15	0.16	0.1	0.1
HS800	—	0.07	—	—

* In accordance with ISO 7004 standard. Without lead screens

† In accordance with ISO 7004 standard - EN 584-1 Lead screens

‡ 8 mm Copper filtration. 100/200 microns lead screens

§ 100/200 microns lead screens

AUTOMATIC PROCESSING

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

See publication TI-2621, *Processing KODAK INDUSTREX Films*, for additional information on automatic processing.

EXPOSURE CONDITIONS: 200/220 kV, ISO/ANSI/EN Conditions, KODAK INDUSTREX Chemicals

Film Characteristics (Sensitometric)

KODAK INDUSTREX Processor / Cycle	Base + Fog	Contrast*
M431C, 8 min 79° F (26° C)	0.19	5.4
M431C, 5 min 86° F (30° C)	0.20	5.55
M35, 10.5 min 86° F (30° C)	0.20	6.0

* Contrast calculated between net densities of 1.5 and 3.5.

Recommended Replenishment Rates

The consistency of the radiographic quality is related to the accurate adjustment of the replenishment rate.

Replenishment should maintain the chemical equilibrium, replacing the components used by the film.

Solution	Replenishment Volume	
	per 35 x 43 cm (14 x 17 inch) sheet	per m ²
Developer	100 mL	665 mL
Fixer	180 mL*	1200 mL

* For optimum archivability, a 10% increase in fixer replenishment rate may be desirable.

Washing and Drying

Washing: Follow the processor manufacturer's recommendation for wash flow rate, or adjust flow to achieve the equivalent of the wash tank capacity every five minutes, or twelve tank volumes per hour. Insufficient wash flow can adversely affect the life expectancy of processed radiographs. Wash flow rate should be increased if chemical spot tests or other analytical methods reveal a high level of retained chemicals in the processed film. For best results, the wash tank should be drained daily and left empty when not in use.

Drying: Follow the processor manufacturer's recommendation for dryer settings. In general, the dryer should be set to a temperature slightly above (3° C/5° F) the lowest temperature required to eliminate any signs of tackiness in films exiting the dryer.

MANUAL PROCESSING

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

See publication TI-2643, *Guide to Manual Processing of NDT Films*, for additional information on manual processing.

Film Characteristics (Sensitometric)

Development Conditions	Base + Fog	Contrast*
5 min 68° (20° C)	0.20	5.10
3 min 75° (24° C)	0.20	5.00

* Contrast calculated between net densities of 1.5 and 3.5.

Development

Develop with rack and tank, using properly replenished solutions.

	Temperature	Recommended Time (Minutes)	Agitation
KODAK	68° F (20° C)	5	Intermittent (5 seconds every 30 seconds)
INDUSTREX	72° F (22° C)	4	
Single Part Developer	75° F (24° C)	3	
Replenisher	79° F (26° C)	2	

- Remove film and hanger 5 seconds before end of development. **DO NOT ALLOW EXCESS DEVELOPER TO DRAIN BACK INTO THE TANK.** Normally this will carry out the proper amount of solution to permit correct replenishment.
- Use floating covers on developer tanks to reduce oxidation and evaporation; store developer replenisher in a closed container.
- Fill the developer and fixer tank to its original level each morning with developer or fixer replenisher solution (topping off).
- Discard solution after adding two tank volumes of replenisher to tank, or at least once a month, and refill with fresh solution.

Stop, Fix, Wash and Dry Steps

	Temperature	Recommended Time	Agitation
KODAK Indicator Stop Bath, or acetic acid (diluted to 3.5%) solution	60 to 85° F 16 to 30° C	30 to 60 seconds	Continuous, Moderate
KODAK Rapid Fixer, KODAK INDUSTREX Manual Fixer, or KODAK INDUSTREX LO Fixer and Replenisher	60 to 85° F 16 to 30° C	3 to 6 minutes, or twice the clearing time	Vigorous for 15 seconds, then intermittent (5 sec every 30 sec)
Running water wash (8 volume changes per hour)	60 to 85° F 16 to 30° C	10 to 30 Minutes	

Stop baths check development, prevent most spots or streaks, and prolong the life of the fixing bath.

Immerse the film in fixer for **3 to 6 minutes**, agitating for **5 seconds every 30 seconds**. Film should remain in fixer for twice the time it takes to "clear" it (when the milky look disappears). **Never fix film for less than 3 minutes.**

KODAK Hypo Clearing Agent may be used following the fixer to reduce washing time and conserve water. First rinse films in running water for 30 seconds, then use Hypo Clearing Agent for 1 to 2 minutes, followed by a final running water wash for 5 minutes.

To minimize water spots and drying marks, use KODAK PHOTO-FLO Solution after washing.

Dry in a dust-free area at room temperature or in a suitable drying cabinet. Temperature not to exceed 120° F (50° C).

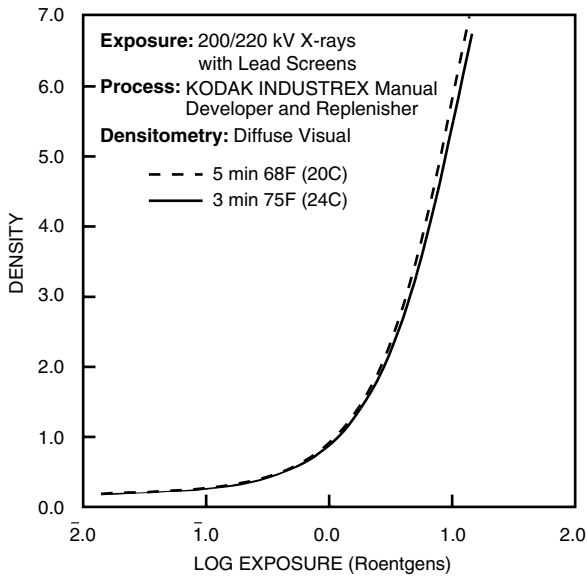
Recommended Replenishment Rates

Maintain chemical activity and solution level in the developer tank by adding 100 mL (3.38 fluid ounces) of replenisher according to instructions for each 14 x 17-inch (35 x 43 cm) film processed. Stir vigorously after each addition. Replenish the fixer tank at the rate of 180 mL (6 fluid ounce) per 35 x 43 cm (14 x 17 in) sheet of film processed.

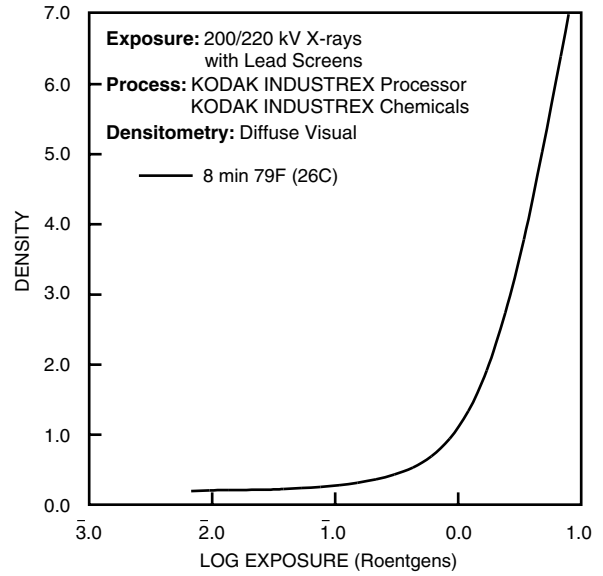
KODAK INDUSTREX DR50 Film

CURVES

Characteristic Curves, Manual Processing



Characteristic Curves, Machine Processing



NOTICE: While the sensitometric data in this publication are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

