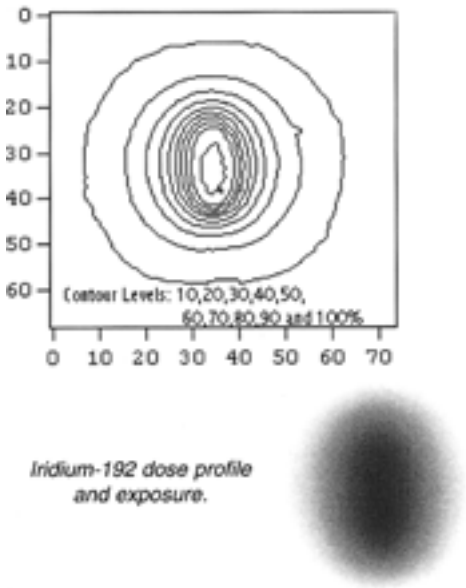
Radiation Oncology ON

GAFCHROMIC® Therapy Dosimetry Media

Models 37-040 to 37-045

- Superior uniformity and sensitivity
- Dose rate and fractionation independent
- Maps dose distribution
- Provides quantitative measurements (via densitometer or scanner)
- No darkroom (handle in room light, no chemicals, no waste)
- Water-resistant



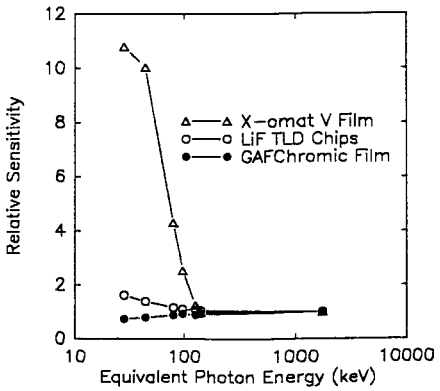
Iridium-192 dose profile and exposure.

Introduction

GAFCHROMIC Therapy Dosimetry Media is a radiation-sensitive imaging film that is colorless, grainless, and offers a very high spatial resolution, making it invaluable for measuring dose distribution around small brachytherapy sources and stereotactic radiosurgery fields. It is available in a variety of dose sensitivity and size formats.

Applications

- Can be used in plastic phantoms or (with special care) in water phantoms
- Can be used invivo for certain high-dose or multifraction applications
- Routine dosimetry, such as dose mapping, beam profiling and high-resolution radiography
- Surface dose and buildup region
- Dose distributions
- Penumbra characterizations
- Depth dose measurements
- Multi-leaf collimator shaped beams
- Stereotactic radiosurgery beam parameters
- Dynamic wedge profiles
- IMRT (Intensity Modulated Radiotherapy Treatment) dose distributions
- Dose distributions near traditional and new endovascular brachytherapy sources
- GAFCHROMIC superior to conventional film in dosimetry studies[1]
- GAFCHROMIC's sensitivity to energy change is far less than silver-based films (see graph)[2]



References

1. P.J. Muench, A.S. Meigooni, R. Nath, and W.L. McLaughlin, "Photon Energy Dependence of the Sensitivity of Radiochromic Film and Comparison with Silver Halide Film and LiF TLDs Used for Brachytherapy Dosimetry," *Medical Physics*, 18:4 (July/August 1991), 769-775.
2. W.L. McLaughlin, C. Yun-Dong, C.G. Soares, A. Miller, G. Van Dyk, and D.F. Lewis, "Sensitometry of the Response of a new Radiochromic Film Dosimeter to Gamma Radiation and Electron Beams," *Nuclear Instruments and Methods in Physics Research*, A302 (1991), 165-176.

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Therapy range dosimetry media types

GAFCHROMIC MD-55 (Model 37-041) Very high resolution; tissue equivalent; dynamic range (1.0 to 100 Gy); energy independent (> 0.2 MeV); dose rate independent; no dose fractionation effects; available in 5 x 5 inch sheets

GAFCHROMIC MD-22 (Model 37-041-2525) Very high resolution; tissue equivalent; dynamic range (1.0 to 100 Gy); energy independent (> 0.2 MeV); dose rate independent; no dose fractionation effects; available in 2.5 x 2.5 inch octagonal shaped sheets (ideal for IMRT Phantom Film Stack Insert Model 74-013 applications)

GAFCHROMIC HD-810 (Model 37-040) Very high resolution; tissue equivalent; dynamic range (5 to 400 Gy); energy independent (> 0.2 MeV); dose rate independent; no dose fractionation effects; available in 8 x 10 inch sheets

GAFCHROMIC D-200 (Model 37-043) Very high resolution; tissue equivalent; dynamic range (5 to 400 Gy); energy independent (> 0.2 MeV); dose rate independent; no dose fractionation effects; available in film strips that have an overall size of 12 x 60 mm with an active area (window) of 8 x 22 mm (well suited for spectroscopy applications)

GAFCHROMIC HS (high sensitivity†) (Model 37-044) Very high resolution; tissue equivalent; dynamic range (0.5 to 40 Gy); energy independent (> 0.2 MeV); dose rate independent; no dose fractionation effects; available in 5 x 5 inch sheets

GAFCHROMIC HS-14 (high sensitivity†) (Model 37-044-1400) Very high resolution; tissue equivalent; dynamic range (0.5 to 40 Gy); energy independent (> 0.2 MeV); dose rate independent; no dose fractionation effects; available in film strips measuring 0.5 x 3.875 inch

GAFCHROMIC XR - Type T (Model 37-045) It's a transparent radiochromic dosimetry film optimized for measuring and mapping low-energy photons; ideal for low dose rate brachytherapy; dynamic range (0.1 to 10 Gy); no significant energy dependence (60 to 120 keV); dose rate and fractionation independent; very high resolution; available in 5 x 5 inch sheets

† *2x the sensitivity of MD-55.*

* *Use Radiochromic Densitometer (Model 37-443).*

Specifications

Temperature Store below 77°F (25°C). Do not use above 131°F (55°C)

Humidity Below 77°F (25°C), no humidity effect, 50% relative humidity or less is preferred

Available model(s)

37-041* GAFCHROMIC MD-55 Therapy Dosimetry Media, package of five 5 x 5 inch sheets

37-041-2525* GAFCHROMIC MD-22 Therapy Dosimetry Media, package of twenty 2.5 x 2.5 inch octagonal shaped sheets

37-040* GAFCHROMIC HD-810 Therapy Dosimetry Media, package of five 8 x 10 inch sheets

37-043* GAFCHROMIC D-200 Therapy Dosimetry Media, package of two-hundred film strips. Each strip has an overall size of 12 x 60 mm with an active area (window) of 8 x 22 mm

37-044* GAFCHROMIC HS Therapy Dosimetry Media, package of five 5 x 5 inch sheets

37-044-1400* GAFCHROMIC HS-14 Therapy Dosimetry Media, package of twenty-five 0.5 x 3.875 inch film strips

Model 37-045* GAFCHROMIC XR - Type T Low Dose Rate Brachytherapy Dosimetry Media, package of five 5 x 5 inch sheets

See Radiochromic Densitometer data sheet (Model 37-443) for complete specifications

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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Radiochromic Densitometer with Film Transport System

Nuclear Associates Model 37-443

Optimized for use with GAFCHROMIC® Dosimetry Media

- Designed to measure the optical density of self-developing GAFCHROMIC Dosimetry Media
- Optimized to measure the principle (671 nm) absorption spectrum peak of GAFCHROMIC Dosimetry Media
- High-precision, instant readout, easy to use
- Compact, hand-held, rugged
- Unsurpassed performance and value; priced at a fraction of the cost of laser densitometers
- Features a high-quality 2-D film transport
- Provides three-times the sensitivity of He-Ne laser densitometers

Introduction

The Radiochromic Densitometer is a highly accurate, reliable, and rugged test tool that allows precise and repeatable measurements to be made quickly and easily. Its state-of-the-art design incorporates a narrow bandpass filter. This filter matches the principle peak of the dose absorption spectrum for our GAFCHROMIC Dosimetry Media, thus maximizing sensitivity and calibration stability. By using the Radiochromic Densitometer (Model 37-443) with Film Transport System, readings of optical density for GAFCHROMIC Dosimetry Media can be obtained directly, accurately, and reproducibly.

The two-dimensional film transport system is supplied with the radiochromic densitometer. Its micrometer-like design provides a precise method of holding and moving a piece of GAFCHROMIC Dosimetry Media over the aperture of the densitometer in both x and y dimensions. The micrometer movement and the device's vernier scale provide an x-y axis precision of ± 0.1 mm.

The Radiochromic Densitometer includes a handy carrying/storage case and a five-step calibrated density tables (gray scale). A durable, aluminum-bottom casing houses 4 AA batteries (good for approximately 3,000 exposures), and the detector light source.

Specifications

Densitometer

Density range 0 to 4.00
Accuracy ± 0.02 D over specified range
Reproducibility ± 0.01 D
Aperture 2 mm
Measuring length (throat) 5.3 in (135 mm)
Zero range Auto-zeros to density 0.0 (for densities up to 1.00)
Sensor High-efficiency silicon photodiode
Light source Ultra-bright red LED. A bandpass filter mounted above the LED provides a 10 nm bandwidth centered at 671 nm. Lamp turns on during measurement; provides extremely long life with minimum spectral and intensity degradation; reduces specimen heating to a minimum

Controls

Zero button Automatically zeros unit
Power On/Off switch
Read-button Initiates read sequence
Calibration control Screwdriver-adjustable; 20-turn potentiometer used to calibrate against a known step tablet
Lamp-button Turns light source on for three seconds

Operating temperature 50° to 104°F (10° to 40°C)
Display 3 digit, 0.5 inch LCD with polarity and low-battery indicator
Power Four 1.5 V AA batteries
Dimensions 3.2 (w) x 7.1 (d) x 2.4 in (h) (81 x 180 x 61 mm)
Weight 1.8 lb (0.8 kg)

Film transport system

Range of film movement 6 x 3 cm
Precision ± 0.1 mm
Dimensions 5.87 (w) x 10.87 (l) x 0.5 in thick (14.9 x 27.8 x 1.6 mm). Base thickness plus measuring device height equals 2.12 inch
Weight 2.2 lb (1 kg)

Available model(s)

37-443 Radiochromic Densitometer with Film Transport System

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

CE **Tested.** **Meets applicable standards.**

Specifications are subject to change without notice.
GAFCHROMIC is a registered trademark of International Specialty Products.

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Howtek MultiRAD™ 860

Model 37-860

ON Radiation Oncology

Advanced generation film digitizer technology offers diagnostic quality primary read capabilities, digital overread of mammograms, digital comparative read of prior mammograms, and detection of microcalcifications and lesions.

"Final Read" initial quality (e.g., in orthopedics) saves steps, time, duplication, and non-chargeable preliminary reads.

More information and less noise from dense film areas -- "see in the dark" even where films are dense or overexposed.

High energy red LED illumination offers laser quality at fluorescent prices.

- 3.85 OD HiResolve™ Film Digitizer
- Technical advances account for image superiority
- Dynamic range of 3.85 OD
  - Reduces image noise by almost half
- Patent pending solid state, high energy red LED illuminator
  - Precise control of individual LED's
  - Self-calibrating for optimal illumination and brightness
- Consistent photometric accuracy
  - Film to film, hour to hour, day to day
- No fluorescent artifacts
  - No hot spots, no shifting illumination or flicker
- No annual laser maintenance costs

Diagnostic quality

Dynamic range 0 to 3.85 OD

Gray scale 8 or 12 bit

Spot size 43.5 micron at 8 K

High resolution

K	Dots per inch	Resolving power	14x17x12 bit file size	8x10x12 bit file size
1 K	73 dpi	1.4375 lp/mm	2.5 MB	0.8 MB
2 K	146 dpi	2.875 lp/mm	10 MB	3.4 MB
4 K	292 dpi	5.75 lp/mm	40 MB	13 MB
8 K	584 dpi	11.5 lp/mm	162 MB	54 MB

Productivity

Scan rate 125 lines/second, 14 x 17 inch film scanned @ 2 x 2.5 K, 12 bit in < 20 seconds

Film sizes 5 to 14 inch (w) (12.7 to 35.6 cm); up to 40 inch (l) (101.6 cm)

Batch feeder Standard 60 sheet film feeder

Selective mode Region of interest high resolution capture

Technology

Light source Patent pending solid state, high energy red LED illuminator

Detection system 8,000 element CCD, low noise high fidelity system

Calibration Automatically and continuously consistent photometric accuracy film to film, hour to hour, day to day, week to week

Feeding mechanism Patented SureFeed™ system

Specifications

Interface SCSI-2

Applications software Multiple vendors

Dimensions 18 (w) x 14 (d) x 18.5 in (h) (45.72 x 35.56 x 47 cm)

Power requirements 100 to 240 V; 50/60 Hz; 1.5 A

Temperature

Operating 60° to 90°F (16° to 32°C)

Non-operating - 30° to 160°F (- 34°C to 71°C)

Relative humidity 35 to 85%, non-condensing

Certification TuV; UL; CE; FCC-A; FDA 510(k) 970908

Weight 60 lb (27.3 kg)

Available model(s)

37-860 Howtek MultiRAD 860

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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Howtek MultiRAD™ 460

Model 37-460

- 3.85 OD Diagnostic Film Digitizer
- Technical advances account for image superiority
- Dynamic range of 3.85 OD
  - Reduces image noise by almost half
- Patent pending solid state, high energy red LED illuminator
  - Precise control of individual LED's
  - Self-calibrating for optimal illumination and brightness
- Consistent photometric accuracy
  - Film to film, hour to hour, day to day
- No fluorescent artifacts
  - No hot spots, no shifting illumination or flicker
- No annual laser maintenance costs

Advanced generation film digitizer technology offers diagnostic quality primary read capabilities, and accurate comparative readings where clinical decisions are based on small changes in gray scale.

Critical clinical information from small changes in density enables the diagnostician to discern fine tissue damage.

"Final Read" initial quality saves steps, time duplication, and non-chargeable preliminary reads.

More information and less noise from dense film areas -- "see in the dark" even where films are dense or overexposed.

High energy red LED illumination offers laser quality at fluorescent prices.

Diagnostic quality

Dynamic range 0 to 3.85 OD

Gray scale 8 or 12 bit

Spot size 43.5 micron at 8 K

High resolution

K	Dots per inch	Resolving power	14x17x12 bit file size	8x10x12 bit file size
1 K	73 dpi	1.4375 lp/mm	2.5 MB	0.8 MB
2 K	146 dpi	2.875 lp/mm	10 MB	3.4 MB
4 K	292 dpi	5.75 lp/mm	40 MB	13 MB

Productivity

Scan rate 125 lines/second, 14 x 17 inch film scanned @ 2 x 2.5 K, 12 bit in < 20 seconds

Film sizes 5 to 14 inch (w) (12.7 to 35.6 cm); up to 40 inch (l) (101.6 cm)

Batch feeder Standard 60 sheet film feeder

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Light source Patent pending solid state, high energy red LED illuminator

Detection system 8,000 element CCD, low noise high fidelity system

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Feeding mechanism Patented SureFeed™ system

Specifications

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Applications software Multiple vendors

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Power requirements 100 to 240 V; 50/60 Hz; 1.5 A

Temperature

Operating 60° to 90°F (16° to 32°C)

Non-operating - 30° to 160°F (- 34°C to 71°C)

Relative humidity 35 to 85%, non-condensing

Certification TuV; UL; CE; FCC-A; FDA 510(k) 970908

Weight 60 lb (27.3 kg)

Available model(s)

37-460 Howtek MultiRAD 460

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

Specifications are subject to change without notice.

MultiRAD and SureFeed are trademarks of Howtek.

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