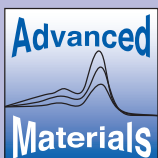


GAFCHROMIC® EBT

product brochure

QD+



A BUSINESS UNIT OF ISP



INTERNATIONAL SPECIALTY PRODUCTS

GAFCHROMIC® EBT FEATURES

GAFCHROMIC® EBT dosimetry film has been developed specifically to address the needs of the medical physicist and dosimetrist working in the radiotherapy environment. It is targeted toward applications in external beam radiotherapy, in particular, intensity modulated radiation therapy (IMRT) and brachytherapy, and supports the processor-less environment of the modern hospital.

Some of the technical benefits are:

- Sensitive to doses ranging from 1cGy to 800cGy.
- Develops in real time. There is no post-exposure treatment.
 - Eliminates processing discrepancies.
- Density changes stabilize rapidly after exposure.
- Energy-independent dose response from keV to MeV.
 - Eliminates concerns caused by scattered radiation.
 - Near tissue-equivalent.
- Uniformity better than 1.5%.
- High spatial resolution.
- Can be handled in room light.
 - Eliminates the need for a darkroom.
- Water resistant.
 - Usable in water phantoms.
- Will withstand temperatures up to 70°C.

Some of the economic benefits are:

- Large size.
- Eliminates the need for a processor.
- Eliminates chemical wastes.
- Convenient to handle and easy to cut.
 - Film can be marked with marker pen and erased if necessary.
 - Size and shape the film to your needs.
- Competitively priced with conventional films.
 - Significant savings.

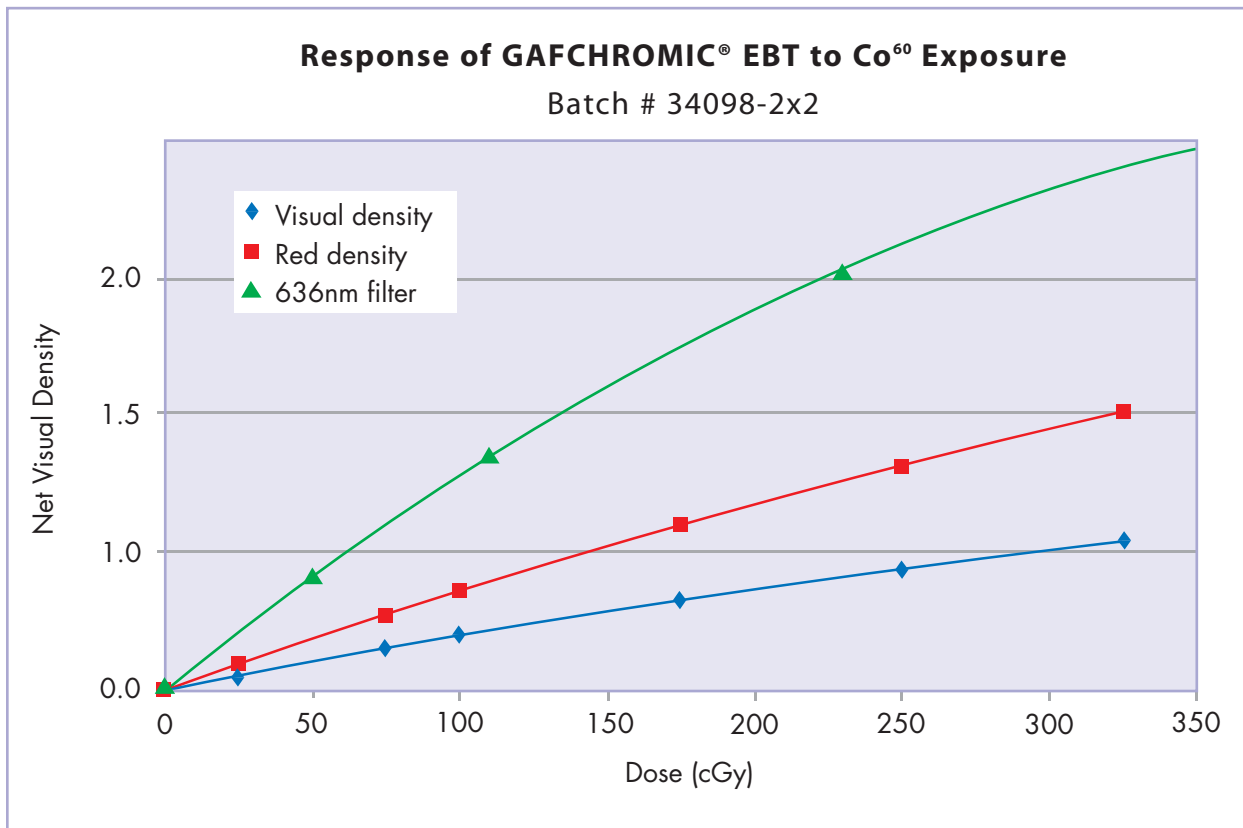
CONFIGURATION AND STRUCTURE OF GAFCHROMIC® EBT

GAFCHROMIC® EBT is made by laminating two active layers bonded together. The outer surface is polyester that makes a robust product and allows water emersion.

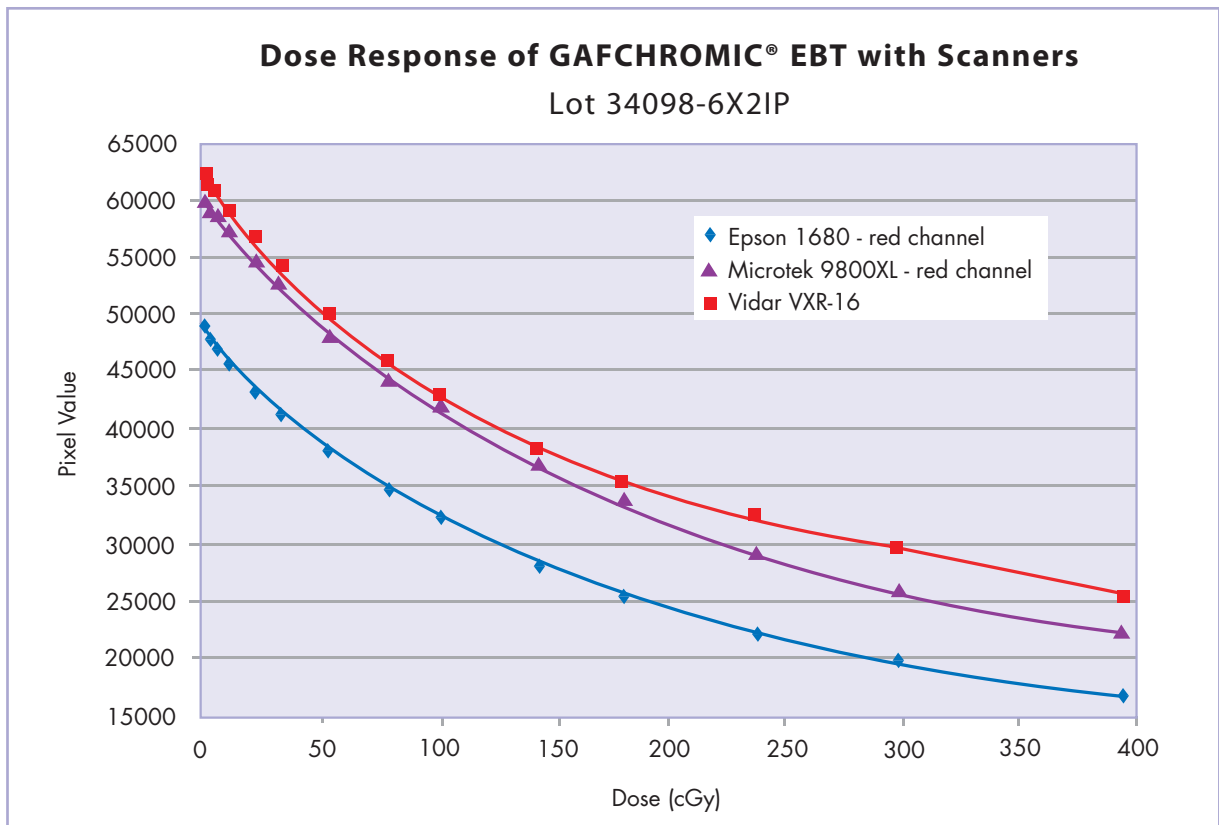
OPTIMIZING THE SENSITOMETRIC RESPONSE OF GAFCHROMIC® EBT DOSIMETRY FILM

Since the absorbance spectra of GAFCHROMIC® EBT peaks at 636nm, the sensitivity is maximized by measurement with red light.

Transmission densitometers that are commonly used to measure visual density with conventional films are suitable for use with EBT film. Better results can be obtained from the red color channel with a color densitometer. However, the best results can be obtained by using a narrow band pass filter with central wavelength at about 636nm and 10nm bandwidth while making measurements.



Sensitometric response of GAFCHROMIC® EBT in the visual and red color bands and with a 636nm filter



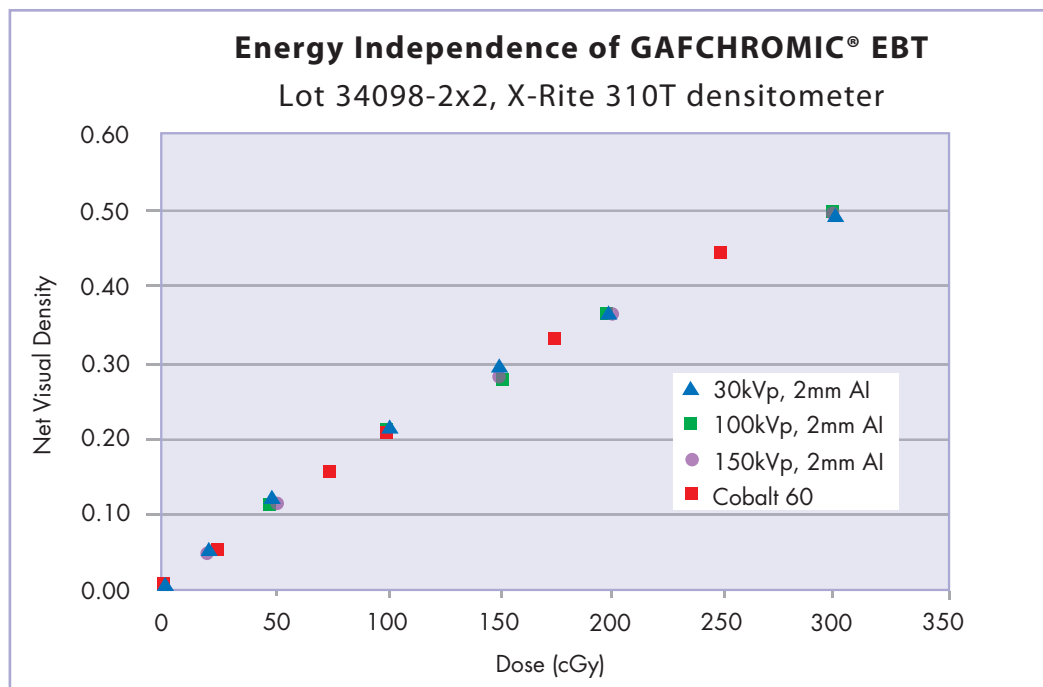
GAFCHROMIC® EBT dosimetry film can also be read with a film scanner or digitizer. As with densitometers, the response of the film will be enhanced if the spectral response of the scanner is matched to the absorbance of the film.

Many high-quality scanners are designed to digitize colored films. Our preferred scanner is an Epson® flatbed color scanner designed to digitize colored films up to 8" x 10" and even as large as 12" x 17" in size. These color scanners provide the best response for the EBT film from the red color channel. Black-and-white scanners usually employ a broad spectrum light source and this will usually result in a lower response with EBT film.

HeNe laser scanners (Lumisys, Molecular Dynamics) provide the highest response with EBT film because the laser has a wavelength of about 633nm, very close to peak absorbance. However, the coherent light of the laser scanners can produce artifacts caused by the interaction of polarized light with the film. These artifacts can be minimized, if not eliminated, through the use of a diffuser in the beam path.

ENERGY INDEPENDENCE OF GAFCHROMIC® EBT DOSIMETRY FILM

GAFCHROMIC® EBT radiochromic film has been designed to measure absorbed dose from high-energy radiation used in IMRT. The response to photons has been found to be energy-independent in the MeV range and measurements at lower energies show that the response changes by only a few percent, even down to 30keV



Energy Independence of GAFCHROMIC® EBT Dosimetry Film

The response of GAFCHROMIC® EBT dosimetry film is dependent upon factors specific to the facility such as the energy spectrum of the radiation source, the characteristics of the densitometer, film scanner or other means of measurement and the elapsed time between exposure and measurement etc. Therefore, the user should determine the dose-density response under the conditions pertaining to the user's facility and measurement protocol. Since the absolute response of GAFCHROMIC® EBT dosimetry film may vary from lot to lot, the user should re-measure response when changing to a new lot number.

DOSE FRACTIONATION

The results in the table below indicate that the response of EBT film exposed to a single fraction is indistinguishable from the response of the film given fractionated exposure and establishes EBT film as an effective dose integrator.

EXPOSURE	NET VISUAL DENSITY CHANGE (average of 9 measurements)
5Gy in a single fraction	0.681 ± 0.015
5Gy in 1Gy fractions at 30min. intervals	0.677 ± 0.009

Response of GAFCHROMIC® EBT Dosimetry Film to Fractionated Exposure

POST-EXPOSURE DENSITY GROWTH

GAFCHROMIC® EBT film develops in real time. When calibrating and analyzing films, the time interval between exposing the films and scanning them should be consistent for all films.

STORAGE AND HANDLING

GAFCHROMIC® EBT film is designed to be handled in interior room light but it is recommended that the film be kept in the dark when not in use. Exposure to sunlight should be avoided. The film may be stored at room temperature (20°-25°C), but the best practice is to store the film at refrigerator temperature. The shelf-life of the film is two years when stored at room ambient temperature. It can tolerate brief exposures (e.g. <1min.) to temperatures up to 70°C, or more prolonged exposure (e.g., <1 day) at temperatures of 50°C. However, it is recommended that the film be handled, exposed and measured at room ambient temperature (20°-25°C).

FILM SIZE

GAFCHROMIC® EBT - 8" x 10"

GAFCHROMIC® EBT-1417 - 14" x 17"

ALSO AVAILABLE

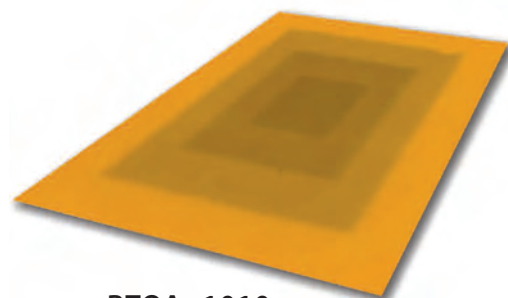
IMRT QA system consisting of:

- 1) QD⁺ Quickstart package (includes 4 EBT boxes, scanner and 1 day hands on training.)
Note: (QD⁺ Quickstart Deluxe package with larger scan format is also available.)
- 2) FilmQA™ - IMRT plan verification software.

For QA and commissioning we recommend the use of GAFCHROMIC® RTQA film.

This film comes in three sizes.

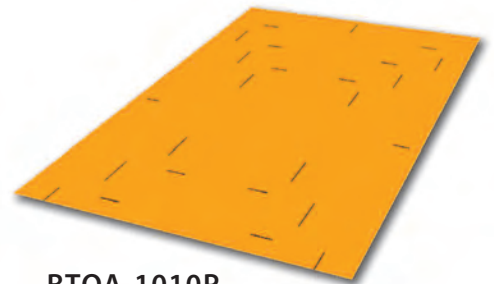
- 1) GAFCHROMIC® RTQA -1010 and GAFCHROMIC® RTQA -1010P both are 10"x10" and is recommended for light-field alignment, precision star-shots, autoradiography, etc.
- 2) GAFCHROMIC® RTQA -111 which is 1.25"x11" and is recommended for verifying brachytherapy source positioning.
- 3) GAFCHROMIC® RTQA -1417 which is 14"x17" in dimension designed for larger field size.



RTQA -1010
Light-field alignment test



RTQA -111
Brachytherapy source positioning



RTQA-1010P
Pre-scaled



RTQA -1417
Larger light-field alignment test

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