GC60 Series - Gamma Beam Irradiator

Overview

The Model GC60 Gamma Beam Irradiator provides a horizontal radiation beam for calibrating radiation detection instruments and irradiating personnel dosimetry. This irradiator is available with up to 7 radioactive sources in a wide range of activities. The system comes complete with radiation sources, source shield, beam collimator, safety interlocks, and control panel.

The GC60 irradiator, when matched with our positioning system, attenuator set and instrument camera, provides a simple to use, fail safe, turn-key system for many radiation calibration applications.

Advantages

- Can be used with many sources and isotopes.
- Sources can be replaced as they decay below acceptable activities.
- Provides the purest energy spectrum when used without attenuators.
- Can be used with attenuators to provide the widest dynamic dose rate range possible.
- Custom collimators are available to fit the customers application.

Source Shielding

The irradiator source shielding consists of two steel encased lead cylinders. The storage shield holds the carousel and sources, while the second smaller shield, called the top shield, consists of the collimated opening for the radiation beam. Lead surrounds the transport tube through which the sources travels from the safe to exposed positions. The storage shield may also be located in a below grade well, using earth and concrete rather than lead to provide the required shielding.

The top shield has an integrated ISO4037 collimator used at the expose position to provide a low scatter beam of radiation

The shielding is designed to maintain the radiation levels around the irradiator to less than 5 mR/hr at 12 inches when the sources are in the storage position.

Model GC60 Gamma Beam Irradiator

Standard Models

Model	Overall Dimensions	Weight	Max Activities
GC60-10	30x30x65 inches	3000 lbs	2600 Ci Cs-137 10 Ci Co-60
GC60-100	32x32x68 inches	5000 lbs	2600 Ci Cs-137 100 Ci Co-60
GC60-1000	36x36x72 inches	10,000 lbs	2600 Ci Cs-137 1000 Ci Co-60

Radioactive Sources

- All the sources are doubly encapsulated, hermetically sealed, special form sources.
- Standard source sizes are:
  - Up to 2200 Ci of Cs-137
  - Up to 1000 Ci of Co-60

www.hopewelldesigns.com
5940 Gateway Dr. Alpharetta, GA 30004 USA
sales@hopewelldesigns.com
Phone: 770-667-5770

The sources are installed into an aluminum holder called a rabbit. These rabbits are loaded into the irradiator into a rotating carousel. The carousel rotates to align the selected source with the transport tube. The source is moved from the storage position to the expose position by compressed air and held in place by a suction cup. Position of the rabbit is closely monitored with photo eye sensors and vacuum sensors to ensure the source is in the desired location.

Safety System

The irradiator system incorporates many safety features to create a fail-safe system. Safety constraints have been applied to all components that involve source exposure. The safety interlock system must be fully satisfied before an exposure can occur and will immediately halt any exposure in process if they are broken. Status panels show radiation conditions at a glance. The entire system has been designed to meet or exceed guidelines and regulations found in ANSI Standards N43.3 and NCRP 88.

Control Panel

The GC60 irradiator is controlled by an industrial computer and programmable logic controller. Computer control offers exposure rate calculation, automated instrument setup with positioning system control, and automated irradiator calibration. On the control panel, the operator has switches for power and system enable, and buttons for source expose and return operations. Indicator lights and emergency stop buttons are also available on the system control panel. The computer provides the operator with the current status of the irradiator, instrument position, source selection, attenuator selection, plus additional information about the irradiator system.

Ancillary Equipment and Options

Linear Positioning System

A linear positioning system for instrument placement is available with up to four axis of motion and 10 meters of displacement.

Collimators

Custom collimators are available if the standard beam does not fit your application.

Attenuators

The attenuator set allows for up to 16 different levels of attenuation factors from 1 up to 8000.

Video Monitors

Video monitors for instrument inspection and room security are available.

Jigs/Fixtures

Dozens of standard jigs are available for nearly every instrument.

Multiple Sources

Up to 7 sources are available to provide a full range of exposure rates.

Safety Systems

Last person out safety systems are used on irradiators with high exposure rates and are optional on other systems.

GI-Am241 Irradiator

Model GI-Am241 Irradiator

The Am-241 source is shaped as a disc, similar to a coin, to optimize the dose rate for this low energy gamma emitter. The Model GI-Am241 gamma beam irradiator holds a single Am-241 source on a source rod that is raised vertically to lift it out of its shield to the exposed position. The shielding consists of lead and plastic to shield the radiation the Am-241 source emits. Overall size of the shield is 12″ x 13″ x 14″ and has 3/8″ of lead shielding and 5″ of high density polyethylene shielding.

The Model GI-AM241 irradiator is typically mounted at the opposite end of the linear positioning system from the GC60 and is controlled by the GC60 computer control system. When selected, the computer control system references exposure distance to the source center.

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