WATER PHANTOM MOTOR DRIVE SYSTEM

Motor Control Box

- **Rugged construction**
- **Precision ground shaft**
- **Variable speed control**
- **All metal motor drive**
- **No lost counts of travel**
- **No jitter counting**
- **Quadrature X1 counting mode**
- **Two sizes of water tanks are available**
- **Meets AAPM-51 and IAEA TRS-398 dosimetry protocol requirements**

Motor Drive System
The main feature of this motor drive system is that no travel movement counts are lost if jogging up or down when setting the chamber depth position. This is due to an output shaft encoder producing 100 counts per millimeter in travel and a quadrature X 1 counting mode. This mode requires two identical square wave signals with one of the (QUAD) shifted 90° relative to other (COUNT). These two signals are processed by a dual counter. Counter accuracy becomes 0.01 mm with no lost counts.

The all metal motor drive system adds convenience and saves time by allowing the user to set the ion chamber position from outside of the treatment room.

The motor control box has a 5 digit 1/2" (1.27 cm) LCD (liquid crystal display) which reads to 0.01 mm resolution, and has a reset button below the display. A downward chamber movement is indicated by a (-) on the LCD. A knob for the motor speed control sets the speed of travel based on the % of maximum motor speed. When pushed, the drive thumb switch gives continuous motion in the up (p / +) or down (q / -) direction of travel. A lighted power switch indicates when the unit is on. The motor control box is fused through a 6' (1.8 m) long hospital grade cord that attaches to the motor control box through an isolation transformer. A fuse holder is located on the back of the motor control box for easy service and accessibility.

A 50’ (15.25 m) fully shielded cable connects the motor control box to the motor drive unit. Individual cables (Item 691-080) can be installed in each treatment room.

The motor drive unit sits on the side of the water phantom and is manually positioned in the X or Y axis using the scales on the side of the phantom. The motor drive unit is held in place using the two tightening screws. The momentary toggle switch on the side of the motor drive unit also controls the up/down direction of travel. The speed of travel is set at the motor control box. The vertical position is displayed in millimeters at the motor control box or can be read on the 30 cm scale attached to the motor drive unit. The maximum vertical travel is 30 cm.

For safety the maximum power supply to the motor is 24 volts D.C. All components of the motor control box and motor drive unit are UL approved.

Water Phantom
The water phantom has 1/4" (0.635 cm) thick clear acrylic sides, a 3/8" (0.953 cm) thick white acrylic bottom, and a clear acrylic support rim at the top of the phantom. The white bottom allows for easy viewing of the chamber and cross hair shadows. The water phantom has a tank plug and a drain valve assembly. A 5' (1.5 m) drain hose is also included. Two sides of the water phantom have ±16 cm scales with millimeter markings. The water phantom is available in two sizes: large and small.

A 46 cm aluminum depth scale with millimeter markings is included with the water phantom. The depth scale has a half-round cutout at the base which allows positioning on the active area of a RPD waterproofing tip (Item 691-030 and 691-032) for a Farmer style chamber. When using the 46 cm aluminum depth scale on the active chamber area of a **waterproof** Farmer style chamber (all manufacturers) to measure water depth, **subtract 1 mm** from depth reading.

Items 691-010 Small Water Phantom and 691-015 Large Water Phantom Includes

- Motor control box
- 50’ (15.25 m) cable
- Motor drive unit
- 46 cm aluminum depth scale (Item 692-000-50)
- Chamber support rod w/scribing, 1/2" (1.27 cm) diameter delrin (Item 691-036 or Item 691-037)
- Acrylic holder for a Farmer Style Chamber (Item 691-034)
- Drain valve assembly (Item 691-000-56)
- Pipe plug (Item 14-310)
- 5' (1.5 m) drain hose with hose connection (Item 691-090)

Specifications

Motor Drive System
Power: 115 Vac, 50/60 Hz
Optional Power: 230 Vac, 50/60 Hz
Display: 5 Digit LCD
Accuracy: 0.01 mm
Travel: 30 cm
Cable: 50' (15.25 m) Fully shielded
Motor: Variable speed, reversible, 24 VDC

Item 691-010 Small Water Phantom
Inside Dimensions: 35 cm x 40 cm x 38 cm D
Gallons: 13
Weight: 15 lb (6.8 kg)
Weight When Full: Approximately 104 lb (47.3 kg)

Item 691-015 Large Water Phantom
Inside Dimensions: 40 cm x 45 cm x 38 cm D
Gallons: 16.5
Weight: 16.5 lb (7.5 kg)
Weight When Full: Approximately 132 lb (60 kg)

Item	Description
691-010	Small Water Phantom with Motor Drive System
691-015	Large Water Phantom with Motor Drive System
691-080	Cable, Fully Shielded, 50' (15.25 m)
692-000-50	46 cm Depth Scale

WATER PHANTOM MANUAL DRIVE SYSTEM

- **Rugged construction**
- **Precision ground shaft**
- **Quadrature X1 counting mode**
- **Two sizes of water tanks are available**
- **Meets AAPM-51 and IAEA TRS-398 dosimetry protocol requirements**

Manual Drive Unit
When using the manual drive unit the chamber is manually positioned in the X or Y axis using the scale on the side of the water phantom. The manual drive unit is held in place by two tightening screws. The chamber is adjusted on the Z axis using the manual drive. The maximum vertical travel is 30 cm. A precision 2:1 gear box allows for quick vertical motion. The large handwheel provides ease of motion and a 0.1 mm mechanical increment counter provides an accurate readout of the vertical position of the chamber. One turn of the handwheel is equal to 3.0 mm of travel. The mechanical counter can be reset to zero at any position by turning the reset knob (located on the side of the counter) counter clockwise.

Water Phantom
The water phantom has 1/4" (0.635 cm) thick clear acrylic sides, a 3/8" (0.953 cm) thick white acrylic bottom, and a clear acrylic support rim at the top of the phantom. The white bottom allows for easy viewing of the chamber and cross hair shadows. The water phantom has a tank plug and a drain valve assembly. A 5' (1.5 m) drain hose is also included. Two sides of the water phantom have ±16 cm scales with millimeter markings. The water phantom is available in two sizes: large and small.

A 46 cm aluminum depth scale with millimeter markings is included with the water phantom. The depth scale has a half-round cutout at the base which allows positioning on the active area of a RPD waterproofing tip (Item 691-030 and 691-032) for a Farmer style chamber. When using the 46 cm aluminum depth scale on the active chamber area of a **waterproof** Farmer style chamber (all manufacturers) to measure water depth, **subtract 1 mm** from depth reading.

Items 691-001 Small Water Phantom and 691-005 Large Water Phantom Includes

- 46 cm aluminum depth scale (Item 692-000-50)
- Chamber support rod w/scribing, 1/2" (1.27 cm) diameter delrin (Item 691-036 or Item 691-037)
- Acrylic holder for a Farmer Style Chamber (Item 691-034)
- Drain valve assembly (Item 691-000-56)
- Pipe plug (Item 14-310)
- 5' (1.5 m) drain hose with hose connection (Item 691-090)

Specifications

Manual Drive Unit
Counter: Mechanical
Accuracy: 0.1 mm
Travel: 30 cm

Item 691-001 Small Water Phantom
Inside Dimensions: 35 cm x 40 cm x 38 cm D
Gallons: 13
Weight: 15 lb (6.8 kg)
Weight When Full: Approximately 104 lb (47.3 kg)

Item 691-005 Large Water Phantom
Inside Dimensions: 40 cm x 45 cm x 38 cm D
Gallons: 16.5
Weight: 16.5 lb (7.5 kg)
Weight When Full: Approximately 132 lb (60 kg)

Item	Description
691-001	Small Water Phantom with Manual Drive Unit
691-005	Large Water Phantom with Manual Drive Unit

CHAMBER HOLDERS FOR WATER PHANTOM

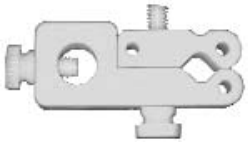
Items 691-034 and 691-036 or 691-037 are included with water tank

691-034

691-041, 691-042 or 691-043

691-036

691-040



691-050

The Markus (Item 691-041) or Roos (Item 691-042) chamber holders will hold the chamber parallel with the water surface. A thumb screw secures the chamber in place.

Item	Description
691-034	Farmer Style Chamber Holder, Additional or Replacement
691-036	Chamber Support Rod for Small Water Phantom
691-037	Chamber Support Rod for Large Water Phantom
691-040	Chamber Holder for PTW 0.1cc, 0.125cc, and 0.3cc Chambers
691-041	Chamber Holder - Acrylic for PTW Markus/Exradin A10/Wellhoffer NACP/PPC05
691-042	Chamber Holder - Acrylic for PTW Roos/Wellhoffer PPC40/PPC035
691-043	Chamber Holder - Acrylic for Exradin Model 11
691-050	Universal Chamber Holder Sizes 5.8mm to 17.7mm Dia.

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CHAMBER WATERPROOFING ACCESSORIES

691-030

691-030 Shown with a Farmer Style Chamber Holder

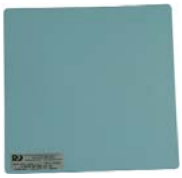
691-033

A Farmer Style Chamber can be housed in a watertight tip made of polystyrene (Item 693-030) or acrylic (Item 693-032) with a tip wall thickness of 1 mm. A 60 cm long rubber sheath is connected to the tip with an O-Ring. The shealth is long enough to extend out of the water phantom. Atmospheric air pressure is provided through the rubber sheath to the chamber tip.

Item	Description
691-030	Waterproof Poly Farmer Style Chamber Tip with Tubing
691-032	Waterproof Acrylic Farmer Style Chamber Tip with Tubing
691-033	Kit - Sheath and O-ring

Will NOT Fit Exradin A12 Chamber

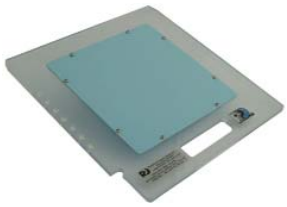
LEAD FOIL FOR TG-51



691-175

691-176

691-177



691-190

691-200
Shown in PTW holder T4316-U563
(holder not included)

Items 691-175 through 691-190: The lead foil thickness is 1 mm ±10% and 25 cm square. The lead is sandwiched between two 0.025" PVC sheets. The lead foil is also available mounted to a tray.

Item 691-200: The lead foil thickness is 1 mm ±10% and 10.4 cm in diameter. The lead is sandwiched between two 0.025" PVC sheets and fits in the PTW chamber holder T4316-U563.

Item #	Description
691-175	Lead Foil for TG-51
691-176	Lead Foil, Varian III Wedge Slot Tray
691-177	Lead Foil, Varian II or III Block Tray
691-178	Lead Foil, Varian II Wedge Slot-Coding By-Pass
691-180	Lead Foil, Siemens Screw Coding, Block Tray
691-184	Lead Foil, Siemens, Block Tray w/ By-Pass Coding
691-185	Lead Foil, Siemens, Block Tray w/Coding Plug Pocket
691-190	Lead Foil, Elekta, Acrylic, Block Tray
691-200	Lead Foil Insert for PTW T4316-U563 Holder

* Coding Plug is extra, use Item 1884-10-5

CASE & TRANSPORT CART FOR WATER PHANTOM

691-055

691-056

An optional foam lined storage case (Item 691-055) for the motor drive provides safe transport/storage. Also available is a collapsible transport cart (Item 691-056) with bungee straps that will hold the storage case, water phantom and accessories to provide easy transport.

Item #	Optional Waterproofing Accessories
691-055	Case for Motor Drive and Control
691-056	Foldable Transport Cart

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SHIPPING CASES FOR WATER PHANTOMS

691-058

691-0581

691-0582

691-0583

Item 691-058
This case holds the Water Tank. The top lifts off exposing the complete tank which can be lifted and placed on a cart. Sturdy foam on the bottom of the case holds the tank in place. Foam is secured to all four (4) sides and the top and bottom of the case.

Inside Dimensions: 33” W x 33” D x 29.5” H

Item 691-0581
This case holds the water Phantom Cart. Wood guides inside the case are used to guide the cart inside. One side of the case is hinged and used as a ramp. Four (4) 4” swivel casters allow for easy rolling and two (2) of the casters are locking. The case is lined with foam on three (3) sides and the top. One (1) loose piece of foam is used on the ramp side when the ramp is closed.

Inside Dimensions: 29.75" W x 37" D x 33.5" H

Item 691-0582
This case will hold a dosimeter, chambers, cables, levels, tools and manuals.

Item 691-0583
This pail is used to hold a water pump.

Item	Description
691-058	Tank Case, Inside: 33" W x 33" Deep x 29.5" High
691-0581	Cart Ramp Case, Inside: 29.75" W x 37" D x 33.5" H
691-0582	Transport Case, Inside: 43" W x 29" D x 19" H w/Foam
691-0583	Pail Case, Inside: 5 Gallon (for water pump)

Specify Manufacturer Model and Contact Person

PTW WATER TANK CHAMBER HOLDERS FOR EXRADIN ION CHAMBERS

696-018

696-020

Holders for holding Ion Chamber in horizontal position.

Item	PTW Water Tank Chamber Holder
696-018	For Exradin A14SL and A16
696-019	For Exradin Models 1, 2, 12 and 14 (Exradin A1, A2, A12, A12S, A14, A14P, M1, M2, P2, T1, T2, T14 and T14P)
696-020	For Exradin A10
696-021	For PTW T31002 (0.125cc Semifliex)

Holders for holding Ion Chamber in vertical position.

Item	PTW Water Tank Chamber Holder
696-022	For Exradin A10
696-024	For Exradin 11 and 13 (Exradin A11, A11TW, A13, P11, P11TW, P13, T11 and T11TW)

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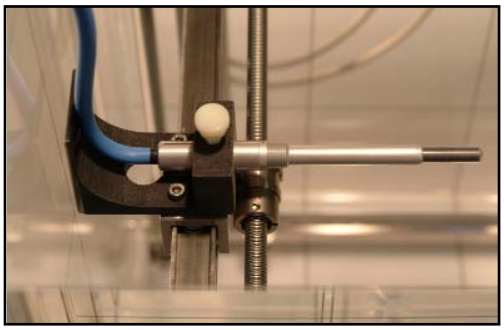
FARMER CHAMBER HOLDER FOR PTW MP3-XS 3D WATER PHANTOM



This chamber holder will hold any 1/2. (12.7mm) diameter waterproof Farmer chamber horizontal in the PTW MP3-XS 3D Water Phantom.

This chamber holder allows the triax cable to be guided vertically and smoothly over the top of the tank. There is no side wall pressure against the triax cable. A plastic “C” channel stop is provided to prevent crashing of the chamber against the side wall.

Item	PTW Water Tank Chamber Holder
696-025	Holder for 1/2" (12.7mm) Dia Waterproof Farmer Chamber

CHAMBER HOLDERS FOR PTW MP1 AND MP3 WATER TANKS

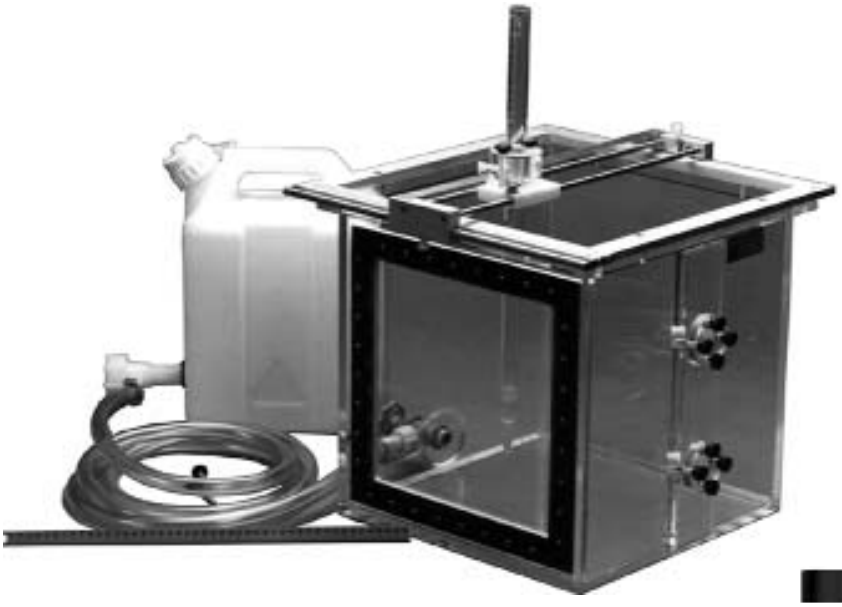
696-050

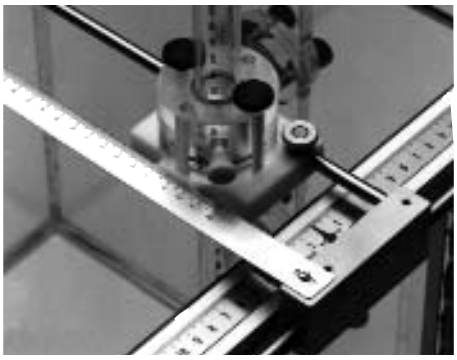
696-060

These chamber holders will hold any ion chamber, with diameters as specified, horizontal in the PTW MP1 and MP3 Water Tanks.

Item	PTW MP1 and MP# Water Tank Chamber Holders
696-030	7.0 mm Diameter
696-040	13.0 mm Diameter
696-050	30.1 mm Diameter
696-060	45.1 mm Diameter

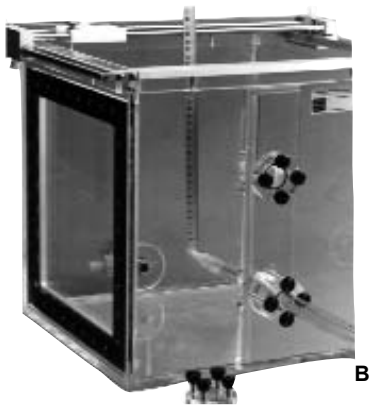
MYLAR WINDOW WATER PHANTOM





A

692-000-60



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Mylar Window
The window is made of 0.010" thick Mylar. It is mounted in an 27 cm square aluminum frame. The outside of the water phantom is 18.7 cm from the bottom to the center of the mylar window.

Two Water-Tight Side Openings
The side openings for the chamber holder are located 10 cm and 25 cm from the bottom of the phantom. The chamber holder has a single axis of motion.

Drain
The Water Phantom drain valve can be connected with a vinyl hose to a 2 1/2" gallon reservoir tank with valve. Place the reservoir tank above the water phantom and open the valves to raise the water level. Place the reservoir tank below the water phantom to lower the water level.

Depth Scale
A 46 cm aluminum depth scale with millimeter markings is included with the water phantom. The depth scale has a half-round cutout at the base which allows positioning on the active area of a RPD waterproofing tip (Item 691-030 and 691-032) for a Farmer style chamber.

When using the 46 cm aluminum depth scale on the active chamber area of a **waterproof** Farmer style chamber (all manufacturers) to measure water depth, **subtract 1 mm** from depth reading.

Chamber Holder
The chamber holder comes with an 18" L x 7/8" or 5/8" diameter acrylic tube with a polystyrene or acrylic tip that has a 1 mm thick wall for a Farmer Style Chambers (Figure B). A millimeter scale is silk screened on the outside of the 7/8" diameter tube only. Optional chamber holders are also available.

Chamber Carriage
A welded aluminum frame is secured to the phantom. It can be rotated 90º. X-axis delrin bearings slide on a stainless steel rod with two scales and locks. A Y-axis delrin chamber holder slides on stainless steel rods with a lock and is adjustable (Figure A). An adjustable scale allows for accurate setting of the chamber tip to the mylar window distance. A Z-axis acrylic chamber holder slides on o-rings with a lock.

Service
Lubricate o-rings with vaseline so the acrylic chamber tube slides easily.

Specifications

Size: 35 cm x 37 cm H
Weight (empty): 42 lbs
Weight with Water: 94 lbs. (35 cm³)
Material: Acrylic reinforced top and corners (sides measure 1/4" thick and bottom measures 3/8" thick)
Shipping Weight: 42 lbs.

Included with Mylar Window Water Phantom:
Hose w/drain connection
2 1/2 gallon reservoir tank
46 cm depth scale
3 cm calibrator from Farmer Chamber tube
1 chamber holder of your choice

Item #	Description
692-000	Mylar Window Water Phantom
	Replacement Accessories
692-000-50	46 cm Depth Scale
692-000-60	Farmer Chamber Tube 3 cm Calibrator
692-011	Hose with Drain Connection

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CHAMBER HOLDERS FOR MYLAR WINDOW PHANTOM

- **Waterproof**
- **Included o-ring assembly**
- **Scaled acrylic tube**

The chamber holders are watertight acrylic tubes that have a 1 mm thick polystyrene or acrylic tip for Farmer-style Ion Chambers. A 50 cm scale is printed on the tube. No further waterproofing is necessary.

Item 692-600 and 692-610 Options A and B
Fit Capintec PR-06C or G with TNC connector.

Item 692-620 and 692-630 Options C and D
Fit all Farmer-style chambers except Capintec PR-06C or G with TNC connector.

Item #	Chamber Holder	Tube Diameter	Tip Material
692-600	Option A	0.875" (2.22 cm)	Polystyrene
692-610	Option B	0.875" (2.22 cm)	Acrylic
692-620	Option C	0.625" (1.59 cm)	Polystyrene
692-630	Option D	0.625" (1.59 cm)	Acrylic
692-635	Exradin A12	0.875" (2.22 cm)	Polystyrene

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OPTION "N" COMBINATION CHAMBER HOLDER

The Option "N" Chamber Holder has a 5/8" (1.59 cm) O.D. tube and is a combination holder. It can be used for the Markus chamber, and the 0.3 cm^3 or 0.1 cm^3 chambers. This holder can be used both horizontally or vertically.

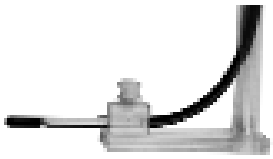
Item	Description
692-652	Option "N"Combination Chamber Holder

OPTION "H" CHAMBER HOLDER

The Option "H" Chamber Holder is a 5/8 O.D. acrylic tube used with the PTW 23332/233641/31003/31013 waterproof chamber.

Item	Description
692-640	Option "H" Chamber Holder

OPTION "L" CHAMBER HOLDER



The Option "L" Chamber Holder has a 5/8" O.D. acrylic tube and holds a PTW 23332/233641/31003/31013 chamber parallel to the water surface.

Item	Description
692-641	Option "L" Chamber Holder

OPTION "M", "O", & "Q" HOLDERS

The Option "M", "O", and "Q" Chamber Holders have a 7/8" O.D. Tube and are used to hold a Markus (PTW 23343), Roos (PTW 34001) or Exradin Model 11 Chamber parallel to the water surface.

Item	Description
692-651	Option "M" Chamber Holder
692-653	Option "O" Roos Chamber Holder
692-655	Option "Q" Exradin Model 11 Chamber Holder

OPTION "K", "P", "R" & "S" HOLDERS

The Option "K", "P", "R" and "S" Chamber Holders are used to hold a Markus (PTW 23343), Roos (PTW 34001), Exradin Model 11 or Exradin Model 10 Chamber parallel to the mylar window.

Item	Description
692-650	Option "K" Markus Chamber Holder
692-654	Option "P" Roos Chamber Holder
692-656	Option "R" Exradin Model 11 Chamber Holder
692-658	Option "S" Exradin Model A10 Chamber Holder

HYDRAULIC-SCISSORS LIFT TABLE

The Hydraulic-Scissors Lift Table is ideally suited to hold a water phantom. A white platform top allows for easy viewing of the crosshairs through a water phantom with a clear bottom.

The lift table has three holes drilled in the platform to accommodate the corresponding leveling plate (see below).

The Hydraulic-Scissors Lift Table utilizes a jack pedal to raise the platform. A mechanical height lock will hold the platform at the desired height. To lower the platform use the lowering lever.

Use the parking brake to hold the hydraulic-scissors lift table in place. Four heavy duty leveling legs are used to make sure the platform is level when being used. For more precise leveling, use the leveling plate which is compatible with lift table. The hydraulic-scissors lift table is easily moved by the four 5” diameter casters. Item 693-037 accommodates a large Wellhofer water tank.

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Specifications

Platform Height Adjustment: 11.8” to 36.6”
Handle Height: 37.8”,
Front Casters: 5” diameter rigid rubber
Rear Casters: 5” diameter, swivel rigid rubber
Capacity: 1,100 lbs.
Finish: White platform - blue enamel frame
Shipping Weight: 265 lbs. - 300 lbs.

Item	Description	Table Top Size
693-036	Hydraulic-Scissors Lift Table	23.75" x 36" (60.54 x 91.76 cm)
693-037	Hydraulic-Scissors Lift Table	27.75" x 36" (70.73 x 91.76 cm)

LEVELING PLATE

For Hydraulic-Scissors Lift Table

The aluminum leveling plate utilizes three point leveling. Three location pads fit into the pre-drilled holes on the platform of the hydraulic-scissors lift table. The three hand adjustable threaded leveling legs go through the holes in the leveling plate and rest inside the location pads.

For added stabilization a pair of rubber feet are included. These feet will go through the tapped holes on either side of the third leg of the leveling plate.

Specifications

Height Adjustment: 1/2" to 3 3/4"
Plate Size: 35 7/8" L x 1/2" T
Finish: White polyurethane enamel

Item	Description	Use With Hydraulic-Scissors Lift Table	Weight
693-3624	Leveling Plate - 24" (61.18 cm) W	Item 693-036	50 lb (22.73 kg)
693-3627	Leveling Plate - 27" (68.82 cm) W	Item 693-037	60 lb (27.27 kg)

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ELECTRIC LIFT TABLE

- **Large Platform size accommodates all Water Tanks on the market**
- **Instantaneous start and stop movement - no drift**
- **Removable handle with cord wrap hooks**
- **Hanger on all four (4) sides for control pendant**

The Electric Lift Table is ideally suited to hold any water tank currently on the market. A white platform top allows for easy viewing of the crosshairs through a water phantom with a clear bottom.

The table platform has a vertical travel distance of 15.75" (40.0 cm). In the lowest position the top of the platform is 24.75" (62.8 cm) from the floor. In the highest position the top of the platform is at 40.5" (102.8 cm) from the floor. The telescoping pillar provides a smooth up and down movement of the platform. The control pendant has push buttons for up and down movement with instantaneous starting and stopping without any drift. The table platform has a 0.25" (0.64 cm) high raised lip on all four sides to prevent a water tank or an adjustable base from sliding off the platform.

For user convenience there is a control pendant hanger on each of the four sides of the platform. The handle of the lift table has cord wrap hooks for easy storage of the power cord. The handle is also removable with a quick release pin on each side of the handle.

The electric lift table has four (4) 6" (15.2 cm) diameter swivel locking casters for ease of moving and locking in position. Four (4) heavy duty screw leveling legs are used to make sure the platform is level when being used.

Specifications

Capacity: 900 lb (408 kg)
Platform Size: 31.75" x 31.75" (80.65 x 80.65 cm)
Platform Lowered Height: 24.75" (62.8 cm)
Platform Raised Height: 40.5" (102.8 cm)
Vertical Travel: 15.75" (40.0 cm)
Handle Height: 34" (86.3 cm)
Casters: Four (4) - 6" (15.2 cm) swivel locking, rubber
Material: Steel and Aluminum
Platform Color: Bright White
Frame Color: Precision Tan
Power: 120 VAC, 50/60 Hz or 220VAC, 50/60 Hz

Item	Description
693-040	Electric Lift Table - 120VAC, 50/60 Hz
693-042	Electric Lift Table - 220VAC, 50/60 Hz.

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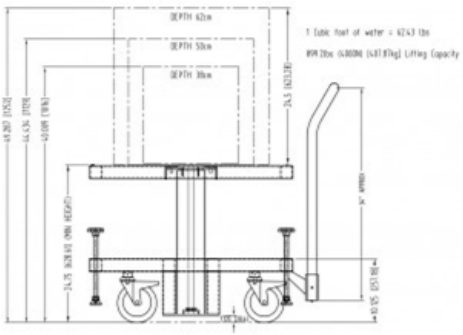
TABLE LARGE ELECTRIC LIFT



The Electric Lift Table is ideally suited to hold any water phantom currently on the market. A white platform top allows for easy viewing of the crosshairs through a water phantom with a clear bottom.

- Large Platform size accommodates all Water Phantoms on the market
- Instantaneous start and stop movement - no drift
- Removable handle with cord wrap hooks
- Hanger on all four (4) sides for control pendant
- Raised Lip around top edge of table

The table platform has a vertical travel distance of 15.75" (40.0 cm). In the lowest position the top of the platform is 24.75" (62.8 cm) from the floor. In the highest position the top of the platform is at 40.5" (102.8 cm) from the floor. The telescoping pillar provides a smooth up and down movement of the platform. The control pendant has push buttons for up and down movement with instantaneous starting and stopping without any drift. The table platform has a 0.25" (0.64 cm) high raised lip on all four sides to prevent a water tank or an adjustable base from sliding off the platform.

For user convenience there is a control pendant hanger on each of the four sides of the platform. The handle of the lift table has cord wrap hooks for easy storage of the power cord. The handle is also removable with a quick release pin on each side of the handle.

The electric lift table has four (4) 6" (15.2 cm) diameter swivel locking casters for ease of moving and locking in position. Four (4) heavy duty screw leveling legs are used to make sure the platform is level when being used.

Specifications Item 693-046

Capacity: 900 lb (408 kg)
Platform Size: 31.75" x 31.75" (80.65 x 80.65 cm)
Platform Lowered Height: 24.75" (62.8 cm)
Platform Raised Height: 40.5" (102.8 cm)
Vertical Travel: 15.75" (40.0 cm)
Handle Height: 34" (86.3 cm)
Base Size: 32" x 58"
Casters: Four (4) - 6" (15.2 cm) swivel locking, rubber
Material: Steel and Aluminum
Platform Color: Bright White
Frame Color: Precision Tan
Power:
Item 693-046: 120 VAC, 156 Watts, 50/60 Hz CEE7
Item 693-048: 220 VAC, 156 Watts, 50/60 Hz CEE7

Item	Description
693-046	Table Lg Electric Lift - 120VAC/156 Watts/50/60 Hz
693-048	Table Lg, Electric Lift 220VAC/156Watts/50/60Hz CEE7

THREE POINT LEVELING PLATE

For Water Phantom Tank

The Three Point Leveling Plate is used with the Water Phantoms (Items 691-001, 691-005, 691-010, 691-011, 691-015, 691-016 or 692-000). The aluminum plate is 18" x 24" x 0.5" (45.7 x 60.9 x 0.13 cm). A wood support panel on the bottom is 0.75" (1.9 cm) thick.

Item	Description
693-080	Three Point Leveling Plate for Water Phantom

LEVELING PLATE

For Water Phantoms on Treatment Table

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The three hand adjustable threaded leveling legs go through the holes in the leveling plate and secured to anti-skid feet.

For added stabilization a pair of rubber feet are included. These feet will go through the tapped holes on either side of the third leg of the leveling plate.

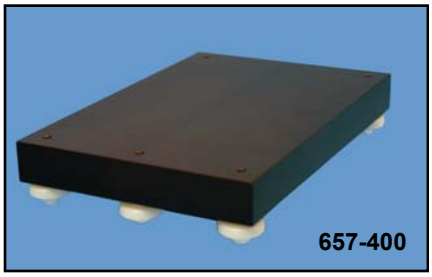
Specifications

Material: Aluminum
Finish: White polyurethane enamel
Feet: Anti-skid

Item #	Description
693-083	Leveling Plate with 3 Anti-Skid Feet Size: 18” W x 24” L x 1/2” T
693-085	Leveling Plate with 3 Anti-Skid Feet Size: 24” W x 35 7/8” x 1/2” T

LEVELING PLATFORMS

For Slab Phantoms



These Leveling Platforms can be used for slab phantoms. Both leveling platforms feature three (3) leveling legs and two (2) stabilizer legs with five (5) threaded nylon leveling feet.

Specifications

Item 657-400
Capacity: 60 lbs
Dimensions: 30 cm x 44 cm x 5 cm thick

Item 657-401
Capacity: 40 lbs
Dimensions: 30 cm x 50 cm x 2 cm thick

Item	Description
657-400	Leveling Platform, for Slab Phantoms, ABS 5x30x44cm
657-401	Leveling Platform, 3/4" Acrylic, 30 cm X 50 cm

WATER TRANSFER TANK AND PUMP

The 60 gallon Water Transfer Tank is molded of polyethylene in one piece to eliminate seams and stress areas. The 1/4" (0.64 cm) wall thickness will bow slightly when filled with water. The water level will show through the tank wall. A mark can be made on the outside of the tank for the fill capacity of your Water Phantom. A steel frame supports the transfer tank with four 5" (12.7 cm) diameter swivel casters to allow easy movement.

The removable top is made of 1/2" thick (1.27 cm) polyethylene with two holes. A copper pipe inserted through the stand-off hole touches the bottom of tank. This pipe is attached to one end of a 45 gallon/8 minute pump and the other end is attached to 10' (3 m) of clear vinyl tubing. The tubing is put into the Water Transfer Tank from the top for filling. To pump the water from the water phantom back into the Water Transfer Tank, simply reverse the water connections on the pump. A faucet adapter is included for initial filling of the transfer tank, using the vinyl tubing.

Specifications

Item 695-000 Water Transfer Tank with Pump
Tank Dimension: 24" x 24" x 24" (61 x 61 x 61 cm)
Overall Dimension: 26" x 26" x 43" (66 x 66 x 109 cm)
Pump: 115V VAC, 1.6 Amps, thermal protection
Shipping Weight: 83 lb (38 kg)

Item 695-020 Pump Repair Kit
Includes: Impeller and cover gasket

Item #	Description
695-000	Water Transfer Tank with Pump
695-010	Water Transfer Tank Only, NO PUMP
695-015	Pump, HI/LOW Temp, 115 VAC
695-020	Impeller Repair Kit for 695-015 Pump

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15-GALLON WATER TANK WITH HAND PUMP OR MOTORIZED PUMP

695-100

695-200

- **Easy to Use**
- **Lightweight**
- **Mobile**

The Water Tank is a 15 gallon drum constructed of one piece of low density polyethylene. It has a removable slide lever lock lid and two bung openings. For mobility the water tank sits on a polyethylene dollie with four swivel casters.

Item 695-100 Water Tank w/ Hand Pump
The Hand Pump is a reversible crank style and will pump 6 gallons of water with 50 revolutions. Turning the crank clockwise will pump water into a water phantom and turning counter clockwise will pump water out of the water phantom. A 5 foot hose is attached to the pump.

Item 695-200 Water Tank w/ Motorized Pump
The electric pump is 115V VAC, 1.6 Amps, with thermal protection. The pump the water from the water phantom back into the tank, simply reverse the water connections on the pump.

Specifications:
Drum Size: 16” Dia. X 22 3/4” H
Dollie Size: 17” Dia. X 7” H (includes casters)
Shipping Weight: Approximately 20 lbs.

Item #	Description
695-100	Water Tank with Reversible Hand Pump- 15 Gallon
695-200	Water Tank with Motorized Pump- 15 Gallon
695-020	Pump Repair Kit

15 CM PLASTIC WATER CUBE CONSTANCY PHANTOMS

- **Photon measurements at 5 and 10 cm depth**
- **Electron measurements at 1 cm or 1.5 cm depth**
- **Compact and economical**

The constancy phantoms are solid 15 cm cubes. The photon hole is placed 5 cm from one side and therefore is 10 cm from the other side. Three sides of the cube contain black corner and crosshair markings which define a 10 cm² field

The phantom cubes can be custom drilled to meet customers specifications. Please provide name and phone number of contact person.

Specifications

Plastic Water Density: 1.02g/cm³

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Item #	Chamber	Compatible Chamber Model #'s	Photon Chamber Hole	Electron Chamber Hole
665-510	0.6 cc Farmer Style Chamber	PTW 0.6cc Farmer Chambers, NE2505/3	With Build-up Cap	1.0 cm Depth, No Build-up Cap
665-512	0.6 cc Farmer Style Chamber	PTW 0.6cc Farmer Chambers, NE2505/3	With Build-up Cap	1.5 cm Depth, With Build-up Cap
665-513	0.6 cc Farmer Style Chamber	**ALL** - PTW / Nuclear Associates / Fluke / Bicron NE / Capintec / RMI / Exradin A19 / Scanditronix-Wellhofer FC65-G	No Build-up Cap	1.5 cm Depth, No Build-up Cap
665-514	0.6 cc Farmer Style Chamber	**ALL** - PTW / Nuclear Associates / Fluke / Bicron NE / Capintec / RMI / Exradin A19 / Scanditronix-Wellhofer FC65-G	No Build-up Cap	1.0 cm Depth, No Build-up Cap
665-518	0.64 cc Farmer Type Chamber	Exradin A12	No Build-up Cap	1.5 cm Depth, No Build-up Cap

15 CM ACRYLIC CUBE CONSTANCY PHANTOMS

- **Photon measurements at 5 and 10 cm depth**
- **Electron measurements at 1 cm or 1.5 cm depth**
- **Compact and economical**

The constancy phantoms are solid 15 cm cubes. The photon hole is placed 5 cm from one side and therefore is 10 cm from the other side. Three sides of the cube contain black corner and crosshair markings which define a 10 cm² field

The phantom cubes can be custom drilled to meet customers specifications. Please provide name and phone number of contact person.

Specifications

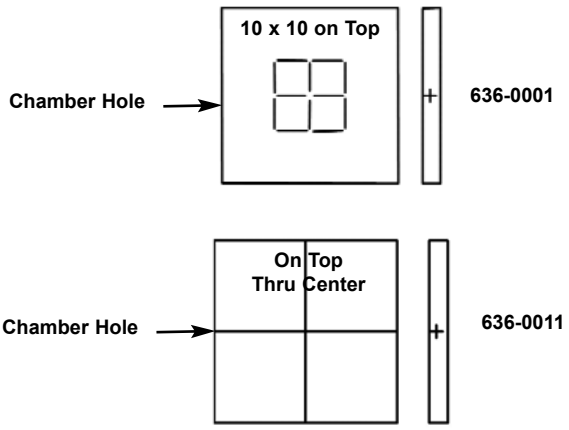
Acrylic Density: 1.185g/cm³

Item #	Chamber	Compatible Chamber Model #'s	Photon Chamber Hole	Electron Chamber Hole
665-601	0.6 cc Farmer Style Chamber	PTW 0.6cc Farmer Chambers, NE2505/3	With Build-up Cap	1.0 cm Depth, No Build-up Cap
665-6015	0.6 cc Farmer Style Chamber	PTW 0.6cc Farmer Chambers, NE2505/3	With Build-up Cap	1.5 cm Depth, No Build-up Cap
665-602	0.3 cc Waterproof Chamber	PTW 23332 / 233641 / 31003 / 31013, Nuclear Associates 30-316, 30-317	No Build-up Cap	1.0 cm Depth, No Build-up Cap
665-6025	0.3 cc Waterproof Chamber	PTW 23332 / 233641 / 31003 / 31013, Nuclear Associates 30-316, 30-317	No Build-up Cap	1.5 cm Depth, No Build-up Cap
665-603	0.6 cc Farmer Style Chamber	NE2581	With Build-up Cap	1.5 cm Depth, No Build-up Cap
665-605	0.125 cc Chamber	PTW 233642 / 31002 / 31010, Nuclear Associates 30-344	No Build-up Cap	1.0 cm Depth, No Build-up Cap
665-622	0.6 cc Farmer Style Chamber	Capintec PR-06C, PR-06G	With Build-up Cap	1.5 cm Depth, No Build-up Cap
665-642	0.1 cc Chamber	PTW N23323 and Nuclear Associates 30-350	No Build-up Cap	1.0 cm Depth, No Build-up Cap
665-702	0.6 cc Farmer Style Chamber	PTW 0.6cc Farmer Chambers, NE 2505/3, Nuclear Associates 30-351, 30-352	With Build-up Cap	1.5 cm Depth, With Build-up Cap
665-704	0.6 cc Farmer Style Chamber	PTW 0.6cc Farmer Chambers, NE 2505/3, Nuclear Associates 30-351, 30-352	With Build-up Cap	1.5 cm Depth, No Build-up Cap
665-705	0.125 cc Chamber	PTW: 233642 / 31002 / 31010, Nuclear Associates 30-344	No Build-up Cap	1.5 cm Depth, No Build-up Cap
665-712	0.6 cc Farmer Style Chamber	NE2571	With Build-up Cap	1.5 cm Depth, With Build-up Cap
665-722	0.6 cc Farmer Style Chamber	Capintec PR-06C and PR-06G	With Build-up Cap	1.5 cm Depth, With Build-up Cap
665-732	0.6 cc Farmer Style Chamber	NE 2581	With Build-up Cap	1.5 cm Depth, With Build-up Cap
665-742	0.6 cc Farmer Style Chamber	MDH/Radcal 10x5-0.6, 20x5-0.6	With Build-up Cap	1.5 cm Depth, With Build-up Cap
665-750	0.64 cc Farmer Style Chamber	Exradin Model A-12	No Build-up Cap	1.5 cm Depth, No Build-up Cap
665-751	0.64 cc Farmer Style Chamber	Exradin Model A-12	With Build-up Cap	1.5 cm Depth, With Build-up Cap
665-752	0.053 cc Sllimline MiniShonka Chamber	Exradin Model A1SL	No Build-up Cap	1.5 cm Depth, No Build-up Cap
665-7521	0.053 cc Sllimline MiniShonka Chamber	Exradin Model A1SL	No Build-up Cap	1.0 cm Depth, No Build-up Cap
665-753	0.007 cc Farmer Style Chamber	Exradin Model A-16	No Build-up Cap	1.5 cm Depth, No Build-up Cap
665-7531	0.007 cc Farmer Style Chamber	Exradin Model A-16	No Build-up Cap	1.0 cm Depth, No Build-up Cap
665-760	0.6 cc Farmer Style Chamber	**ALL** - PTW / Nuclear Associates / FLUKE / Bicron NE / Capintec / RMI / Exradin A19 / Scanditronix-Wellhofer FC65-G	No Build-up Cap	1.5 cm Depth, No Build-up Cap
665-761	0.6 cc Farmer Style Chamber	**ALL** - PTW / Nuclear Associates / FLUKE / Bicron NE / Capintec / RMI / Exradin A19 / Scanditronix-Wellhofer FC65-G	No Build-up Cap	1.0 cm Depth, No Build-up Cap
665-770	0.62 cc Farmer Style Chamber	Exradin A19	With Build-up Cap	1.0 cm Depth, No Build-up Cap
665-771	0.62 cc Farmer Style Chamber	Exradin A19	With Build-up Cap	1.5 cm Depth, With Build-up Cap

PLUG INSERT

Item #	Chamber	Compatible Chamber Model #'s	Photon Chamber Hole	Electron Chamber Hole
665-6011	0.6 cc Farmer Style Chamber	Acrylic Plug Insert for PTW N23333	With Build-up Cap	

SCRIBING ON CHAMBER PHANTOMS



1 side: + scribe is opposite chamber hole.
2 sides: + scribes are on sides perpendicular to the chamber.
3 sides: + scribes are on the sides without chamber hole.
4 sides: + scribes are on all four sides.

Item #	Scribing
636-0000	10 x 10 cm on Top
636-0001	10 cm x 10 cm on Top, + 1 Side
636-0002	10 cm x 10 cm on Top, + 2 Sides
636-0003	10 cm x 10 cm on Top, + 3 Sides
636-0004	10 cm x 10 cm on Top, + 4 Sides
636-0005	10 cm x 10 cm on Top and Bottom
636-0006	10 cm x 10 cm on Top and Bottom + 1 Side
636-0007	10 cm x 10 cm on Top and Bottom + 2 Sides
636-0008	10 cm x 10 cm on Top and Bottom + 3 Sides
636-0009	10 cm x 10 cm on Top and Bottom + 4 Sides
636-0010	Top Thru Center
636-0011	Top Thru Center, + 1 Side
636-0012	Top Thru Center, + 2 Sides
636-0013	Top Thru Center, + 3 Sides
636-0014	Top Thru Center, + 4 Sides

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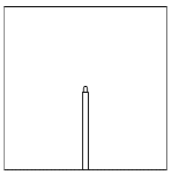
PHANTOMS FOR SCANDITRONIX / WELLHOFFER IONIZATION CHAMBERS

SCANDATRONIX/WELLHOFFER IC 15, CC13

0.13 cm³ Chamber without Build-Up Cap

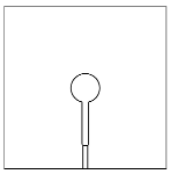


Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-736	Polystyrene	25 cm sq. x 2.5 cm T
636-737	Acrylic	25 cm sq. x 2.5 cm T

WELLHOFFER PPC 035 AND PPC40

0.05 cm³ Chamber



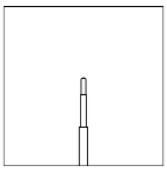
Chamber is flush with surface.

Item #	Phantom Material	Size
636-731	Polystyrene	25 cm sq. x 2.5 cm T
636-732	Acrylic	25 cm sq. x 2.5 cm T

PHANTOMS FOR PTW IONIZATION CHAMBERS

PTW 23333, 30001, 30002, 30004, 30006, 30010, 30011, 30012, 30013

0.6 cm³ Farmer Style Chamber without Build-Up Cap



Most Common

Chamber Hole Depth:
1 cm from top to center of hole.

Item #	Phantom Material	Size
636-001	Polystyrene	25 cm sq. x 2.5 cm T
636-002	Acrylic	25 cm sq. x 2.5 cm T

PHANTOMS FOR PTW IONIZATION CHAMBERS

PTW 23333, 30001, 30002, 30004, 30006, 30010, 30011, 30012, 30013

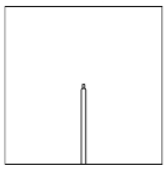
0.6 cm³ Farmer Style Chamber with Build-Up Cap

Chamber Hole Depth:
1.2 cm from top to center of hole, and has a diameter of 1.65 cm.

Item #	Phantom Material	Size
636-101	Polystyrene	25 cm sq. x 2.5 cm T
636-102	Acrylic	25 cm sq. x 2.5 cm T
636-104	Plastic Water	30 cm sq. x 3 cm T

PTW 31006, 31014, 31015, 31016

0.015 cm³ Pin Point Chamber without Build-Up Cap



Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-526	Polystyrene	25 cm sq. x 2.5 cm T
636-527	Acrylic	25 cm sq. x 2.5 cm T

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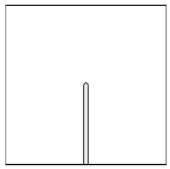
PTW 233642, 31002, 31010, 233643, 31005, 31011

0.125 cm³ Chamber without Build-Up Cap

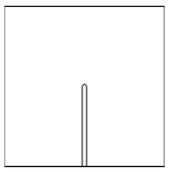


Chamber Hole Depth:
1 cm from top to center of hole.

Item #	Phantom Material	Size
636-511	Polystyrene	25 cm sq. x 2.5 cm T
636-512	Acrylic	25 cm sq. x 2.5 cm T

PTW 23332, 233641, 31003, 31013

0.3 cm³ Chamber without Build-Up Cap



Chamber Hole Depth:
0.7 cm from top to center of hole.

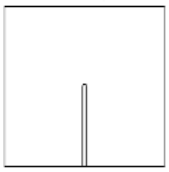
Item #	Phantom Material	Size
636-301	Polystyrene	25 cm sq. x 2.5 cm T
636-302	Acrylic	25 cm sq. x 2.5 cm T

Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-311	Polystyrene	25 cm sq. x 2.5 cm T
636-312	Acrylic	25 cm sq. x 2.5 cm T

PTW 23323, 2332

0.1 cm³ Chamber without Build-Up Cap



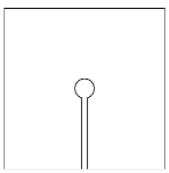
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-501	Polystyrene	25 cm sq. x 2.5 cm T
636-502	Acrylic	25 cm sq. x 2.5 cm T

PHANTOMS FOR PTW IONIZATION CHAMBERS

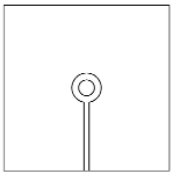
PTW 23343, 34045

0.055 cm³ Markus and 0.02 cm³ Advanced Markus Chamber



Chamber is flush with surface.

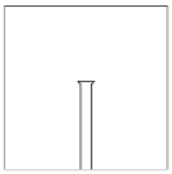
Item #	Phantom Material	Size
636-701	Polystyrene with Cable Cover	25 cm sq. x 2.5 cm T
636-702	Acrylic with Cable Cover	25 cm sq. x 2.5 cm T
636-704-2	Plastic Water Cable Cover	



Chamber is flush with surface.

PTW 34001
0.35 cm³ Roos Chamber

Item #	Phantom Material	Size
636-721	Polystyrene	25 cm sq. x 2.5 cm T
636-722	Acrylic	25 cm sq. x 2.5 cm T

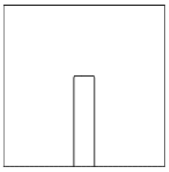


The chamber hole has special curved sides.

Chamber is flush with surface.

PTW 23342
0.02 cm³ Small Soft X-ray Chamber

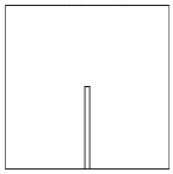
Item #	Phantom Material	Size
636-915	Polystyrene	25 cm sq. x 2.5 cm T
636-915-2	Polystyrene Chamber Plug	
636-916	Acrylic	25 cm sq. x 2.5 cm T
636-916-2	Acrylic Chamber Plug	



Chamber is flush with surface.

PTW 23344
.02 cm³ Big Soft X-ray Chamber

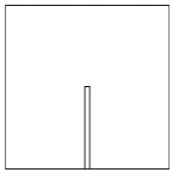
Item #	Phantom Material	Size
636-911	Polystyrene	25 cm sq. x 2.5 cm T
636-912	Acrylic	25 cm sq. x 2.5 cm T



Chamber Hole Depth:
1.0 cm from top to center of hole.

PTW T60003
Riga Diamond Detector Chamber without Build-Up Cap

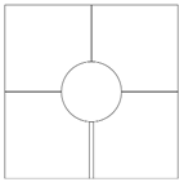
Item #	Phantom Material	Size
636-521	Polystyrene	25 cm sq. x 2.5 cm T
636-522	Acrylic	25 cm sq. x 2.5 cm T



Chamber Hole Depth:
1.0 cm from top to center of hole.

PTW 60019
microDiamond Detector

Item #	Phantom Material	Size
636-542	Acrylic	25 cm sq. x 2.5 cm T



Chamber is flush with surface.

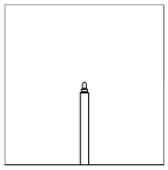
PTW 34070
Bragg Peak Chamber

Item #	Phantom Material	Size
636-752	Acrylic	30 cm sq. x 2 cm T

PHANTOMS FOR EXRADIN IONIZATION CHAMBERS

EXRADIN MODEL A1

0.056 cm³ Chamber without Build-Up Cap

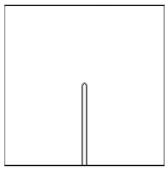


Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-211	Polystyrene	25 cm sq. x 2.5 cm T
636-212	Acrylic	25 cm sq. x 2.5 cm T
636-214	Solid Water	30 cm sq. x 2 cm T

EXRADIN MODEL A1SL

0.056 cm³ Chamber without Build-Up Cap



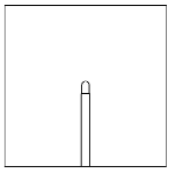
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-206	Polystyrene	25 cm sq. x 2.5 cm T
636-207	Acrylic	25 cm sq. x 2.5 cm T

F

EXRADIN MODEL A2

0.5 cm³ Chamber without Build-Up Cap

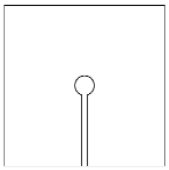


Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-201	Polystyrene	25 cm sq. x 2.5 cm T
636-202	Acrylic	25 cm sq. x 2.5 cm T
636-203	Aluminum Stem Spacer	

0.051 cm³ EXRADIN A10

0.051 cm³ Chamber

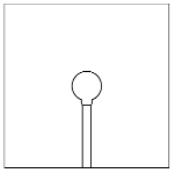


Chamber is flush with surface.

Item #	Phantom Material	Size
636-701	Polystyrene with Cable Cover	25 cm sq. x 2.5 cm T
636-702	Acrylic with Cable Cover	25 cm sq. x 2.5 cm T
636-704-2	Plastic Water Cable Cover	

EXRADIN MODEL A11

0.62 cm³ Chamber

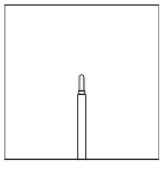


Chamber is flush with surface.

Item #	Phantom Material	Size
636-223	Polystyrene	25 cm sq. x 2.5 cm T
636-224	Acrylic	25 cm sq. x 2.5 cm T

EXRADIN MODEL A12

0.65 cm³ Chamber without Build-Up Cap



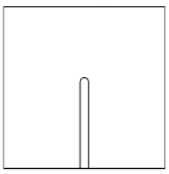
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-215	Polystyrene	25 cm sq. x 2.5 cm T
636-216	Acrylic	25 cm sq. x 2.5 cm T

PHANTOMS FOR EXRADIN IONIZATION CHAMBERS

EXRADIN MODEL A12

0.65 cm³ Chamber with Build-Up Cap



Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-219	Polystyrene	25 cm sq. x 2.5 cm T
636-220	Acrylic	25 cm sq. x 2.5 cm T

EXRADIN MODEL A12S

0.25 cm³ Chamber without Build-Up Cap

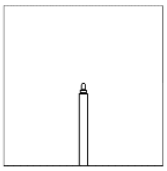
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-240	Polystyrene	25 cm sq. x 2.5 cm T
636-241	Acrylic	25 cm sq. x 2.5 cm T

F

EXRADIN MODEL 14

0.009 cm³ Chamber without Build-Up Cap

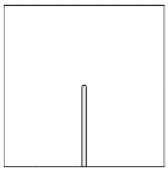


Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-230	Polystyrene	25 cm sq. x 2.5 cm T
636-231	Acrylic	25 cm sq. x 2.5 cm T

EXRADIN MODEL A14SL

0.009 cm³ Chamber without Build-Up Cap

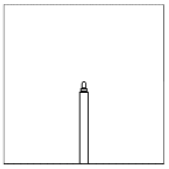


Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-236	Polystyrene	25 cm sq. x 2.5 cm T
636-237	Acrylic	25 cm sq. x 2.5 cm T

EXRADIN MODEL A16

0.007 cm³ Chamber without Build-Up Cap

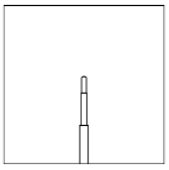


Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-400	Polystyrene	25 cm sq. x 2.5 cm T
636-401	Acrylic	25 cm sq. x 2.5 cm T
636-4011	Acrylic Chamber Plug	

EXRADIN A19

0.6 cm³ Farmer Style Chamber without Build-Up Cap



Most Common

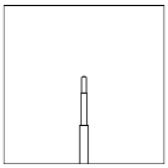
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-001	Polystyrene	25 cm sq. x 2.5 cm T
636-002	Acrylic	25 cm sq. x 2.5 cm T

PHANTOMS FOR CAPINTEC IONIZATION CHAMBERS

CAPINTEC PR-06G

0.6 cm³ Farmer Style Chamber without Build-Up Cap



Most Common

Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-001	Polystyrene	25 cm sq. x 2.5 cm T
636-002	Acrylic	25 cm sq. x 2.5 cm T

CAPINTEC PR-06C OR G

0.6 cm³ Farmer Style Chamber without Build-Up Cap

Drawing Unavailable

A large outer chamber hole accommodates the TNC or BNC style connector.

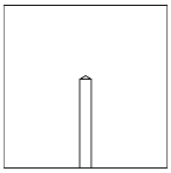
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-011	Polystyrene	25 cm sq. x 2.5 cm T
636-012	Acrylic	25 cm sq. x 2.5 cm T

F

CAPINTEC PR-06C OR G

0.6 cm³ Farmer Style Chamber with Build-Up Cap

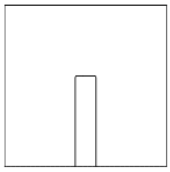


The chamber hole accommodates the TNC or BNC style connector.

Chamber Hole Depth:
1.2 cm from top to center of hole.

Item #	Phantom Material	Size
636-017	Polystyrene	25 cm sq. x 2.5 cm T
636-018	Acrylic	25 cm sq. x 2.5 cm T

CAPINTEC PS-033



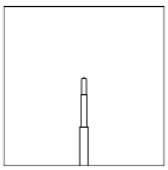
Chamber is flush with surface.

Item #	Phantom Material	Size
636-711	Polystyrene	25 cm sq. x 2.5 cm T
636-712	Acrylic	25 cm sq. x 2.5 cm T
636-714	Solid Water	30 cm sq. x 2 cm T

PHANTOMS FOR BICRON / NE AND THERMO SCIENTIFIC IONIZATION CHAMBERS

BICRON / NE 2571, 2581, 2505/3 A OR B

0.6 cm³ Farmer Style Chamber without Build-Up Cap



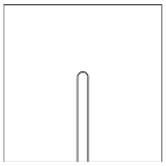
Most Common

Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-001	Polystyrene	25 cm sq. x 2.5 cm T
636-002	Acrylic	25 cm sq. x 2.5 cm T

BICRON / NE 2505/3

0.6 cm³ Farmer Style Chamber with Build-Up Cap



Chamber Hole Depth:
1.2 cm from top to center of hole and has a diameter of 1.65 cm.

Item #	Phantom Material	Size
636-101	Polystyrene	25 cm sq. x 2.5 cm T
636-102	Acrylic	25 cm sq. x 2.5 cm T
636-104	Plastic Water	30 cm sq. x 3 cm T

BICRON / NE 2571

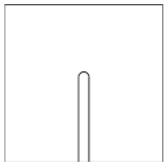
0.6 cm³ Farmer Style Chamber with Delrin Build-Up Cap

Chamber Hole Depth:
1.0 cm from top to center of hole and has a diameter of 1.53 cm.

Item #	Phantom Material	Size
636-121	Polystyrene	25 cm sq. x 2.5 cm T
636-122	Acrylic	25 cm sq. x 2.5 cm T

BICRON / NE 2581

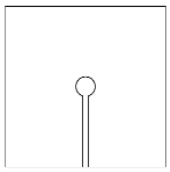
0.6 cm³ Farmer Style Chamber with Polystyrene Build-Up Cap



Chamber Hole Depth:
1.0 cm from top to center of hole and has a diameter of 1.86 cm.

Item #	Phantom Material	Size
636-131	Polystyrene	25 cm sq. x 2.5 cm T
636-132	Acrylic	25 cm sq. x 2.5 cm T

THERMO SCIENTIFIC 2534



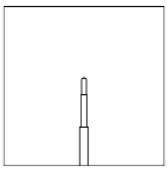
Chamber is flush with surface.

Item #	Phantom Material	Size
636-701	Polystyrene with Cable Cover	25 cm sq. x 2.5 cm T
636-702	Acrylic with Cable Cover	25 cm sq. x 2.5 cm T
636-704-2	Plastic Water Chamber Plug	

PHANTOMS FOR NUCLEAR ASSOCIATES IONIZATION CHAMBERS

NUCLEAR ASSOCIATES 30-351

0.6 cm³ Farmer Style Chamber without Build-Up Cap



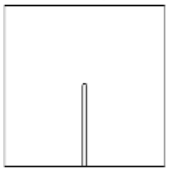
Most Common

Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-001	Polystyrene	25 cm sq. x 2.5 cm T
636-002	Acrylic	25 cm sq. x 2.5 cm T

NUCLEAR ASSOCIATES 30-350

0.1 cm³ Chamber without Build-Up Cap



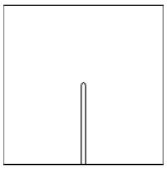
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-501	Polystyrene	25 cm sq. x 2.5 cm T
636-502	Acrylic	25 cm sq. x 2.5 cm T

F

NUCLEAR ASSOCIATES 30-344

0.125 cm³ Chamber without Build-Up Cap

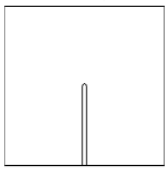


Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-511	Polystyrene	25 cm sq. x 2.5 cm T
636-512	Acrylic	25 cm sq. x 2.5 cm T

NUCLEAR ASSOCIATES 30-361 AND 30-317

0.3 cm³ Chamber without Build-Up Cap



Chamber Hole Depth:
0.7 cm from top to center of hole.

Item #	Phantom Material	Size
636-301	Polystyrene	25 cm sq. x 2.5 cm T
636-302	Acrylic	25 cm sq. x 2.5 cm T

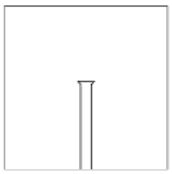
Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-311	Polystyrene	25 cm sq. x 2.5 cm T
636-312	Acrylic	25 cm sq. x 2.5 cm T

PHANTOMS FOR NUCLEAR ASSOCIATES IONIZATION CHAMBERS

NUCLEAR ASSOCIATES 30-334

0.02 cm³ Small Soft X-ray Chamber



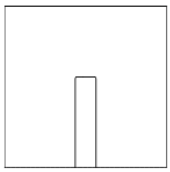
The chamber hole has special curved sides.

Chamber is flush with surface.

Item #	Phantom Material	Size
636-915	Polystyrene	25 cm sq. x 2.5 cm T
636-915-2	Polystyrene Chamber Plug	
636-916	Acrylic	25 cm sq. x 2.5 cm T
636-916-2	Acrylic Chamber Plug	

NUCLEAR ASSOCIATES 30-330

0.2 cm³ Big Soft X-ray Chamber



Chamber is flush with surface.

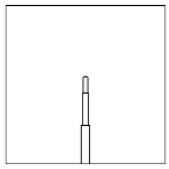
Item #	Phantom Material	Size
636-911	Polystyrene	25 cm sq. x 2.5 cm T
636-912	Acrylic	25 cm sq. x 2.5 cm T

F

PHANTOMS FOR VICTOREEN AND RMI IONIZATION CHAMBERS

VICTOREEN 580-006 AND RMI 448

0.6 cm³ Farmer Style Chamber without Build-Up Cap

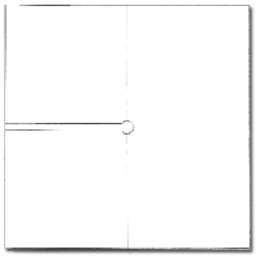


Most Common

Chamber Hole Depth:
1.0 cm from top to center of hole.

Item #	Phantom Material	Size
636-001	Polystyrene	25 cm sq. x 2.5 cm T
636-002	Acrylic	25 cm sq. x 2.5 cm T

EQUIDOSE II DIODE PHANTOM



Specifications

Material: Polystyrene
Size: 9.8" x 9.8" x 1" (25 x 25 x 2.54 cm)

This phantom is also available in other materials. Call RPDinc for more information.

Item #	Description
638-000	Equidose II Diode Phantom

ACRYLIC PHANTOM

The Acrylic Phantom consists of:
(1) 1/32" (0.80 mm) x 25 cm sq acrylic sheet
(1) 1/16" (1.57 mm) x 25 cm sq acrylic sheet
(1) 1/8" (3.43 mm) x 25 cm sq acrylic sheet
(1) 1/4" (6.30 mm) x 25 cm sq acrylic sheet
(1) 1/2" (12.7 mm) x 25 cm sq acrylic sheet
(8) 1" (25 mm) x 25 cm sq acrylic sheet
(1) 1" (25 mm) x 25 cm sq with farmer chamber hole

The standard chamber hole will fit the following chambers:
Capintec - PR-06G
PTW - 23333 / 233633 / 30001 / 30010 / 30002 / 30011 / 30004, 30012, 30006 / 30013
Bicron - NE2571, 2505/3 A or B
Nuclear Associates - 30-351, 30-352 and 30-361

Chamber holes other than the standard are available upon request. **Please specify chamber to be used in phantom**. To accommodate a 2nd chamber, one of the 1" plates can be machined to fit the chamber.

Markings
All of the Acrylic Sheets are marked "ACRYLIC" and state the material thickness with a special black ink that is etched into the acrylic.

Specifications

Material: Clear acrylic
Density: 1.17 to 1.20 g/cm³
Size: 25 cm sq x approx. 25 cm T

Item #	Description
602-0000	Acrylic Phantom
600-0010	Machining Extra Standard Chamber Hole

F

POLYSTYRENE AND ACRYLIC SHEETS

Polystyrene

Acrylic

All of the Sheets are marked "POLYSTYRENE" or "ACRYLIC" and state the material thickness with a special black ink that is etched into the material.

The thickness of the sheets is not exact and varies within the tolerance of industry standards. If a precise thickness is needed please state the thickness desired when placing your order.

All 1" and 2" Polystyrene Sheets are machined flat on the top and the bottom. This reduces air gaps when stacking the sheets.

Specifications

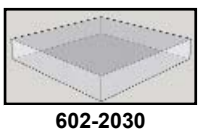
Polystyrene Density: 1.05 g/cm³
Size: 25 cm sq.

Acrylic Density: 1.185 g/cm³
Size: 25 cm sq.

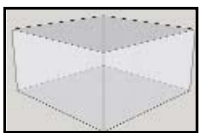
Item #	Description	Approximate Thickness
601-0020	Polystyrene Sheet - Color: Clear	1/51" (0.50 mm)
601-0032	Polystyrene Sheet - Color: White	1/32" (0.80 mm)
601-0062	Polystyrene Sheet - Color: White	1/16" (1.57 mm)
601-0125	Polystyrene Sheet - Color: White	1/8" (3.18 mm)
601-0187	Polystyrene Sheet - Color: White	3/16" (4.75 mm)
601-0250	Polystyrene Sheet - Color: White	1/4" (6.35 mm)
601-0500	Polystyrene Sheet - Color: White	1/2" (12.7 mm)
601-1000	Polystyrene Sheet - Color: White	1" (25 mm)
601-2000	Polystyrene Sheet - Color: White	2" (50 mm)

Item #	Description	Approximate Thickness
602-0032	Acrylic Sheet - Color: Clear	1/32" (0.80 mm)
602-0062	Acrylic Sheet - Color: Clear	1/16" (1.57 mm)
602-0125	Acrylic Sheet - Color: Clear	1/8" (3.18 mm)
602-0250	Acrylic Sheet - Color: Clear	1/4" (6.30 mm)
602-0500	Acrylic Sheet - Color: Clear	1/2" (12.7 mm)
602-1000	Acrylic Sheet - Color: Clear	1" (25 mm)
602-2000	Acrylic Sheet - Color: Clear	2" (50 mm)

ACRYLIC / PMMA PHANTOM



602-2030



602-6030

Item #	Phantom Material	Size
602-2030	Acrylic/PMMA	30cm sq x 5 cm T
602-6030	Acrylic/PMMA	30cm sq x 15 cm T

SOLID WATER® HE

Density: 1.032 g/cm³

Solid Water® HE (High Equivalency) is the next generation of water mimicking material. Solid Water® HE uses new patent-pending technology that more accurately mimics true water within 0.5% for therapeutic and diagnostic energies. Finally - no more compromises between therapy, imaging, quality, and convenience.

Exceptional uniformity is achieved through a patent-pending manufacturing process using nanosphere technology, and quality control testing of each slab on a CT machine before shipment.

Leading Uniformity
- Improved uniformity and reduced variation compared to other water mimicking formulations
- No streaks or stripes for more consistent and accurate results in imaging and therapeutic QA tests

Leading Durability
- Unique Nanosphere technology offers a combination of high strength and water equivalence
- Increased strength and durability allows manufacturing of slabs as thin as 1.0 mm
- Longer lifespan from increased durability and resistance to scratches and chipping

Leading Versatility
- Designed for both diagnostic and therapeutic energy ranges
- No need for different stacks of water mimicking materials rated at different energy ranges

Enhanced Water Equivalency
- Improves the linear response of the slab across a spectrum of energies

Specifications

Depth ionization relative-to-water
Photons: 1.000 ± 0.005
Electrons: 1.000 ± 0.005
Mass Density (g/cm³): 1.032 ± 0.005
Electron Density (e-/cm³ NA): 0.557 ± 0.001

Solid Water HE / Water Electron Density Ratio: 1.000 ± 0.005

Thickness	Item #	Size	Item #	Size	Item #	Size
0.1 cm	604-501	20 cm sq.	604-601	30 cm sq.	Not Available	
0.2 cm	604-502	20 cm sq.	604-602	30 cm sq.	604-702	40 cm sq.
0.3 cm	604-503	20 cm sq.	604-603	30 cm sq.	604-703	40 cm sq.
0.4 cm	Not Available		604-604	30 cm sq.	Not Available	
0.5 cm	604-505	20 cm sq.	604-605	30 cm sq.	604-705	40 cm sq.
1.0 cm	604-510	20 cm sq.	604-610	30 cm sq.	604-710	40 cm sq.
1.5 cm	604-515	20 cm sq.	604-615	30 cm sq.	604-715	40 cm sq.
2.0 cm	604-520	20 cm sq.	604-620	30 cm sq.	604-720	40 cm sq.
2.0 cm with Cavity	604-572	20 cm sq.	604-672	30 cm sq.	604-772	40 cm sq.
2.5 cm	Not Available		Not Available		604-725	40 cm sq.
3.0 cm	604-530	20 cm sq.	604-630	30 cm sq.	604-730	40 cm sq.
3.0 cm with Cavity	604-573	20 cm sq.	604-673	30 cm sq.	604-773	40 cm sq.
4.0 cm	604-540	20 cm sq.	604-640	30 cm sq.	604-740	40 cm sq.
4.0 cm with Cavity	604-574	20 cm sq.	604-674	30 cm sq.	604-774	40 cm sq.
5.0 cm	604-550	20 cm sq.	604-650	30 cm sq.	604-750	40 cm sq.
5.0 cm with Cavity	604-575	20 cm sq.	604-675	30 cm sq.	604-775	40 cm sq.
6.0 cm	604-560	20 cm sq.	604-660	30 cm sq.	Not Available	
6.0 cm with Cavity	604-576	20 cm sq.	604-676	30 cm sq.	Not Available	

PLASTIC WATER®

Density 1.02 g/cm³

Plastic Water® - 150 keV - 100 MeV

- Agrees with true water within 0.5% above 7 MeV
- Easy to machine
- Custom cavities are available to accommodate any ion chamber
- Un-breakable
- Includes a 5-Year Warranty

Plastic Water® is flexible and will not break under impact and is the only calibration material available in 1 mm thicknesses. Plastic Water® is the only material which agrees with true water within 0.5% above 7 MeV.

Specifications

Material: Epoxy resins and powders to control density and radiation properties
Density: 1.02 g/cm³

Thickness	30 x 30 cm	40 x 40 cm
0.1 cm	603-301	603-401
0.2 cm	603-302	603-402
0.3 cm	603-303	603-403
0.5 cm	603-305	603-405
1.0 cm	603-310	603-410
2.0 cm	603-320	603-420
3.0 cm	603-330	603-430
4.0 cm	603-340	603-440
5.0 cm	603-350	603-450
6.0 cm	603-360	603-460
7.0 cm	603-370	603-470

Item #	Plastic Water®
603-325	30 x 30 x 2 cm Thick with Cavity for Ion Chamber
603-326	Plug for Chamber Cavity in 30 x 30 cm Phantom
603-425	40 x 40 x 2 cm Thick with Cavity for Ion Chamber
603-426	Plug for Chamber Cavity in 40 x 40 cm Phantom
603-500	Drilling Chamber Cavity at Custom Location

VIRTUAL WATER™

Virtual Water™ is designed for photon and electron beam calibrations. It eliminates the inconvenience of transporting, setting-up, and filling water tanks. Virtual Water™ is free of air and other imperfections and is not affected by humidity or temperature changes.

Virtual Water™ scatters and attenuates diagnostic and radiotherapy range x-rays the same way as water without the charge storage problems. It can be used for both photon and electron beam calibrations, including relative ionization, depth dose measurements, and absolute calibrations without the need for correction and scaling factors. Ionization readings obtained in Virtual Water™ are practically the same as those in liquid water for the same depth and exposure duration.

Each batch of Virtual Water™ is tested at an independent calibration lab and verified to be within 0.5% of water at photon energies.

605-520

Custom cavities are available to accommodate various types of ion chambers in any size section and in thicknesses of 2cm or more. Customer must specify ion chamber.

No positive (plug) is supplied with the chamber cavity. Plugs can be ordered separately.

Specifications

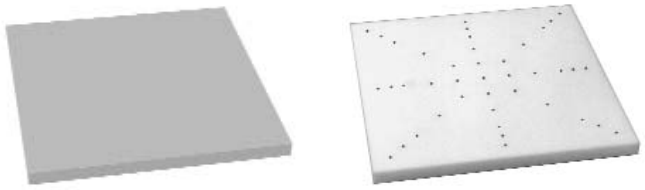
Material: Epoxy resins and powders to control density and radiation properties
Density: 1.04g/cm³
Flatness: 0.2mm (0.008 in)
Length and Width Tolerance: ± 0.02" (0.5 mm)
Thickness Tolerance: ± 0.006" (0.15 mm)
Batch Consistency: ± 0.02% (measured)

Thickness	20 x 20 cm	30 x 30 cm	40 x 40 cm
0.1 cm	605-201	605-301	Not Available
0.2 cm	605-202	605-302	605-402
0.3 cm	605-203	605-303	605-403
0.5 cm	605-205	605-305	605-405
1.0 cm	605-210	605-310	605-410
2.0 cm	605-220	605-320	605-420
3.0 cm	605-230	605-330	605-430
4.0 cm	605-240	605-340	605-440
5.0 cm	605-250	605-350	605-450
6.0 cm	605-260	605-360	Not Available

Virtual Water™ is a trademark of Med-Cal, Inc.

Item #	Virtual Water™
605-500	DRILLING for Chamber
605-505	MILLING for Chamber
605-510	Fly-Cut A-10 & A-11
605-520	Scribe 10" x 10" and Crosshairs (per Face)
605-521	Scribe + on 3 Sides
605-503	Plug for Drilled Chamber Hole
605-508	Plug for Milled Chamber Hole
605-515	Custom Plug

FLATNESS PHANTOM PLATE



Item	Material	cm²	Thickness
657-005	Acrylic	45	0.5"
657-010	Acrylic	45	1.0"
657-012	Acrylic	40	0.5"
657-013	Acrylic	40	1.0"
657-014	Acrylic	50	1.0"
657-303	Polystyrene	30	1.0"
657-304	Polystyrene	40	1.0"
657-305	Polystyrene	50	1.0"

Tungsten Pins can be Customed Drilled in Phantom
Custom Made Items are Nonreturnable

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METAL SHEETING

Specifications

Half-Hard Brass Sheets
Type 260: 70% Copper, 30% Zinc
Density: 8.515 g/cm³
Size: 6” sq.

Copper Sheets
Type C110: 99.9% Copper
Density: 8.9 g/cm³
Size: 6" sq.

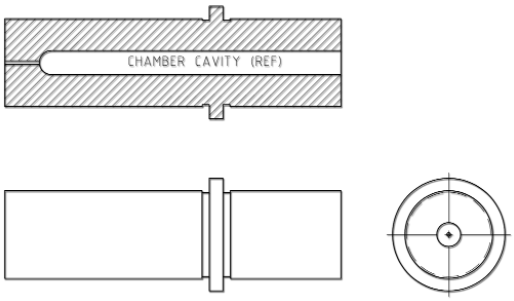
Aluminum Sheets
Density: 2.718 g/cm³
Size: 6" sq.

Item	Material	Thickness
650-0020	Brass	0.020" (0.50 mm)
650-0032	Brass	0.032" (0.80 mm)
650-0064	Brass	0.064" (1.65 mm)
650-0125	Brass	0.125" (3.10 mm)
650-0190	Brass	0.187" (4.76 mm)
650-0250	Brass	0.250" (6.35 mm)
650-0500	Brass	0.500" (12.7 mm)
650-1000	Brass	1.000" (25.4 mm)
651-0020	1100 Aluminum	0.020" (0.50 mm)
651-0040	1100 Aluminum	0.040" (1.02 mm)
651-0080	1100 Aluminum	0.080" (2.03 mm)

Item	Material	Thickness
651-0250	6061 Aluminum	0.250" (6.35 mm)
651-0375	6061 Aluminum	0.375" (9.52 mm)
651-0500	6061 Aluminum	0.500" (12.7 mm)
651-1000	6061 Aluminum	1.000" (25.4 mm)
652-0011	Copper	0.010" (0.25 mm)
652-0021	Copper	0.021" (0.55 mm)
652-0032	Copper	0.032" (0.84 mm)
652-0064	Copper	0.064" (1.64 mm)
652-0125	Copper	0.125" (3.18 mm)
652-0187	Copper	0.187" (4.76 mm)

GAMMA KNIFE PHANTOMS

Phantom Plate



Phantom Cylinder

Specifications

Item 638-100 Phantom Plate
Material: Black ABS or Customer Supplied Material
Density: 1.04 gm/cm³
Size: 6.3" L x 5.12" W x 0.39" T (16 x 13 x 1 cm)

Item 638-200 Phantom Cylinder
Material: Solid Water or Customer Supplied Material
Density: 1.03 gm/cm³
Size: 0.9 / 1.2" diameter x 3.6" L (2.4 / 3.1 x 9.2 cm)

Item	Leksell Gamma Knife Phantom
638-100	Phantom Plate
638-102	Drilling Phantom Plate for Capintec PR05P
638-103	Drilling Phantom Plate for PTW 0.125 cc Semiflex
638-104	Drilling Phantom Plate for PTW 0.015 cc PinPoint
638-105	Drilling Phantom Plate for Exradin A16
638-106	Drilling Phantom Plate for Exradin A14SL
638-107	Drilling Phantom Plate for PTW 31021
638-200	Phantom Cylinder
638-201	Drilling Phantom Cylinder for Exradian A14SL
638-202	Drilling Phantom Cylinder for Exradian A1SL
638-203	Drilling Phantom Cylinder for PTW 0.015 cc PinPoint
638-204	Drilling Phantom Cylinder for PTW 0.125 cc Semiflex

Customer Can Provide Phantom Plate or Cylinder for Drilling
Custom Drilling is Available

QA PHANTOM FOR ARC THERAPY AND FIELD ABUTMENT VERIFICATION

The 622-305 Phantom was designed to provide a means of verification for abuting fields and gaps using film.

Item 622-305 is an acrylic phantom that is split in half to accommodate an 8 x10 or 10 x 12 film. There are four aluminum screws that are tightened after film placement to keep the film from moving and keep the phantom halves aligned. The phantom has springs loaded into the screw holes which cause the phantom halves to separate when the screws are loosened. One end of the phantom has a scale for rotation on each half of the phantom. One scale goes from 0° to 180° with 30°, 60°, 90°, 120° and 150° numbered and with markings at every 10°. The other scale goes from 180° to 360° and also has the 10° markings with numbers at 210°, 240°, 270°, 300° and 330°. The scales can be used to position the phantom to match the gantry angle.

The ends of the stand are acrylic plates that have a scribed line for alignment of the phantom. Two wood dowels between the stand ends provide the phantom support which allows for rotation of the phantom and also gives minimal radiation obstruction. A rubber pad on the bottom of the acrylic end plates prevents the stand from moving.

This item can be customized or a chamber cavity can be added. Contact RPDinc for customization or for a chamber cavity.

Item 622-305 Includes

Phantom, Stand, Hex Driver and Carrying Case

Specifications

Phantom
Overall Size: 20 cm Diameter x 25 cm Long (7.87" x 9.84")
Material: Acrylic and Aluminum Screws

Stand
Overall Size: 20.4 W x 35.8 cm L (8.03" x 14.1")
Material: Acrylic and Wood

Item	Description
622-305	QA Phantom for ArcTherapy and Field Abutment Verification

ALUMINUM FILM COMPRESSOR

The Aluminum Film Compressor is used to compress polystyrene, acrylic, plastic water, or solid water phantom pieces together with a Ready Pack Film placed in the center.

Specification

For: 25 cm sq., 30 cm sq. and 35 cm sq.
Size: 15.65" W x 9.5" L
Inside Width: 30 cm
Plates: 1/2" T. Aluminum

Item #	Description
622-302	Aluminum Film Compressor

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FILM DOSIMETRY CASSETTES

The two piece, Film Dosimetry Cassette keeps the edge of the film at the surface of the cassette. A light hole at the bottom marks the film orientation.

To insert film loosen screws 1/2 turn and slide film in. The film will stop at the stoppers between the two pieces. The edge of the film should be flush with top edge of the cassette. Tighten the screws. To remove film, loosen screws, turn the cassette over and the film will slide out.

The Film Dosimetry Cassette is light sealed with rubber tubing on 3 sides. The film entry side must be covered with black tape to prevent light exposure.

The Film Dosimetry Cassette can be used in any plane: parallel, perpendicular or angled.

Scribing is available upon request. Custom thicknesses are available upon request.

BLACK ACRYLIC FILM DOSIMETRY CASSETTE

Density: 1.17 to 1.20 g/cm^3

Item #	Size	Sides	Film Size
623-025	25cm W x 30cm L x 3.6cm T	1.8cm & 1.8cm	8" x 10"
623-030	30cm W x 30cm L x 2.4cm T	1.2cm & 1.2cm	8" x 10"
623-035	30cm W x 40cm L x 5cm T	2.5cm & 2.5cm	10" x 12"

BLACK ABS* FILM DOSIMETRY CASSETTE

***(ACRYLONITRILE-BUTADINE STYRENE) Density: 1.04 g/cm^3**

Item #	Size	Sides	Film Size
623-128	30cm W x 30cm L x 4cm T	2.0cm & 2.0cm	8" x 10"
623-135	30cm W x 40cm L x 5cm T	2.5cm & 2.5cm	10" x 12"

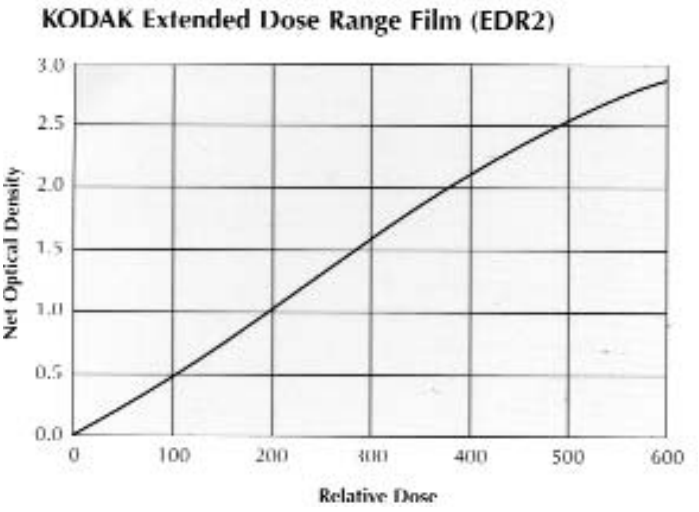
SOLID WATER 457-CTG FILM DOSIMETRY CASSETTE

Density: 1.015 g/cm^3

Item #	Size	Sides	Film Size
623-230	30cm W x 30cm L x 3cm T	1cm & 2cm	8" x 10"
623-235	30cm W x 40cm L x 5cm T	2cm & 3cm	10" x 12"

EDR2 FILM

Extended Dose Range (EDR) Ready-Pack Film for Monitoring and Evaluation of Exposures at Therapy Energies



The curve above shows the approximate relative dose response for EDR2 film. The curve is representative only - - the exact results will depend on the exposing, processing, and scanning conditions at each facility. EDR2 film will saturate in direct exposure at ~ 700 cGy

EDR2 film is designed specifically for oncology applications. Compared to most x-ray films, it is relatively insensitive to x-ray energies and, hence, has a response which extends to very high exposures. Intended for direct exposure applications, it is not suitable for portal imaging radiographs.

EDR2 FEATURES

- **Large area**
- **Low cost, widely available**
- **Excellent for relative dosimetry (e.g., field uniformity, equipment characterization: field shapes, port openings, MLCs)**
- **With appropriate calibration, film may be applicable to absolute dosimetry (e.g., high-dose treatment strategies such as IMRT**

FEATURES OF EDR2 DIRECT EXPOSURE APPLICATIONS

- **Wide response range**
- **Approximately linear**
- **Robust processing**

DOSE RESPONSE FOR EVALUATION

Exact dose responses are a function of facility dependent factors including processing conditions (processing time, processing temperature, processing equipment, processing chemistry), the density sampling (digitizer equipment and calibration), and exposure monitoring equipment. The exact response relationship should be measured and verified for the local conditions. The films should be processed using recommendations found in Kodak Service Bulletin #30 (refer to EC film guidelines).

MEASUREMENT TECHNIQUE

The dose response of a film should be measured using appropriate amounts of build-up and backscatter material. Many references have discussed methodology for measuring the response of a film.

REFERENCES

M.D.C. Evans and L.J. Schreiner, “A simple technique for film dosimetry,” Radiotherapy. Oncol. Vol 23, pages 265-267, 1992.

J. I. Hale, A. T. Kerr, and P. C. Shragge, “Calibration of film for accurate mega voltage photon dosimetry,” Med. Dosimetry Vol 19, pages 43-46, 1994.

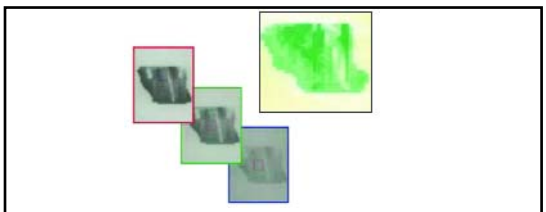
Inhwan J. Yeo, C-K Chris Wang, and Sandra E. Burch, “A filtration method for improving film dosimetry in photon radiation therapy,” Medical Physics Vol 24, pages 1943-1953, December 1997.

J. L. Robar and B. G. Clark, “The use of radiographic film for linear accelerator stereotactic radiosurgical dosimetry,” Medical Physics Vol 26, pages 2144-2150, 1999.

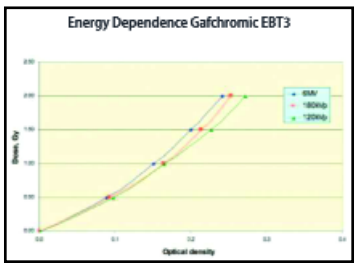
CE

Item	Description
624-100	EDR2 Film - 10" x 12" (50/box, 4 box min order)
624-105	EDR2 Film - 14" x 17" (50/box, 2 box min order)

GAFCHROMIC® EBT3 DOSIMETRY FILM



Scanned image using Gafchromic EBT3 dosimetry film and separation of image into each RGB color channel



Gafchromic EBT3 dosimetry film has been designed specifically as a time and cost-saving tool that addresses the needs of medical physicists and dosimetrists working in radiotherapy environments and supports the processor-less environment of the modern hospital.

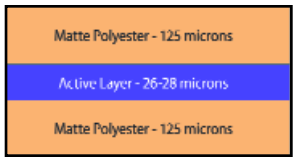
Benefits of Gafchromic EBT3 dosimetry films

- Superior resolution over array devices that meets the demand of increasing conformity requirements for new therapy modalities
- Wide dose range: 1 cGy to 40 Gy
- Response independent of radiation incident angle allowing film to measure the dose just as the patient would receive it
- Energy-independent dose response
- Near tissue-equivalent
- Uniformity better than ±2% in dose
- Can be handled in room light – no need for a darkroom
- Water-resistant, water-immersible and usable with water phantoms
- Lowest starting expense and comparable continuing operating cost among all QA systems
- Saves time and money with improved accuracy and outstanding convenience
- Cut and shape the film to your needs

Configurations and structures of Gafchromic EBT3 dosimetry film

Gafchromic EBT3 dosimetry film is made by laminating an active layer between two polyester layers. The polyester surface makes an exceptionally robust product and allows water immersion.

The polyester lamination for EBT3 is symmetrical providing greater confidence that neither side of the film is affected differently by exposure or scanning. The polyester surface also has anti Newton Ring coating so repeat scanning is kept to a minimum.



Structure of Gafchromic EBT3 dosimetry film (actual thicknesses may vary slightly)

Optimizing the sensitometric response of Gafchromic EBT3 dosimetry film

The sensitometric responses of Gafchromic EBT3 dosimetry films are identical as they have the same type and amount of active component.

Gafchromic EBT3 dosimetry film is engineered with Ashland Specialty Ingredients technology including a special marker dye in the active layer that enables proprietary multi-channel dosimetry analysis built in to FilmQA Pro software.

Versatile Performance

Gafchromic™ EBT3 dosimetry film can also be read with a film scanner or digitizer. As with densitometers, the response of the film can be enhanced if the spectral response of the scanner is matched to the absorbance of the film.

The Epson* 11000XL PHOTO flatbed color scanner, which is designed to digitize film up to 12.5" x 16" in size, is the preferred and recommended scanner for use with Gafchromic EBT3 dosimetry film.

The main advantages of using a flat bed color scanner is to fully utilize the properties inherent to Gafchromic EBT3 dosimetry film. The multiple sets of the color data obtained from a single scan can be used with FilmQA Pro software. FilmQA Pro software allows automatic correction so it reduces the effects of film non-uniformity, scanner and other artifacts and provides the most accurate dosimetric results. Furthermore, the difference in color channel response allows the extended dynamic range of the film from 1 cGy to 10 Gy.

Energy independence of Gafchromic EBT3 dosimetry film

Gafchromic EBT3 dosimetry film has been designed to measure absorbed dose from high-energy radiation used in RT. The response of photons has been found to be highly energy-independent in the MeV range and measurements at lower energies show that the response changes by only ten percent, even down to keV range.

Energy Dependence of Gafchromic EBT3 dosimetry film

Dose fractionation

Gafchromic EBT3 dosimetry film exposed to a single fraction yields the equivalent amount of response as the film given fractionated exposure thus establishing Gafchromic EBT3 dosimetry film as an effective dose integrator.

Post-exposure density growth

Gafchromic EBT3 dosimetry film self develops in real time. The time interval between the exposure and the scan should be kept approximately the same for all films in an analysis. The effect of the post-exposure density growth can be mitigated effectively using our OneScan Protocol.

Storage and handling

Gafchromic EBT3 dosimetry film is designed to be handled in interior room light, however it is recommended that the film be kept in darkness 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. It can tolerate brief exposures (e.g. < 1 min.) 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).

Gafchromic EBT3 dosimetry film can be easily formatted with simple cutting to be used with the FilmQA™ Pro software and the OneScan protocol.

Item #	Gafchromic® EBT3 Film	Sheets
115-016	8" x 10" (20.3 x 25.4 cm)	25
115-019	13" x 17" (33.0 x 43.2 cm)	10

Item #	Gafchromic® EBT3P Film	Sheets
115-011	8" x 10" (20.3 x 25.4 cm), for QuiCk Phantom	25

GAFCHROMIC® EBT2, EBT3 AND EBT3+ FILM

- **No processing required**
- **Wide exposure range**
- **Exceptional image resolution**
- **Large measurement area**
- **Less sensitive to indoor lighting**
- **Built-in uniformity indicator**

ADDITIONAL FEATURES OF EBT3

- **Symmetrical**
- **Anti-newton coated**

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GAFCHROMIC® EBT2 and EBT3 dosimetry film has been designed specifically as a time-and-cost-saving tool that addresses the needs of medical physicists and dosimetrists working in radiotherapy environments. It is targeted toward applications in external beam radiotherapy and supports the processor-less environment of the modern hospital.

TECHNICAL BENEFITS

- Supports all major RT technologies
- Large measurement area
- Develops in real time with no processing (eliminates processing discrepancies)
- Density changes stabilize rapidly
- Energy-independent dose response
- Reduces scattered radiation
- Near tissue-equivalent
- Uniformity better than ±3% in dose
- High spatial resolution
- Can be handled in room light
- Eliminates the need for a darkroom
- Water resistant, water immersible
- Usable with water phantoms
- Withstands temperatures up to 70°C

EBT2 SPECIFIC TECHNICAL BENEFITS

- Wide dose range, 1 cGy to 40 Gy
- Special uniformity indicator
- Improved indoor lighting resistance

EBT3 SPECIFIC TECHNICAL BENEFITS

- Wide dose range, 1 cGy to > 40 Gy
- Symmetrical
- Helps avoid Newton's rings

EBT3+ is an enhanced version of GafChromic EBT3 film that has been conveniently formatted for application of the "One-Scan" protocol recently published in the Journal of Medical Physics[1]. By combining measurement with calibration and eliminating many inter-scan variables, the "One-Scan" protocol improves dose measurement accuracy to better than 1%. Moreover, this protocol allows the user to obtain dose measurements within a few minutes of exposure. No more waiting overnight for results.

All these advantages, plus the inherent advantages of radiochromic film - high spatial resolution, water/tissue equivalence, minimal energy dependence and no angular dependence - make GafChromic EBT3+ film the ideal choice for patient-specific QA of treatment plans for IMRT, VMAT, SRS, etc.

1. "An efficient protocol for radiochromic film dosimetry combining calibration and measurement in a single scan," D. Lewis, A. Micke, X. Yu and M. F. Chan, Medical Physics 39(10) p6339-50, October 2012

ECONOMIC BENEFITS

- Eliminates the expense of a processor
- Eliminates the costs and dangers of photo chemical wastes
- Convenient to handle and easy to cut
- Easily noted on with marker pen (notes easily erased if necessary)
- Cut and shape the film to your needs
- Economical and competitive pricing
- Use with professional flatbed scanner
- Saves time and money, with improved accuracy and outstanding convenience
- Available in two sheet sizes

CONFIGURATION AND STRUCTURE

GAFCHROMIC® EBT2 and EBT3 is made by laminating an active layer between two polyester layers. The polyester surface makes an exceptionally robust product and allows water immersion.

OPTIMIZING THE SENSITOMETRIC RESPONSE

Since the absorbance spectra of the active component of GAFCHROMIC® EBT2 and EBT3 peaks at 636 nm, 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 EBT2 or EBT3 film. Better results can be obtained from the red color channel with a color densitometer. Further improvement of results can be obtained by using a narrow band pass filter with central wavelength at about 636 nm and 10 nm bandwidth while making measurements.

EBT2 FEATURES

A PRECISION 5-LAYER LAMINATED COMPOSITION

A clear polyester . . . . . 50 microns
B adhesive layer . . . . . 25 microns
C top coat . . . . . 5 microns
D active substrate layer . . . . . 30 microns
E clear polyester . . . . . 175 microns

Approximate thicknesses, actual values may vary slightly.

EBT3 AND EBT3+ FEATURES

A PRECISION 3-LAYER LAMINATED COMPOSITION

A clear polyester . . . . . 125 microns
B active substrate layer . . . . . 30 microns
C clear polyester . . . . . 125 microns

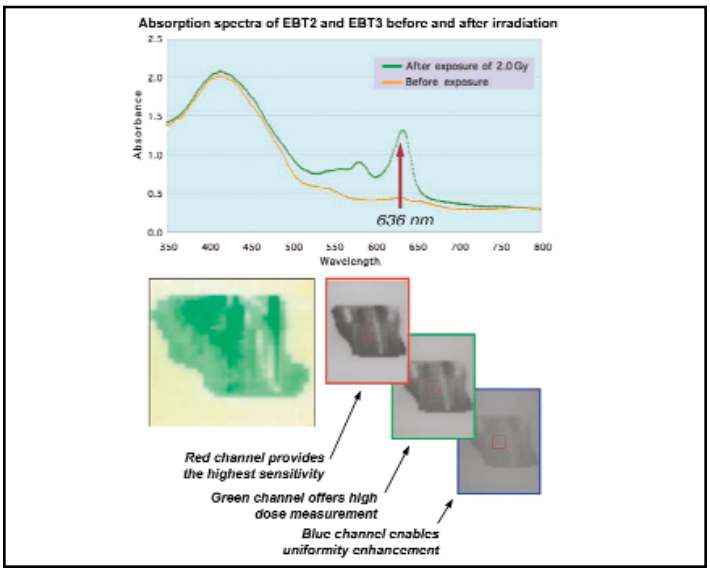
Approximate thicknesses, actual values may vary slightly.

VERSATILE PERFORMANCE

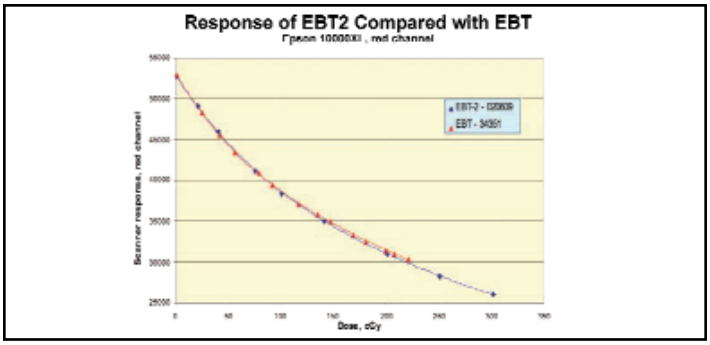
GAFCHROMIC® EBT2 nad EBT3 dosimetry film can also be read with a film scanner or digitizer. As with densitometers, the response of the film can be enhanced if the spectral response of the scanner is matched to the absorbance of the film.

Many high-quality scanners are available to digitize colored films. The Epson® 10000XL PHOTO flatbed color scanner, which is designed to digitize film 8" x 10" in size, and even as large as 12" x 16" in size, is recommended to scan EBT2 and EBT3 film. For doses up to 8 Gy, the Epson® 10000XL provides the most sensitive response for EBT2 and EBT3 film from the red color channel. The green channel can be used to measure doses between 8 Gy and 40 Gy for EBT2 and between 8 Gy and > 40Gy for EBT3. The blue channel provides a response signal for automatic film uniformity enhancement via a special marker dye in the active layer of EBT2 and EBT3 film. The recommended scan orientation for the film is landscape.

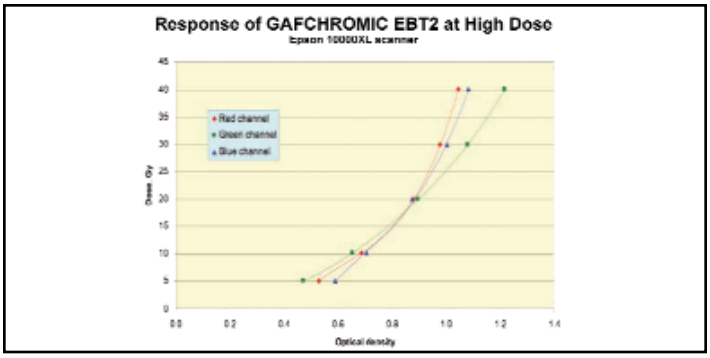
EPSON 10000XL
PHOTO FLATBED COLOR SCANNER PERFORMANCE



NOTE: The response of GAFCHROMIC® EBT2 and EBT3 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® EBT2 and EBT3 dosimetry film may vary from lot to lot, the user should re-measure response when changing to a new lot number.



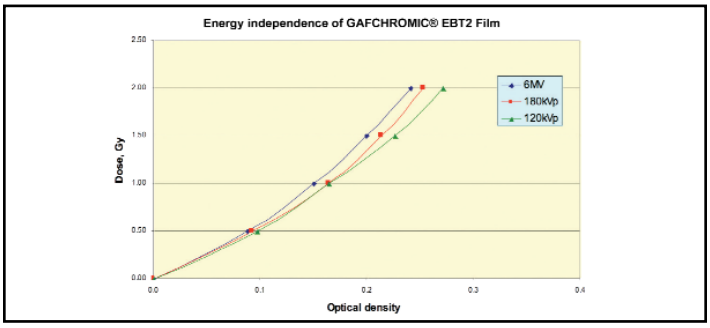
Responses of CAFCHROMIC® EBT2 and EBT to dose up to 3Gy



Response of GAFCHROMIC® EBT2 to doses between 5Gy and 40 Gy, with the Epson® XL10000 PHOTO flatbed color scanner

ENERGY INDEPENDENCE

GAFCHROMIC® EBT2 radiochromic film has been designed to measure absorbed dose from high-energy radiation used in RT. The response to photons has been found to be highly energy-independent in the MeV range and measurements at lower energies show that the response changes by only ten percent, even down to keV range.



DOSE FRACTIONATION

EBT2 film exposed to a single fraction yields the equivalent amount of response as the film given fractionated exposure and establishes EBT2 film as an effective dose integrator.

POST-EXPOSURE DENSITY GROWTH

GAFCHROMIC® EBT2 film self-develops in real time. The time interval between the exposure and the scan should be kept approximately the same for all films in an analysis.

STORAGE AND HANDLING

GAFCHROMIC® EBT2 film is designed to be handled in interior room light, however it is recommended that the film be kept in darkness 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 film's shelf-life is two years when stored at room ambient temperature. It can tolerate brief exposures (e.g. <1 min.) 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).

NOTES

1. GAFCHROMIC® EBT3 8" x 10" is available with or without holes. These holes are fiducial markers used as guides for the end user.

2. GAFCHROMIC® EBT3+ film contains 20 8" x 11" films paired for separation into 8" x 9.5" sheets and matched 8" x 1.5" strips, plus an additional 10 8" x 1.5" films for use as calibration or reference strips.

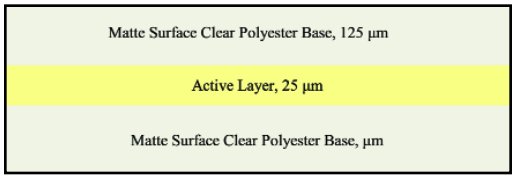
Item #	Gafchromic® EBT2 Film	Sheets
115-015	8" x 10" (20.3 x 25.4 cm)	25
115-017	13" x 17" (33.0 x 43.2 cm)	10

Item #	Gafchromic® EBT3 Film	Sheets
115-016	8" x 10" (20.3 x 25.4 cm)	25
115-018	8" x 10" (20.3 x 25.4 cm) w/Fiducial Markings	25
115-019	13" x 17" (33.0 x 43.2 cm)	10

Item #	Gafchromic® EBT3+ Film	
115-014	8" x 11" (20.3 x 27.9 cm), 20 Films and 10 Strips/Box	

GAFCHROMIC™ EBT-XD DOSIMETRY FILM

GAFCHROMIC™ EBT-XD is designed for the measurement of absorbed doses of ionizing radiation particularly suited for high-energy photons. The dynamic range of this film is specifically designed for best performance in the dose range from 0.4 to 40 Gy which makes it best suited for applications such as SRS and SBRT. The structure of GafChromic™ EBT-XD radiochromic film is comprised of an active layer, nominally 15µm thick, containing the active component, marker dye, stabilizers and other components giving the film its near energy-independent response. The thickness of the active layer may vary slightly from batch-to-batch. The active layer is sandwiched between two 125 µm matte polyester substrates.



Structure of the GafChromic™ EBT-XD Dosimetry Film

Key technical features of GafChromic EBT-XD include

- Dynamic dose range: 0.1 Gy to 200 Gy
- Optimum dose range: 0.4 Gy to 40 Gy, best suited for applications such as SRS and SBRT
- Develops in real time without post-exposure treatment;
- Energy-dependence: minimal response difference from 100keV into the MV range
- Near tissue equivalent;
- High spatial resolution – can resolve features to at least 5µm
- Proprietary new technology incorporating a marker dye in the active layer
- Enables non-unformity correction by using multichannel dosimetry
- Decreases UV/light sensitivity
- Excellent uniformity
- Stable at temperatures up to 60°C (140°F)

The incorporation of a yellow marker dye, when used in conjunction with an RGB film scanner and FilmQAPro™ software[1,2,3], the EBT-XD film enables all the benefits of multi-channel dosimetry.

Performace Data and Practical User Guidelines

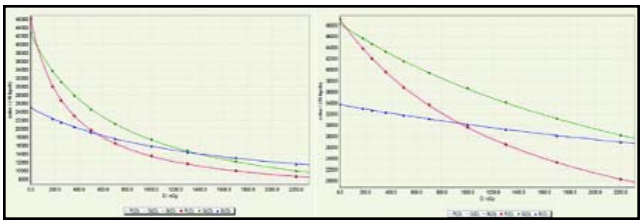
Like all other Gafchromic™ films, EBT-XD dosimetry film can be handled in normal room light for at least several hours without noticeable effects. However, it is suggested that the film should not be left exposed to room light indefinitely, but rather should be kept in the dark when it is not being handled. When the active component in GafChromic™ EBT-XD film is exposed to radiation, it reacts to form a blue colored polymer with absorption maxima at approximately 633 nm.

Gafchromic™ EBT-XD radiochromic dosimetry film is recommended to be digitized to obtain two-dimensional information in speedy fashion using 48 bit color depth flatbed color scanners. The commonly available professional photo scanners such as EPSON Expression 11000XL, V750, V700 and 1680 flatbed color scanners can be used. These scanners are color scanners and measure the red, green and blue color components of the film at a color depth of 16 bit per channel. EPSON Expression 11000XL is particularly recommended due to its large scanning area that allows the least amount of lateral effect.

Performance Comparison between EBT3 and EBT-XD film

As mentioned earlier, Gafchromic™ EBT-XD is specifically designed to obtain optimum results for the applications of SRS and SBRT. The high dose associated with these applications poses many challenges when EBT3 films[4,5] are used. The two main problems are the increased uncertainty at high dose and potentially unacceptable lateral scan effect.

Due to the chromatic nature of Gafchromic™ film, it does not have clear color saturation points. This is especially important when FilmQA Pro software is used for the analysis, since it takes advantage of all available color channels that effectively extend the dynamic range of the film. However, a shallow slope for the dose response curve can cause increased dosimetric error for high dose region. As seen below, for the dose range between 10 and 20 Gy, EBT-XD film provides a more desirable calibration than EBT3.



Comparison of Calibration Curves of GAFCHROMIC™ EBT3 (left) and EBT-XD (right) Films

As noted by many users, flatbed scanners used for film measurement exhibit a lateral scan effect, i.e., the color value measured can vary depending upon the location of the film placement relative to the center of the scanner. Typically, film scanned away from the center location will have lower color pixel values which result in higher calculated doses. The variation (lateral effect) increases with color density of the film as results of the increased dose[6,7].

The active particles in EBT-XD film are significantly smaller than those in EBT3 film. The smaller particle size reduces light scattering and polarization and, in combination with lower color density when compared to EBT3 films exposed to the same dose, is believed to reduce the lateral effect.

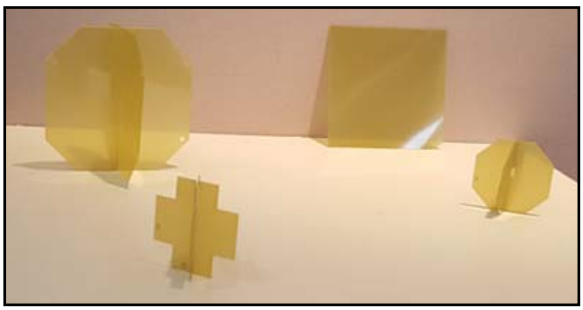
REFERENCES
1. Micke, A., Lewis, D.F., Yu, X. “Multichannel film dosimetry with non-uniformity correction,” Med Phys, 38(5), 2523-2534 (2011).
2. Lewis D., Micke A., Yu X, Chan M.: “An Efficient Protocol for Radiochromic Film Dosimetry combining Calibration and Measurement in a Single Scan”, Medical Physics, 39 (10) 6339(2012)
3. An Efficient Calibration Protocol for Radiochromic Film, April 2011 available at www.filmqapro.com
4. Gafchromic™ EBT2 film specifications, Available at www.gafchromic.com
5. Gafchromic™ EBT3 film specifications, Available at www.gafchromic.com
6. Mathot M, et al., “Gafchromic film dosimetry: Four years experience using FilmQA Pro software and Epson flatbed scanners”, Physica Medica (2014)
7. Schoenfeld A, et al, “The artefacts of radiochromic film dosimetry with flatbed scanners and their causation by light scattering from radiation-induced polymers”, Phys. Med. Biol. 59 (2014) 3575

Specifications

Configuration: Active layer (25 µm) sandwiched between on 5 mil (125 µm) matte surface clear clear polyester substrate
Size: 8" x 10"
Dynamic Dose Range: 0.1 to 200 Gy
Energy Dependency: <5% difference in net optical density when exposed at 100 keV and 18 MeV
Dose Fractionation Response: <5% difference in net optical density for a single 25 Gy dose and five cumulative 5 Gy doses at 30 minute intervals
Dose Rate Response: <5% difference in net optical density for 10 Gy exposures at rates of 3.4 Gy/min. and 0.034 Gy/min.
Stability in Light: $<5x10^{-3}$ change in optical density per 1000 lux-day
Stability in Dark (Pre-exposure): $<5x10^{-4}$ optical density change/day at 23°C (73.4°F) and $<2x10^{-4}$ density change/day refrigerated
Uniformity: Better than 3% in sensitometric response from mean

Item #	Gafchromic®	Sheets
115-013	EBT-XD, 8" x 10" (20.3 x 25.4 cm)	25

GAFCHROMIC® CYBERKNIFE FILMS



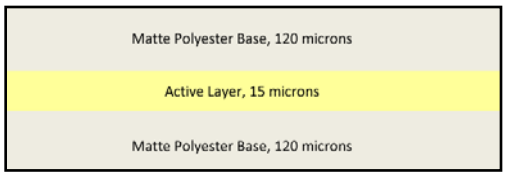
CyberKnife® quality assurance films are now available in both the Gafchromic EBT3 and Gafchromic EBT-XD films. GafChromic specific laser precision cuttiing guarantees an ideal fit for your phantom. EBT-XD films allow for a higher dose range to better simulate actual patient treatment while using a phantom. Additionally, these films are used for daily, weekly and monthly quality assurance testing as required for the CyberKnife system.

Item #	Gafchromic® Film	Size	Quantity	Graphic
115-050	Ballcube I -- EBT3	2.5" x 2.5"	20 (10 Pairs)	
115-070	Ballcube I -- EBT-XD	2.5" x 2.5"	20 (10 Pairs)	
115-052	Ballcube II-- EBT3	2.5" x 2.5"	20 (10 Pairs)	
115-072	Ballcube II-- EBT-XD	2.5" x 2.5"	20 (10 Pairs)	
115-054	AQA-- EBT3	2.5" x 2.5"	100	
115-074	AQA -- EBT-XD	2.5" x 2.5"	100	
115-056	Mini Ballcube -- EBT3	1.25" x 1.25"	20 (10 Pairs)	
115-076	Mini Ballcube -- EBT-XD	1.25" x 1.25"	20 (10 Pairs)	
115-058	XLT -- EBT3	1.25" x 1.25"	20 (10 Pairs)	
115-078	XLT -- EBT-XD	1.25" x 1.25"	20 (10 Pairs)	

GAFCHROMIC® MD-V3 DOSIMETRY MEDIA

The GAFCHROMIC MD-V3 radiochromic dosimetry film is designed for the measurement of absorbed dose of ionizing radiation particularly suited for high-energy photons.

The structure of GAFCHROMIC MD-V3 radiochromic dosimetry film is comprised of an active layer, nominally 15µm thick, containing the active component, marker dye, stabilizers and other components giving the film its near energy-independent response. The thickness of the active layer may vary slightly from batch-to-batch. The active layer is sandwiched between two 120µm matte polyester substrates.



Structure of the GAFCHROMIC MD-V3 Dosimetry Media

Key technical features of GAFCHROMIC MD-V3 include

- Dynamic Dose range: 1 Gy to 100 Gy
- Develops in real time without post-exposure treatment;
- Energy-dependence: minimal response difference from 100keV into the MV range;
- Near tissue equivalent;
- High spatial resolution - can resolve features to at least 5µm;
- Can be handled in room light - eliminates the need for a darkroom;
- Active coating exposed for detection of low energy photon and electron

New and improved features over the previous generation (GAFCHROMIC MD-V2-55)

- Proprietary new technology incorporating a marker dye in active layer to enable use of multichannel dosimetry[1] with FilmQA Pro 3.0 software[2] corrects scanner and film artifacts including uniformity
- Mitigates lateral response dependence
- Enables channel-to-channel consistency measurement as an integrity check
- Decreases UV/light sensitivity;
- New matte film base to eliminate Newton's Rings artifact associated with scanning of the film
- Improved uniformity of response
- Stable at temperatures up to 140°F (60°C)

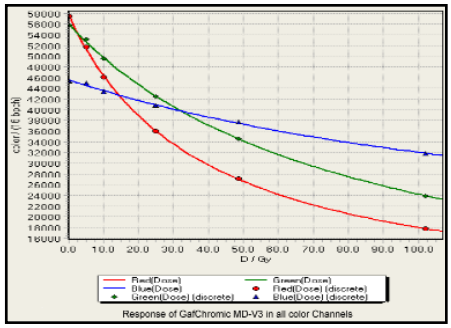
The most exciting new feature of GAFCHROMIC® MD-V3 over the previous generation of GAFCHROMIC® HD810 dosimetry film is the incorporation of a yellow marker dye. Used in conjunction with an rgb film scanner and FilmQAPro™ software, the marker dye in MD-V3 film enables all the benefits of multi-channel dosimetry. Using the marker dye feature is not mandatory. You can continue to perform dosimetry using only the red color channel, but you give up all the advantages of the multi-channel method that will make your film dosimetry better.

Performance Data and Practical User Guidelines

The GAFCHROMIC MD-V3 dosimetry film can be handled in normal room light for at least several hours without noticeable effects. However, it is suggested that the film should not be left exposed to room light indefinitely, but rather should be kept in the dark when it is not being handled. When the active component in GAFCHROMIC® MD-V3 film is exposed to radiation, it reacts to form a blue colored polymer with absorption maxima at approximately 633 nm.

GAFCHROMIC MD-V3 radiochromic dosimetry film may be measured with transmission densitometers, film scanners or spectrophotometers. The response of MD-V3 is enhanced by measurement with red light. In using a spectrophotometer the greatest response is obtained by scanning the film and using the peak absorbances. Most densitometers measure over a band of wavelengths and transmission densitometers for measuring colored films measure over various narrow color bands within the visible spectrum, e.g. visual, red, green and blue. Such densitometers are commonly and widely employed in the photographic industry.

To obtain two-dimensional information in speedy fashion, flatbed color scanners will work well with all GAFCHROMIC films including MD-V3 films. The commonly available professional photo scanners such as EPSON Expression 10000XL, V750, V700 and 1680 flatbed color scanners can be used. These scanners are color scanners and measure the red, green and blue color components of the film at a color depth of 16 bit per channel.



Response of GAFCHROMIC MD-V3 in all Color Channels

1. Micke, A., Lewis, D.F., Yu, X. "Multichannel film dosimetry with nonuniformity correction," Med Phys, 38(5), 2523-2534 (2011).

2. FilmQA Pro 3.0 software can be downloaded at www.filmqapro.com

Specifications

Configuration: Active layer on 5 mil (120µ) matte polyester substrate
Size: 5" x 5"
Dynamic Dose Range: 1 to 100 Gray
Energy Dependency: <5% difference in net density when exposed at 1 MeV and 18 Mev
Dose Fractionation Response: <5% difference in net density for a single 100 Gy dose and five cumulative 20 Gy doses at 30 min. intervals
Dose Rate Response: <5% difference in net density for 10 Gy exposures at rates of 3.4 Gy/min. and 0.034 Gy/min.
Stability in Light: <0.005 change in density per 1000 lux-day
Stability in Dark (Preexposure): $<5x10^{-4}$ density change/day at 23 °C (73.4°F) and $<2x10^{-4}$ density change/day refrigerated
Uniformity: Better than 3% in sensitometric response from mean

Item	Gafchromic®
115-002	MD-V3, 5" x 5"

GAFCHROMIC® HD-V2 DOSIMETRY FILM

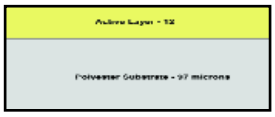
GAFCHROMIC® HD-V2 is a radiochromic dosimetry film designed for the quantitative measurement of absorbed dose of high-energy photons. As a self-developing film, HD-V2 is a perfect fit for the processorless environment. Since radiochromic film requires no post-exposure processing, there are no chemicals to dispose of and the film can be handled and used without need of a darkroom.

Key technical features of GAFCHROMIC® HD-V2 include

- Dynamic Dose range: 10 Gy to 1000 Gy
- Develops in real time without post-exposure treatment
- Energy-dependence: minimal response difference from 100keV into the MV range
- Near tissue equivalent;
- High spatial resolution - can resolve features to at least 5µm, or less
- Active coating exposed for detection of low energy photon and electron
- Proprietary new technology incorporating a marker dye in the active layer:
  - Enables non-unformity correction by using triple-channel dosimetry
  - Decreases UV/light sensitivity;
- Stable at temperatures up to 60°C;

The most important feature of GAFCHROMIC® HD-V2 compared to the previous generation HD810 dosimetry film is the incorporation of a yellow marker dye. Used in conjunction with an rgb film scanner and FilmQAPro™ software[1], the marker dye in HD-V2 film enables all the benefits of triple-channel dosimetry[2]. Using the marker dye feature is not mandatory as dosimetry can still be done using a single color channel (preferably the red channel), but you give up all the advantages of the triple-channel method that compensates for thickness differences of the film's active layer.

The structure of GAFCHROMIC® HD-V2 film is asymmetric. The film is comprised of an active layer, nominally 12µm thick, containing the active component, marker dye, stabilizers and other components giving the film its energy-independent response. The thickness of the active layer may vary slightly from batch-to-batch. The active layer is coated on a clear, 97 µm polyester substrate.



Configuration of GAFCHROMIC® HD-V2 Dosimetry Film

There have been indications that the response measurements made with a scanner or densitometer may be dependent on which side of the film is facing the light source. While the difference may be very small it is advised to be consistent with which side of the film faces the light source.

To help distinguish between the sides, sheets of GAFCHROMIC® HD-V2 film are marked with a small slit near one corner. When film is viewed in landscape orientation with the slit in the top right corner as shown below, the active layer is on the side facing the viewer.

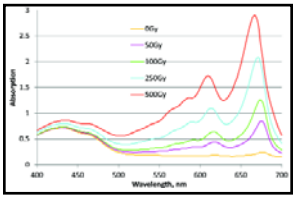
GAFCHROMIC® HD-V2 film in landscape view showing slit in top right corner.

Specifications

Configuration: Active layer on 3.8 mil (97 µ) clear polyester substrate
Size: 8" x 10"
Dynamic Dose Range: 10 to 1000 Gray
Energy Dependency: <5% difference in net density when exposed at 1 MeV and 18 Mev
Dose Fractionation Response: <5% difference in net density[a] for a single 100 Gy dose and five cumulative 20 Gy doses at 30 minute intervals
Dose Rate Response: <5% difference in net density[a] for 10 Gy exposures at rates of 3.4 Gy/min. and 0.034 Gy/min.
Stability in Light: < $5x10^{-3}$ change in density per 1000 lux-day
Stability in Dark (Pre-exposure): <$5x10^{-4}$ density change/day at 23 °C and <$2x10^{-4}$ density change/day refrigerated
Uniformity: Better than 3% in sensitometric response from mean; dose uniformity better than ±2% with FilmQAPro and triple-channel dosimetry

PERFORMANCE DATA AND PRATICAL USER GUIDELINES

When the active component in GAFCHROMIC® HD-V2 film is exposed to radiation, it reacts to form a blue colored polymer with absorption maxima at approximately 670 nm as shown below. Note: The active component in HD-V2 is chemically the same as that in EBT3, EBT-XD and MD-V3, but the crystalline form is different. Hence the absorbance maximum is about 670 nm rather than 635 nm.

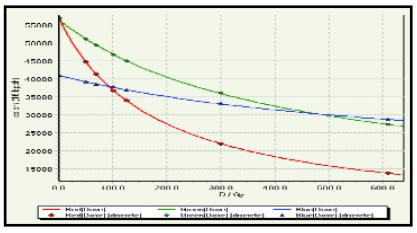


Spectra of GAFCHROMIC® HD-V2 as a function of adsorbed doses

GAFCHROMIC® HD-V2 radiochromic dosimetry film may be measured with transmission densitometers, film scanners or spectrophotometers. As can be inferred from the spectra above, the response of the film is enhanced when measured with red light. For spectrophotometer measurements, the greatest response is obtained at peak absorbance wavelengths. Most densitometers measure over a band of wavelengths. Black/white densitometers measure over the entire visual band while color densitometers measure over various narrower red, green and blue bands within the visible spectrum.

For two-dimensional measurement over a large film area the most efficient process is to use a 48-bit (16-bit per channel) flatbed color scanner. The EPSON Expression 11000XL Photo scanner and the now discontinued model 10000XL Photo scanner are the recommended models. These are color scanners and measure the red, green and blue color components of light transmitted by the film at a color depth of 16 bit per channel. These EPSON scanners are particularly recommended due to their large scanning area.

1. FilmQA Pro 3.0 software can be downloaded at www.Filmqapro.com Micke, A., Lewis, D.F., Yu, X. "Multichannel film dosimetry with non- uniformity correction," Med Phys,38(5), 2523-2534 (2011).



Response of GAFCHROMIC® HD-V2 in all Color Channels

Item	Gafchromic®
115-006	HD-V2, 8" x 10"

GAFCHROMIC® RTQA2 FILM

GAFCHROMIC® RTQA2 is a high performance processor-less film for quality assurance, exceptional accuracy with ease of use and featuring outstanding cost effectiveness. GAFCHROMIC® RTQA2 quality assurance film has been designed by leading radiochromic film scientists and provides state-of-the-art results in radiotherapy environments, while tapping all the exciting advantages of processor-less technology.

F

TECHNICAL BENEFITS

- Developed specifically for
  - light field alignment
  - radiation field alignment
  - precision star shots
  - position verification for HDR
  - autoradiography of implantable seeds, plaques and other sources
- Dynamic range from 0.02 Gy to 8 Gy
- Large measurement area
- Self develops in real time and requires no processing
- Near tissue-equivalent
- High spatial resolution
- Can be handled in room light
- Water resistant, water immersible (usable with water phantoms)
- Withstands temperatures up to 70°C
- Now with improved indoor lighting resistance

ECONOMIC BENEFITS

- No processor required - no darkroom
  - eliminates processing discrepancies
  - eliminates chemical waste
  - environmentally friendly
- Convenient to handle and easy to cut (cut and shape the film to your needs)
- Easily noted on with marker pen (notes easily erased if necessary)
- Economical and competitive pricing
- Available in three sizes

OUTSTANDING PERFORMANCE

GAFCHROMIC® RTQA2 radiotherapy film is an excellent, hassle-free tool for the contemporary and processor-less environment. Just position and shoot. With real-time self-developing, your results are available in seconds! No darkroom or chemicals are needed. After exposure, if the light field is not aligned with the radiation field, the discrepancy is visible immediately. Simply adjust the field accordingly and move on. In most cases, a second exposure is not required. Alignment can be achieved in an exceedingly short time. RTQA2 can even be observed through the monitor, and evaluated while it develops! Saves time and money as less film is used for each alignment, the film can be handled in room light and can be easily cut to the exact size called for. Excellent for autoradiography of implantable seeds, plaques and other sources.

CONFIGURATION AND STRUCTURE

Gafchromic® RTQA2 is made by laminating an active layer between two polyester layers. The polyester surface makes an exceptionally robust product and allows water immersion.

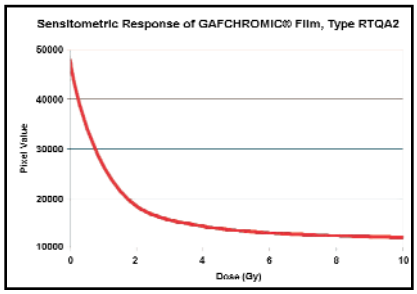
PRECISION 4-LAYER LAMINATED COMPOSITION

A yellow polyester . . . . . 97 microns
B pressure sensitive adhesive . . . . 20 microns
C active layer . . . . . 17 microns
E white polyester . . . . . 97 microns

Approximate thicknesses, actual values may vary slightly.

HDR APPLICATIONS

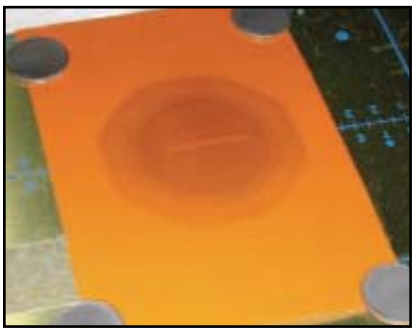
GAFCHROMIC® RTQA2-111 strips are designed for HDR positioning verification. They are designed for use within a phantom, or taped directly under a catheter. RTQA2-111 strips provide excellent results when the catheter position is marked and then the autoradiographic image is checked against the marks. Key advantages of RTQA2-111 strips are their stability and alignment. They eliminate concerns about film movement inside a ready pack and thus increase the accuracy of measurement. With dwell times between 0.5 second to 2.0 seconds (depending on the source) RTQA2-111 film strips exhibit sharp images, and clearly show source positions.

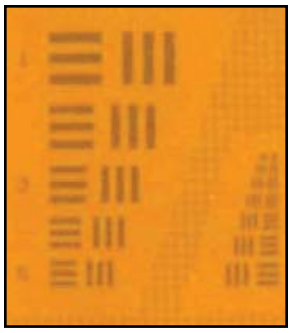


NOTE: The response of GAFCHROMIC® RTQA2 radiotherapy film is dependent upon factors specific to the facility such as the energy spectrum of the radiation source, the characteristics of the densitometer, film scanner or other means of measurement and the elapsed time between exposure and measurement etc. 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® RTQA2 film may vary from lot to lot, the user should re-measure response when changing to a new lot number.

Item #	Gafchromic®	Application	Size	Sheets/Box
115-020	RTQA2-1010	Light field alignment test	10" x 10" (25.4 x 25.4 cm)	25
115-024	RTQA2-111	Brachytherapy Source Positioning	1.25" x 11" (3.2 x 27.9 cm)	25
115-026	RTQA2-1417	Larger light-field alignment test	14" x 17" (35.6 x 43.2 cm)	10

GAFCHROMIC® XR-QA2 FILM





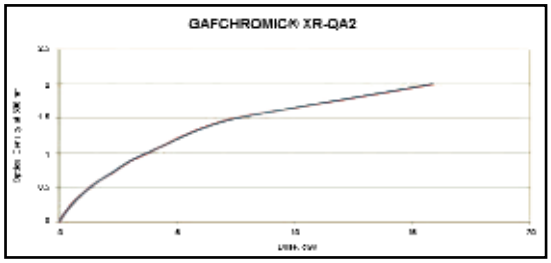
- **No processor required**
- **Sensitive to dose range 0.1 cGy to 20 cGy**
- **Instant calibration results**
- **High data integrity**
- **Cost effective, easy to use**
- **Improved contrast**
- **Can be handled in room light**

GAFCHROMIC® XR-QA2 film is designed specifically as a QA tool for radiology applications in a processor-less environment. Like all GAFCHROMIC® films, it can be cut and handled in room light. Energy range: ~20 KVp to 200 KVp.

STRUCTURE

A	yellow polyester	97 microns
B	pressure sensitive adhesive	20 microns
C	active layer	25 microns
E	white polyester	97 microns

Actual film layer thicknesses may vary slightly



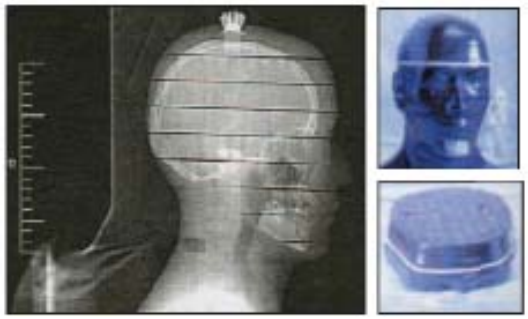
Sensitometric Response of GAFCHROMIC® XR-QA2 Film

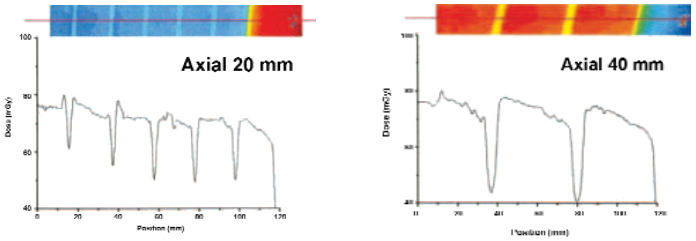
Imaging detail with high resolution and contrast

Imaging detail with high resolution and contrast State-of-the-art quality production techniques for XR-QA2 assure consistent and reliable high contrast results, with imaging detail at greater than 5000 dpi. Results are easy to read; and data is easy to understand.

HEAD PHANTOM DOSIMETRY APPLICATION

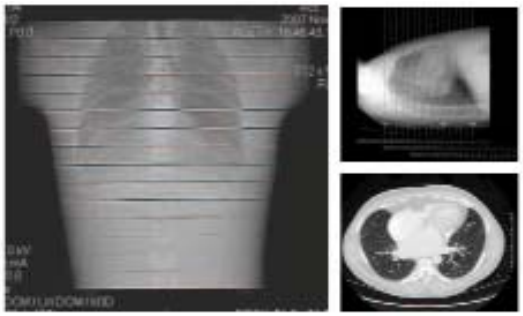
Typical head phantom radiation analysis XR-QA2 film is easy to use, cost effective, and compatible with a wide variety of phantoms.

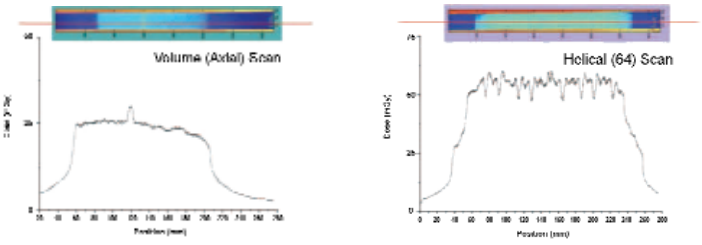




CHEST PHANTOM DOSIMETRY APPLICATION

Typical chest radiation analysis, results taken from an in vivo study for a chest exam with 64 slices made with a CT scanner.

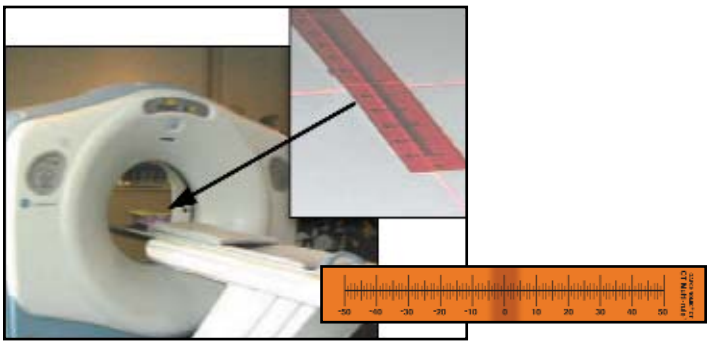


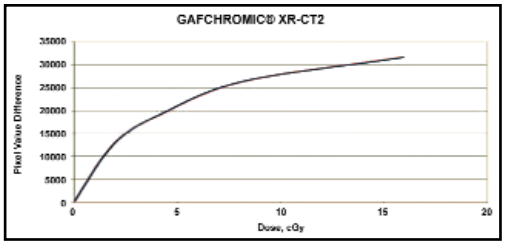


Item #	Gafchromic®	Sheets
115-034	XR-QA2, 10" x 12" (25.4 x 30.5 cm)	10
115-036	XR-QA2, 8" x 10" (20.3 x 25.4 cm)	10

F

GAFCHROMIC® XR-CT2 FILM





- **Excellent for CT QA**
- **Sensitive to dose range 0.1 cGy to 20 cGy**
- **High data integrity**
- **Instant calibration results**
- **Self-developing in real time**
- **Easy to use**
- **Improved contrast**
- **Cost effective**

The GAFCHROMIC® XR-CT2 film is designed for measuring radiation beam slice width on CT scanners in real time. It calibrates the beam slice with high accuracy and superior data integrity, and self-develops in a processor-less environment.

A printed scale helps determine positions of light and radiation field, and beam slice width, with a single exposure.

STRUCTURE

A yellow polyester . . . . . 97 microns
B pressure sensitive adhesive . . . . 20 microns
C active layer . . . . . 25 microns
D white polyester . . . . . 97 microns

Actual film layer thicknesses may vary slightly

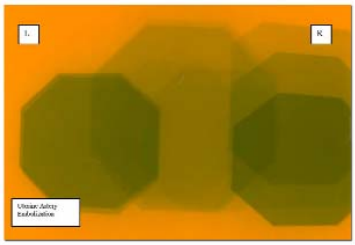
Specifications

Energy Range: ~20 KVp to 200 KVp
Size: 1.9 x 10 cm
Quantity: 50 strips per package

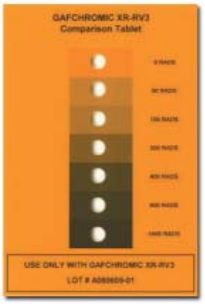
Item #	Gafchromic®	Strips
115-032	XR-CT2, 1.9 x 10 cm	50

GAFCHROMIC® XR-RV3 FILM

For Peak Skin Dose Measurement



An exposed film with patient's orientation with respect to the film



115-031 Comparator Strip

- **An excellent tool for the processor-less environment**
- **Sensitive to wide dose range 0.05 Gy to 15 Gy**
- **An easy to use film with high data integrity**
- **Improved resistance to indoor lighting**
- **For use with FilmQA-XR™ quantitative analysis software or Comparator Strip**
- **Shelf life: 18 month at room ambient temperature**

The GAFCHROMIC® XR-RV3 film is designed for surface-peak skin-dose measurement in interventional procedures guided by fluoroscopy. A comparator strip is also available for quick visual estimation of dosage at a point, requiring no digitizing. The comparator strip must be ordered with the film if not using the FilmQA-XR™ software.
Energy range: 30 keV to 30 MeV.

Structure of GAFCHROMIC® film, type XR-RV3

A yellow polyester . . . . . 97 microns
B pressure sensitive adhesive . . . . 20 microns
C active layer . . . . . 17 microns
E white polyester . . . . . 97 microns

Specifications

Configuration: 3-layer laminate (substrate-active layer-substrate)
Substrate: White and yellow polyester

Item #	Gafchromic®	Sheets
115-030	XR-RV3, 13.8" x 17"	25
115-031	Comparator Strip for XR-RV3 Film	

ALUMINUM HALF VALUE LAYER ATTENUATOR SET

- **Easy to use and customize in thicknesses for specific tasks**
- **Easy to store**
- **Economical**
- **Compact**

Determining the Half Value Layer (HVL) of the x-ray beam is the standard method for specifying the quality of the x-ray beam. For a given kVp, a measurement of the HVL gives information on the total filtration in the x-ray beam. Too little filtration results in unnecessary radiation to the patient and too high of a HVL may require increased kVp and mAs, increasing tube loading and reducing tube life.

Half Value Layer Attenuator Set contains nine (9) sheets of 1100 Aluminum Alloy ranging in thicknesses from 0.1 to 2.0 mm. For your convenience these sheets come in a plastic storage case to help maintain flatness and for ease of storage and transportation.

Specifications

Construction: 1100 Aluminum Alloy (99.0% Pure)
Size: 4" x 4" (10x10 cm)
Weight: 0.4 lb (0.2 kg)
Nine (9) Individual Aluminum Sheets: (3) 0.1 mm, (1) 0.2 mm, (2) 0.5 mm, (2) 1.0 mm and (1) 2.0 mm

Item	Description
115-500	Aluminum Half Value Layer Attenuator Set

F

COPPER HALF VALUE LAYER ATTENUATOR SET

- **Copper attenuators to simulate heavier patients**
- **Wide range of thicknesses for different testing conditions**
- **Satisfy regulatory requirements for fluoroscopic systems**

Regulatory test protocols for fluoroscopic systems increasingly specify copper attenuators to simulate heavier patients. When doing these tests, it is often useful to apply additional copper to drive the systems to maximum output. Copper filters are still used for specifying the Half Value Layer (HVL) of x-ray beams generated between 140 and 400 kVp.

The Pure Copper Half Value Layer Attenuator Set is comprised of nine 10 x10 cm sheets ranging in thicknesses from 0.1 mm to 2.0 mm. A plastic storage case is provided to protect and to help maintain flatness of the filters.

Specifications

Construction: Pure copper
Size: 4" x 4" (10x10 cm)
Weight: 1.1 lb (0.55 kg)
Nine (9) Individual Copper Sheets: (4) 0.1 mm, (1) 0.25 mm, (1) 0.5 mm, (2) 1.0 mm and (1) 2.0 mm

Item	Description
116-000	Copper Half Value Layer Attenuator Set