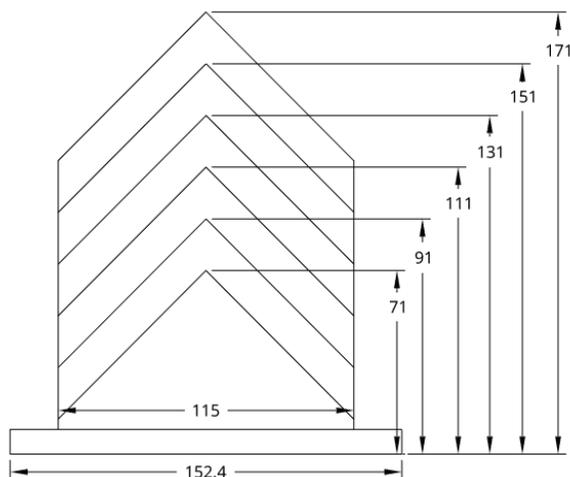


Logos Chevron Wedge 300

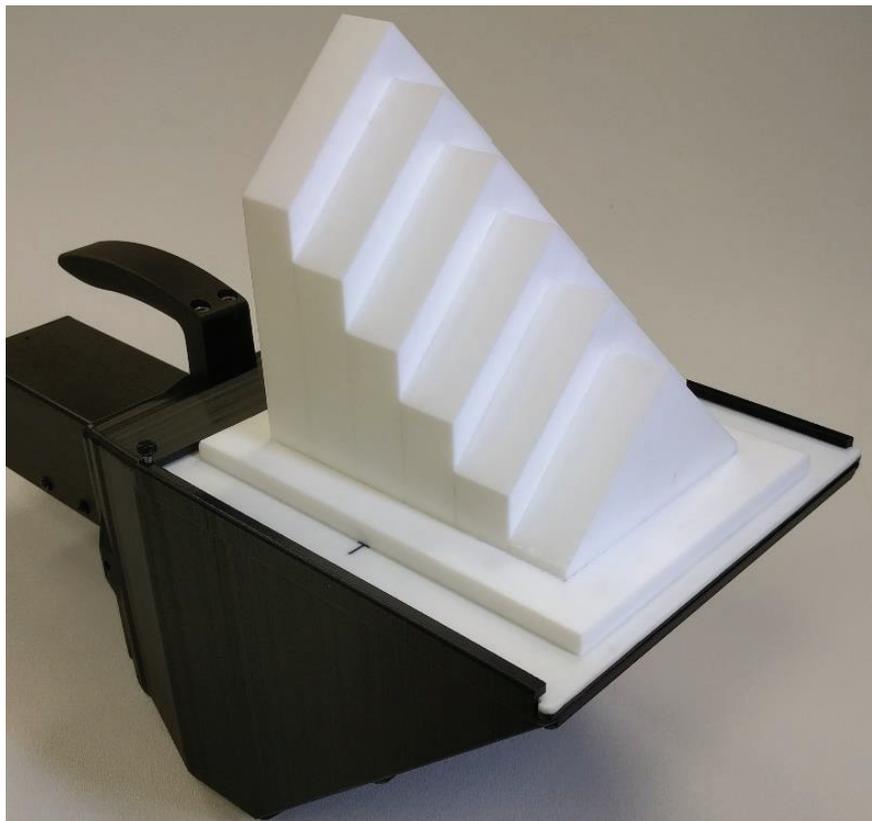
Proton and X-Ray Beam Metrology – Logos Systems Int'l

Features and Benefits:

- Quick Bragg peak measurement of water equivalent Proton beam penetration depths up to 300 mm
- 171 mm tall
- PTFE composition
- Full range Bragg peak measurements in under 5 minutes
- Measurement accuracy typically 0.5 mm
- Measures Proton and X-ray beam depth-dose relationships
- Mounting hardware available for XRV-2000/3000/4000 for use at any gantry angle
- Compatible with film
- Automated image analysis and software measurement
- 35 energy layer Excel analysis template provided



LCW-300 Dimension Diagram



LCW-300 with XRV-2000 Falcon 2D Detector Phantom

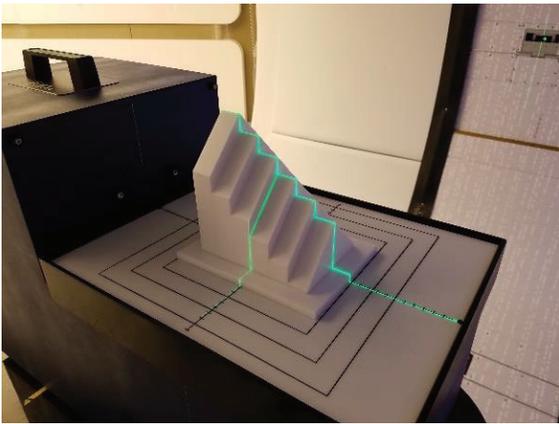
The LCW-300 is a PTFE dual wedge that can be used to measure Proton beam and X-ray depth-dose relationships. It was specifically designed to quickly provide accurate proximal edge measurements of an ion beam's Bragg peak penetration range. The height of 171 mm allows proton beam equivalent penetration depths in water of up to 300 mm to be captured on a detector. The LCW-300 enables a wide range of Bragg peak measurements to be taken quickly with a typical average accuracy of 0.5 mm.

The chevron wedges overlap so that measurements on the edge of one range can be duplicated at the beginning of the next. The wedge angle of 45 degrees enables symmetrical measurements to be made on each side of the center line and averaged for greater precision. Each wedge is 24 mm thick.

The small 152.5 x 205 mm footprint allows the LCW-300 to be placed above the scintillator of any Logos Systems 2D detector, including the XRV-2000 Falcon, XRV-3000 Eagle, and the XRV-4000, so that measurements can be taken quickly and easily. A set of rotation hardware is available to mount the wedge securely on Logos Systems 2D detectors in order to take measurements at any gantry angle.

The PTFE composition of the LCW-300 has a water equivalent density of 1.8 for direct proton range verification up to 300 mm. More energetic beams can be accommodated by padding the bottom surface with additional PTFE, acrylic or tissue equivalent plastic. The patent pending design may be enhanced with additional chevrons, so please contact us for custom configurations.

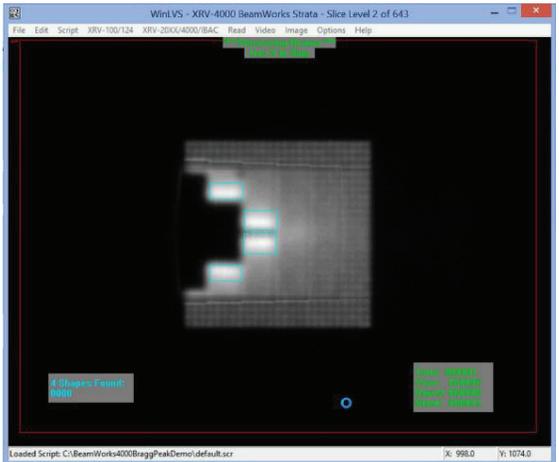
LCW-300/XRV-4000 Data from 35 energy layer diagnostic plan starting at 189 MeV and moving downwards to 121 MeV:



LCW-300 Chevron Data Summary										
Plan	Layer	Post Snout Energy (MeV)	Energy (MeV)	Delta	Chevron BPD (mm)	Delta	Avg. Energy BPD (mm)	Delta	Delta (mm)	(Absolute Delta) BPD (mm)
189	1	189	186.85		228.8477		230.41076		1.563042	1.563042
187.1	2	187.1	184.95	-1.9	225.2981	-3.54957	226.32624	-4.08452	1.028095	1.028095
185.2	3	185.2	183.05	-1.9	221.3971	-3.90102	222.27308	-4.05317	0.875948	0.875948
183.3	4	183.3	181.15	-1.9	217.2609	-4.13622	218.25134	-4.02174	0.990435	0.990435
181.4	5	181.4	179.25	-1.9	213.48	-3.78092	214.26112	-3.99022	0.781132	0.781132
179.5	6	179.5	177.35	-1.9	209.5802	-3.89979	210.30249	-3.95863	0.722293	0.722293
177.5	7	177.5	175.35	-2	205.5626	-4.01762	206.16974	-4.13275	0.607164	0.607164
175.6	8	175.6	173.45	-1.9	201.5439	-4.01869	202.27623	-3.89351	0.73235	0.73235
173.6	9	173.6	171.45	-2	197.6449	-3.89903	198.21222	-4.06401	0.567371	0.567371
171.6	10	171.6	169.45	-2	194.3198	-3.32509	194.18361	-4.02861	-0.13615	0.136152
169.6	11	169.6	167.45	-2	190.3385	-3.98122	190.19051	-3.9931	-0.14804	0.148039
167.6	12	167.6	165.45	-2	186.0855	-4.25302	186.23302	-3.95749	0.147484	0.147484
165.6	13	165.6	163.45	-2	182.1472	-3.9383	182.31124	-3.92178	0.164006	0.164006
163.5	14	163.5	161.35	-2.1	178.2086	-3.9386	178.23194	-4.0793	0.023299	0.023299
161.5	15	161.5	159.35	-2	174.2711	-3.93756	174.38372	-3.84821	0.11265	0.11265
159.9	16	159.9	157.75	-1.6	171.2881	-2.98301	171.33111	-3.05262	0.043042	0.043042
158.3	17	158.3	156.15	-1.6	168.0655	-3.22272	168.30162	-3.02948	0.236282	0.236282
156.7	18	156.7	154.55	-1.6	165.4398	-2.62557	165.29533	-3.00629	-0.14443	0.144434
155.1	19	155.1	152.95	-1.6	161.9784	-3.4614	162.3123	-2.98304	0.333925	0.333925
153.5	20	153.5	151.35	-1.6	159.3541	-2.62431	159.35257	-2.95973	-0.00149	0.00149
151.9	21	151.9	149.75	-1.6	157.1599	-2.19417	156.41622	-2.93635	-0.74367	0.743674
150.3	22	150.3	148.15	-1.6	154.0274	-3.13247	153.5033	-2.91292	-0.52412	0.524119
148.1	23	148.1	145.95	-2.2	150.0509	-3.97651	149.53643	-3.96688	-0.51448	0.514485
146.2	24	146.2	144.05	-1.9	146.5564	-3.49455	146.14637	-3.39006	-0.40999	0.409989
143.6	25	143.6	141.45	-2.6	141.8577	-4.69863	141.56145	-4.58492	-0.29629	0.296287
141.4	26	141.4	139.25	-2.2	138.0023	-3.85546	137.73092	-3.83053	-0.27136	0.271356
139.1	27	139.1	136.95	-2.3	134.0254	-3.97686	133.77452	-3.9564	-0.2509	0.250899
136.8	28	136.8	134.65	-2.3	130.1698	-3.8556	129.86764	-3.90688	-0.30218	0.302176
134.4	29	134.4	132.25	-2.4	126.314	-3.8558	125.84393	-4.02371	-0.47009	0.470093
132.1	30	132.1	129.95	-2.3	122.8593	-3.45471	122.03891	-3.80502	-0.8204	0.820405
129.7	31	129.7	127.55	-2.4	119.0083	-3.851	118.12196	-3.91695	-0.88636	0.886359
127.2	32	127.2	125.05	-2.5	114.9943	-4.014	114.10017	-4.02179	-0.89414	0.894142
124.8	33	124.8	122.65	-2.4	110.8592	-4.13509	110.29556	-3.80461	-0.56366	0.563661
122.3	34	122.3	120.15	-2.5	106.9675	-3.89172	106.39138	-3.90419	-0.57613	0.57613
121	35	121	118.85	-1.3	104.8993	-2.06825	104.38507	-2.0063	-0.51418	0.514184
					Average	-3.89833			Average	0.497045
					Std. Dev.	0.229846			Std. Dev.	0.352387
									Max.	1.563042
									Min.	0.00149
					Total Depth:	94.8223 mm			Average Layer Depth:	3.647012 mm

LCW-300 with XRV-4000

The LCW-300 is aligned with the treatment room lasers on the XRV-2000, XRV-3000, or XRV-4000 phantoms so that the Logos Systems software can perform automatic measurements of the symmetrical Bragg peak regions produced on the scintillator below the target.



Automated Capture and Measurement within WinLVS

The WinLVS capture software has a built-in scripting language that facilitates automatic real-time capture of the multi-energy even-dose delivery pattern needed for Bragg peak range measurements.

After each layer has been delivered, WinLVS merges the captured PBS image streaks to form complete radiographs. Once the 35 layers of the plan have been delivered, the Bragg peak regions on the radiographs are isolated and measured with the CSV formatted data being output to file. This CSV file can then be imported into an Excel template where the Bragg peak penetration depths are calculated.

