



Expect Service

Radiation Products Design Inc

SAMPLE PROCEDURES

RPD INFORMATION

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RPD PRODUCT INFORMATION

Item Number	“GRID” Photon Block
591-010	Varian Type III, 61.6cm
591-011	Varian Type III, 65.4cm
591-020	Siemens 56cm - Screw Coding
591-022	Siemens 56cm - Plug Coding
591-030	Philips Electa SL-20 - 65.4cm

Department of Radiation Medicine Physics Policy and Procedure Manual

Procedure No.		Title: Procedure for Grid Therapy for Linear Accelerator
Date:	Revision Date:	Category: Special Procedures
Written by:		Reviewed:

The following procedures will be followed when performing grid therapy.

- 1. Radiation Therapist:** Simulate the patient using the SSD technique, with SSD = 100cm.
- 2. Radiation Therapist:** Record the field size.
- 3. Radiation Therapist:** Record the energy of the photon beam to be used (grid patients must be treated with the _____ machine.)
- 4. Radiation Oncologist:** Record the location and depth of the prescription point and the total prescribed dose.
- 5. Medical Physicist:** If necessary, part of the radiation field can be blocked by using the MLC on the _____
- 6. Medical Physicist:** Verify that the prescription is complete.
- 7. Medical Physicist:** Calculate the monitor unit setting and given dose for the prescribed dose as follows:

$$MU = \frac{TumorDose}{[Dose / MU(d\ max)] * \%DD(grid) * Ks}$$

$$GivenDose = MU * \frac{Dose(d\ max)}{MU} * Ks$$

Here the factor Ks is the field size dependence factor.

8. Dose per MU at the depth of maximum dose for 6X and 18X were measured to be:
Dose per MU and %DD of Grid for Machine.

Table 1	6 MV
cGy/MU(dmax)	0.82

Depth (cm)	PDD
1.5	100.0
2	97.6
3	92.7
4	87.9
5	83.1
6	78.2
7	73.4
8	68.6
9	63.7
10	58.9

Table 2	18 MV
cGy/MU(dmax)	0.66

Depth (cm)	PDD
3.5	100.0
4	99.5
5	97.9
6	95.4
7	91.9
8	87.6
9	82.4
10	76.3

The percent depth dose curves for the 10x10 grid field for both the 6MV and 18MV resemble most closely the open field of 4x4. The 6MV field has a slight offset, while the 18MV field is very close to the open field 4x4 data. The 4x4 field size was the smallest field size data available, so it is possible that smaller field sizes could better represent the grid 10x10 field better. See figures 1 and 2 for these field size comparisons. The equations on these figures are the polynomial fits to the TLD grid data that was used to extract the values in Table 1 and 2

9. Medical Physicist: Enter information into the IMPAC system.

10. Medical Physicist: A physicist must check the calculation before treatment.

11. Radiation Therapist: Take a port film with grid setup before treatment.

12. Radiation Therapist: Patient may be treated once the setup is verified by the physician. The treatment sheet is to be initialed by the physician before the treatment begins.

Please note, as shown in Table 3 and Table 4, the dose in the shadow of the block relative to the dose in the open area is up to 13% for 6X and up to 20% for 18X

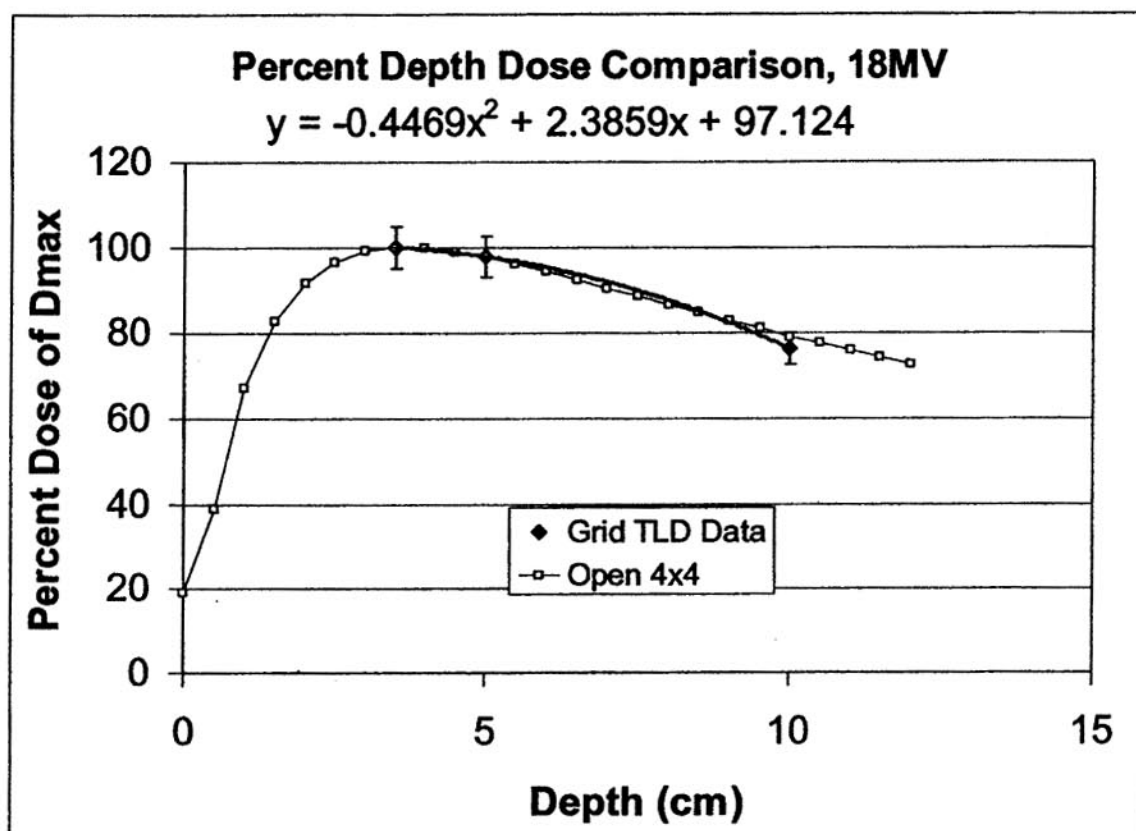
Table 3

6MV	(cGy/MU) closed / open
Depth	
1.5	8.62
5	10.51
10	12.60

Table 4

18MV	(cGy/MU) closed / open
Depth	
3.5	17.56
5	17.93
10	20.01

Figure 2



Field Size Dependence: Ratio of the dose in the center of the grid hole for any field size to that of a 10x10 field is shown in Tables 5 and 6 for 6MV and 18MV respectively. These factors are independent of depth.

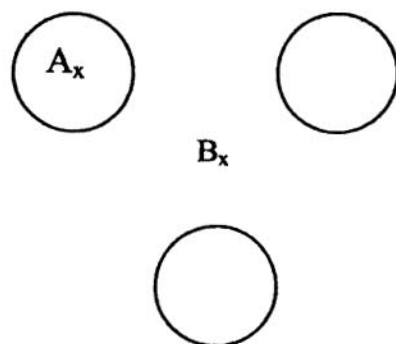
Table 5

6MV, 1.5cm depth			
	Field Size (cm x cm)	Dose Rate (cGy/MU)	Ratio of Dose Rates to 10x10, Ks
open field	5x5	0.79	0.96
	10x10	0.82	1.00
	15x15	0.84	1.02
	20x20	0.82	0.99

Table 6

18MV, 3.5cm depth			
	Field Size (cm x cm)	Dose Rate (cGy/MU)	Ratio of Dose Rates to 10x10
open field	5x5	0.59	0.90
	10x10	0.66	1.00
	15x15	0.63	0.96
	20x20	0.63	0.95

The shadow and open areas from the grid field look like the following:



Where A is the open area and B is the closed (shadow) area.

In comparing the film and TLD dosimetry data, it was found that the two dosimetry techniques are in excellent agreement. Table 7 compares the relative dose rate and Table 8 compares the absolute dose rates the following results were found:

Table 7,

Relative Dose Rate of open versus shadow grid positions:

Beam Energy (MV)	Point of Dosimetry	TLD %	Film %
6MV	A	100	100
	B	8.62	7.41
18MV	A	100	100
	B	17.56	11.4

Table 8,
Absolute Dose Rate:

Beam Energy (MV)	Point of Dosimetry	TLD %	Film %
6MV	A	0.82	0.80
	B	0.07	0.06
18MV	A	0.66	0.70
	B	0.12	0.08

Figure 1

