Determination of Attenuation For Optical Fiber Cables

$L = 4m = 4 \times 10^{-3}$ km

Source Level	Power Output for 1m Cable (P_i)	Power Output for 5m Cable (P_f)	Attenuation $= \frac{10 \log (P_i/P_f)}{L}$ dB/km
max	−47.8	−51.1	−72.4825
min	−48.7	−51.5	−60.6956

Measurement of Numerical Aperture

Circle (1m Cable)	Distance between Source & Screen (L) (mm)	Diameter of the Spot W (mm)	$NA = \frac{W}{\sqrt{4L^2+W^2}}$	θ
2	10	6	0.2873	16.69
3	20	15	0.3511	20.55
4	30	18	0.2873	16.69
5	40	23	0.3669	21.52
			Avg = 0.32315	Avg = 18.86°

Calculation: $N_A = \frac{W}{\sqrt{4L^2+W^2}}$

i) When W = 6 mm; L = 10 mm

$N_A = \frac{6}{\sqrt{4 \times 10^2 + 6^2}} = \frac{6}{\sqrt{4 \times 100 + 36}} = 0.2873$

ii) When W = 15 mm; L = 20 mm

$N_A = 0.3511$

iii) When W = 18mm; L = 30 mm

$N_A = 0.2873$

iv) When W = 23 mm; L = 40 mm

$N_A = 0.3669$

Circle (5m Cable)	Distance between Source & Screen (L) (mm)	Diameter of the Spot W (mm)	$NA = \frac{W}{\sqrt{4L^2+W^2}}$	θ
2	10	7	0.3303	19.28
3	20	13	0.3090	17.99
4	30	19	0.3015	17.54
5	40	20	0.3090	17.99
			Avg = 0.31245	Avg = 18.2

Calculation: $N_A = \frac{W}{\sqrt{4L^2+W^2}}$

When W = 7mm; L = 10mm

i) $N_A = \frac{7}{\sqrt{4\times10^2+7^2}} = \frac{7}{\sqrt{4\times100+49}} = \underline{0.3303}$

ii) When W = 13mm; L = 20mm

$\underline{N_A = 0.3090}$

iii) When W = 19mm; L = 30mm

$\underline{N_A = 0.3015}$

iv) When W = 20mm; L = 40mm

$\underline{N_A = 0.3090}$