BACKstage
Technical Theatre for High Schools

HOW BIG, HOW BRIGHT?

Common Lighting Fixtures

Ellipsoidal Reflector Spotlight

Can produce a hard/soft edge, beam can be shaped using internal shutters, can project images/gobos, focused by running the barrel.

Fresnel

Medium to short throw fixture, name derived from the lens, often used on stage for front, back and down light.

PARNel

Functions like a Fresnel.

A Little Math Never Hurt Anyone

Beam Diameter is:

Multiplying Factor * Throw

Multiplying factor is found on the Fixture Data Sheet:

Ex.
26º Ellipsoidal

Multiplying Factor **.32**
Throw **16'**

.32 * 16 = 5.1'

Calculating Intensity

Intensity is measured in **Footcandles**

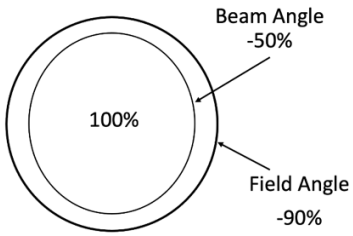
We need to know the **Candela (Peak Candela)** and the **Throw**

Peak Candela is found on the Fixture Data Sheet:

PC (176,255) **/** (256) **T²**

176,255/256 = 688fc

Understanding Beam Spread

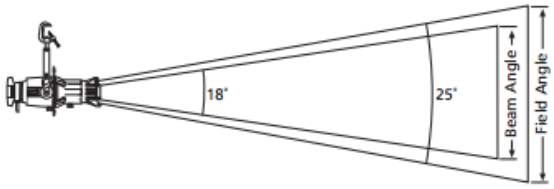


Beam Angle: Light beam is no less than 50% of the brightest part of the light beam.

Field Angle: Light beam is no more than 10% of the brightest part of the light beam.

PHOTOMETRICS

Photometric data below is measured with an HPL 750W/115V 300 hr lamp. To convert data when using any other HPL lamp, use the lumen or candela multiplying factors (Lm MF or Cd MF) for that specific lamp, listed in the Lamps table in this datasheet. For lumen data, multiply by the Lm MF. For candela or footcandle data, multiply by the Cd MF.



Throw Distance (d)	15′ 4.6m	30′ 9.1m	45′ 13.7m	60′ 18.1m
Field Diameter	6.7′ 2.0m	13.4′ 4.1m	20.1′ 6.1m	26.8′ 8.2m
Illuminance (fc)	783	196	87	49
Illuminance (lux)	8,432	2,108	937	527

To determine center beam illumination in footcandles at any throw distance, divide candela by the throw distance squared.

For Field diameter at any throw distance, multiply the throw distance by .45

For Beam diameter at any throw distance, multiply the throw distance by .32

Multiplying Factor

Candela (Sometimes labeled Peak Candela)

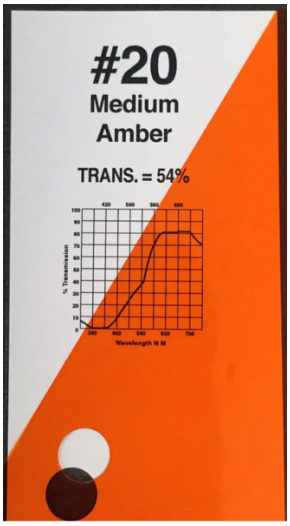
Source Four 26˚(cosine)

Degree	Candela	Field Lumens	Beam Lumens	Efficiency	Lumens per watt
26˚	176,255	13,690	9,040	62.5%	18.3

Metric Conversions: For meters, multiply feet by .3048
For Lux multiply footcandles by 10.76

Adding Gel:

Adding gel will impact the output of the light as well.



Every gel has a transmission percentage which indicates the percentage of intensity after adding it to your lighting fixture.

The darker the gel, the smaller the transmission percentage.

Adding Medium Amber to light described on the reverse, would reduce footcandles by 46%. 688fc reduced to 372fc.

Rosco Congo Blue gel has a Transmission % of 1% reducing 688fc to 7fc