LIGHTING DESIGN: ASK THE EXPERT

Texas Thespians Educator Conference

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Jason E. Weber
JASON E. WEBER

- Lighting Director, Alley Theatre, 2021 – Present
- Lighting Supervisor, Actors Theatre of Louisville, 2014 – 2021
- Master Electrician/Production Coordinator, Adirondack Theatre Festival, 2011 – 2014
- Lighting and Sound Supervisor, Merrimack Repertory Theatre, 2007 – 2014
- B.F.A., Theatre, Marietta College; M.A., Theatre Education, Emerson College
- Author of *The Lighting Supervisor’s Toolkit* (Routledge/Focal Press)
- Master Electrician/Lighting Lead on over 100 professional productions including many World Premieres
FREQUENTLY THOUGHT QUESTIONS

...that you were afraid to ask.
HOW DO I TURN THE LIGHTS ON?
WHAT LIGHTS SHOULD I USE?
WASH OR PROFILE?
WASH OR PROFILE?

Wash

Profile
LED OR INCANDESCENT?

**LED**

**Incandescent**
COLOR FILTER TECHNICAL DATA SHEET

SWATCHBOOK: PERMACOLOR
COLOR FILTER: #3407 FULL CTO
DESCRIPTION: PERMANENT COLOR FILTER
MAX. TRANS.: 76%

COLORIMETRIC DATA

OBSEER: CIE 1931 10 Degree
SOURCE: • 'A' (tungsten)
• 'D65' (daylight)

HUNTER LAB SOURCE A
L* 78.879
A* 26.506
B* 49.394

HUNTER LAB SOURCE D65
L* 71.085
A* 26.493
B* 41.213

CIE 1964 10° SOURCE A
Y 51.060
X 0.457
Y 0.406

CIE 1964 10° SOURCE D65
Y 43.152
X 0.461
Y 0.386

MATERIAL SPECIFICATIONS:
General Description: Dichroic Coated Glass Filter
Substrate: Borosilicate
Thickness: 1.75mm standard
1.1mm and 3.3mm Available
Manufactured in: U.S.A.

AVAILABLE SIZES:
CALL
Almost Any size/Shape
COLOR FILTER TECHNICAL DATA SHEET

SWATCHBOOK: PERMACOLOR
COLOR FILTER: #3202 FULL CTB
DESCRIPTION: PERMANENT COLOR FILTER
MAX. TRANS.: 85%

COLORIMETRIC DATA
OBSERVER: CIE 1931 10 Degree
SOURCE:
- 'A' (tungsten)
- 'D65' (daylight)

HUNTER LAB SOURCE A
L* = 58.498
A* = -16.172
B* = 144.768

HUNTER LAB SOURCE D65
L* = 82.188
A* = 4.4962
B* = 42.665

CIE 1964 10° SOURCE A
Y = 26.467
(x) = 0.338
(y) = 0.355

CIE 1964 10° SOURCE D65
Y = 39.523
(x) = 0.222
(y) = 0.225

MATERIAL SPECIFICATIONS:
General Description: Dichroic Coated Glass Filter
Substrate: Borosilicate
Thickness: 1.75mm standard
1.1mm and 3.3mm Available
Manufactured in: U.S.A.

AVAILABLE SIZES:
CALL
Almost Any size/Shape
ETC

Source Four LED Series 2

Source Four LED Series

CRI AND CQS RATINGS

Source Four LED fixtures were evaluated for CRI and CQS performance using measured output spectrum and optimized mix solutions for a best spectral match to black body sources at 3200 K and 5600 K.

<table>
<thead>
<tr>
<th>FIXTURE</th>
<th>CRI</th>
<th>CQS</th>
<th>COLOR FIDELITY</th>
<th>DUV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Four LED Series 2 Lustr Reg at 3200 K</td>
<td>86</td>
<td>88</td>
<td>88</td>
<td>0</td>
</tr>
<tr>
<td>Source Four LED Series 2 Lustr Reg at 5600 K</td>
<td>90</td>
<td>91</td>
<td>91</td>
<td>0</td>
</tr>
<tr>
<td>Source Four LED Series 2 Tungsten HD Reg at 3200 K</td>
<td>94</td>
<td>91</td>
<td>91</td>
<td>0.002</td>
</tr>
<tr>
<td>Source Four LED Series 2 Daylight HD Reg at 5600 K</td>
<td>91</td>
<td>89</td>
<td>88</td>
<td>0.002</td>
</tr>
</tbody>
</table>

All Source Four LED luminaire versions provide excellent color rendering to the eye, particularly at higher color temperature settings, such as 5600 K. In most cases, the Duv is 0.000. A Duv rating of 0.000 indicates that the color mix used is exactly on the black body line, with no green or magenta tint.
<table>
<thead>
<tr>
<th>Luminaire</th>
<th>Focus</th>
<th>Field Angle</th>
<th>Beam Angle</th>
<th>Field Multiplier</th>
<th>Beam Multiplier</th>
<th>Throw Distance in Feet and Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Four 5&quot;</td>
<td>7</td>
<td>6</td>
<td>0.12</td>
<td>0.20</td>
<td>0.20</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 10&quot;</td>
<td>11</td>
<td>8</td>
<td>0.19</td>
<td>0.25</td>
<td>0.25</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 15&quot;</td>
<td>17</td>
<td>13</td>
<td>0.31</td>
<td>0.47</td>
<td>0.47</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 20&quot;</td>
<td>24</td>
<td>17</td>
<td>0.42</td>
<td>0.57</td>
<td>0.57</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 25&quot;</td>
<td>33</td>
<td>23</td>
<td>0.55</td>
<td>0.57</td>
<td>0.57</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 30&quot;</td>
<td>50</td>
<td>38</td>
<td>0.93</td>
<td>2.11</td>
<td>1.11</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 15-30&quot;</td>
<td>18</td>
<td>12</td>
<td>0.3</td>
<td>0.21</td>
<td>0.21</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 22-30&quot;</td>
<td>23</td>
<td>15</td>
<td>0.41</td>
<td>0.25</td>
<td>0.25</td>
<td>F</td>
</tr>
<tr>
<td>Source Four 25-30&quot;</td>
<td>36</td>
<td>21</td>
<td>0.56</td>
<td>0.39</td>
<td>0.39</td>
<td>F</td>
</tr>
<tr>
<td>Source Four Parallax</td>
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<td>12</td>
<td>0.45</td>
<td>0.21</td>
<td>0.21</td>
<td>F</td>
</tr>
<tr>
<td>Source Four EA Par</td>
<td>46</td>
<td>20</td>
<td>0.87</td>
<td>0.52</td>
<td>0.52</td>
<td>F</td>
</tr>
</tbody>
</table>

**WHAT SIZE?**
\[ x = 14.14' \]
\[ x = 14.14' \]

<table>
<thead>
<tr>
<th>Luminaire</th>
<th>Focus</th>
<th>Field Angle</th>
<th>Beam Angle</th>
<th>Field Multiplier</th>
<th>Beam Multiplier</th>
<th>2' 4&quot;</th>
<th>9' 10&quot;</th>
<th>19' 8&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Four 5°</td>
<td>7</td>
<td>5</td>
<td>0.12</td>
<td>0.09</td>
<td>0° 3&quot;</td>
<td>0° 2&quot;</td>
<td>1° 2&quot;</td>
<td>0° 10&quot;</td>
</tr>
<tr>
<td>Source Four 10°</td>
<td>11</td>
<td>8</td>
<td>0.19</td>
<td>0.14</td>
<td>0° 5&quot;</td>
<td>0° 3&quot;</td>
<td>1° 10&quot;</td>
<td>1° 4&quot;</td>
</tr>
<tr>
<td>Source Four 19°</td>
<td>17</td>
<td>14</td>
<td>0.31</td>
<td>0.25</td>
<td>0° 8&quot;</td>
<td>0° 7&quot;</td>
<td>3°</td>
<td>2° 5&quot;</td>
</tr>
<tr>
<td>Source Four 26°</td>
<td>24</td>
<td>17</td>
<td>0.42</td>
<td>0.3</td>
<td>0° 11&quot;</td>
<td>0° 8&quot;</td>
<td>4° 1&quot;</td>
<td>2° 11&quot;</td>
</tr>
<tr>
<td>Source Four 36°</td>
<td>33</td>
<td>23</td>
<td>0.58</td>
<td>0.41</td>
<td>1° 4&quot;</td>
<td>0° 11&quot;</td>
<td>5° 8&quot;</td>
<td>4°</td>
</tr>
<tr>
<td>Source Four 50°</td>
<td>50</td>
<td>36</td>
<td>0.93</td>
<td>0.64</td>
<td>2° 1&quot;</td>
<td>1° 5&quot;</td>
<td>9° 1&quot;</td>
<td>6° 3&quot;</td>
</tr>
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\[ x = 14.14' \]
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<tr>
<td>Source Four 5°</td>
<td>7</td>
<td>5</td>
<td>0.12</td>
<td>0' 3''</td>
<td>0' 2''</td>
</tr>
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<td>11</td>
<td>8</td>
<td>0.14</td>
<td>0' 5''</td>
<td>0' 3''</td>
</tr>
<tr>
<td>Source Four 19°</td>
<td>17</td>
<td>14</td>
<td>0.31</td>
<td>0' 7''</td>
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<td>0.42</td>
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<td>0' 11''</td>
</tr>
<tr>
<td>Source Four 50°</td>
<td>50</td>
<td>36</td>
<td>0.93</td>
<td>2' 1''</td>
<td>1' 5''</td>
</tr>
</tbody>
</table>

Diagram:
- x = 14.14'
- F (Focus) = 10'
- B (Beam) = 10'
- 6' distance from source to point of interest.
\[ x = 14.14' \]

**Beam Size Calc:** \[ 14.14 \times 0.41 = 5.79' \]

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<th>Beam Angle</th>
<th>Field Multiplier</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F B F B F B F B</td>
<td></td>
</tr>
<tr>
<td>Source Four 5°</td>
<td>7</td>
<td>5</td>
<td>0.12</td>
<td>0.09</td>
<td>0'3'' 0'2'' 0'1'' 0'0'' 0'4'' 1'2'' 0'10'' 2'4'' 1'9''</td>
</tr>
<tr>
<td>Source Four 10°</td>
<td>11</td>
<td>8</td>
<td>0.19</td>
<td>0.14</td>
<td>0'5'' 0'3'' 1'10'' 1'4'' 3'8'' 2'9''</td>
</tr>
<tr>
<td>Source Four 19°</td>
<td>17</td>
<td>14</td>
<td>0.31</td>
<td>0.25</td>
<td>0'8'' 0'7'' 3'' 2'5'' 6'1'' 4'11''</td>
</tr>
<tr>
<td>Source Four 26°</td>
<td>24</td>
<td>17</td>
<td>0.42</td>
<td>0.3</td>
<td>0'11'' 0'8'' 6'1'' 2'11'' 8'3'' 5'10''</td>
</tr>
<tr>
<td>Source Four 36°</td>
<td>33</td>
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<td>0.58</td>
<td>0.41</td>
<td>1'4'' 0'11'' 5'8'' 4'' 11'5'' 8''</td>
</tr>
<tr>
<td>Source Four 50°</td>
<td>50</td>
<td>36</td>
<td>0.93</td>
<td>0.64</td>
<td>2'1'' 1'5'' 9'1'' 6'3'' 18'3'' 12'7''</td>
</tr>
</tbody>
</table>

![Diagram with light angles and calculations](image-url)
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.

---

**Source Four 36° (cosine)**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Candela</th>
<th>Field Lumens</th>
<th>Beam Lumens</th>
<th>Efficiency</th>
<th>Lumens per watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>36°</td>
<td>90,885</td>
<td>14,240</td>
<td>10,510</td>
<td>65%</td>
<td>19</td>
</tr>
</tbody>
</table>

Metric Conversions: For Meters multiply feet by .3048
For Lux multiply footcandies by 10.76

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

For field diameter at any distance, multiply distance by .61
For beam diameter at any distance, multiply distance by .47
WHERE SHOULD I PUT MY LIGHTS?
ASK ME ANYTHING!
ASK ME MORE THINGS:

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