

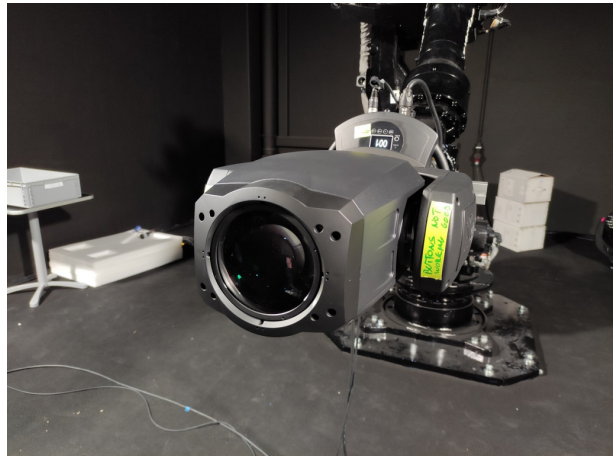


## FUSION Exo Spot 30 Photometric Report

Report 2021-11-09-1

GLP German Light Products GmbH  
GLP LightLab

Maximum Total Lumens	9990 lm
Maximum Intensity	629000 cd
CRI	74
Energy Efficiency Class	B
Energy Efficiency Index	0.43
Power Consumption	316 $\frac{\text{kWh}}{1000 \text{ h}}$
Measurement Date	2021-11-09 13:32
Software Version	2.6.0





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# 1 Light Distribution

Table 1: Summary of beam opening angles for different fixture configurations.

Beam	Beam Angle (50 %)		Field Angle (10 %)		Cutoff Angle (3 %)	
	C0	C90	C0	C90	C0	C90
Full White, Narrow	7.9°	8.0°	8.5°	8.7°	9.0°	9.1°
Full White, Medium	16°	16°	18°	17°	18°	18°
Full White, Wide	30°	30°	31°	31°	32°	32°

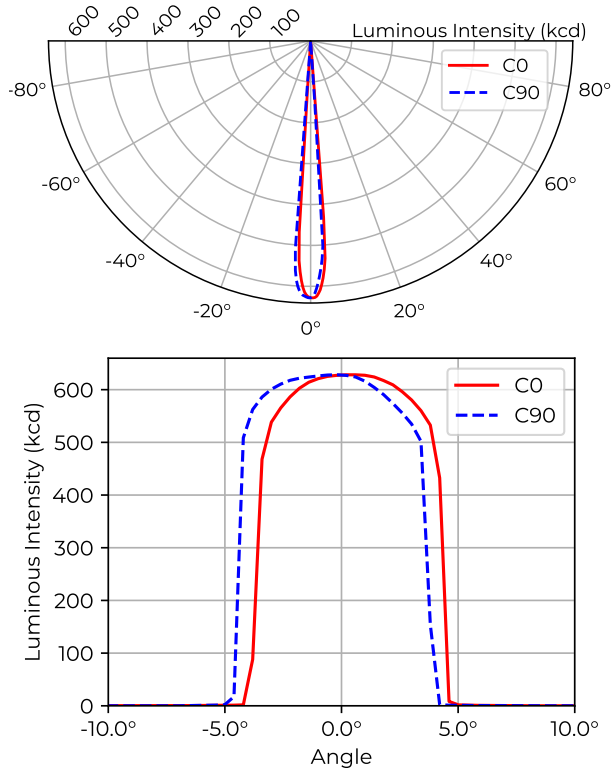
Table 2: Summary of luminous flux and intensity for different fixture configurations.

Beam	Total Lumen Output	Peak Luminous Intensity)
Full White, Narrow	9.07 klm	629 kcd
Full White, Medium	9.98 klm	164 kcd
Full White, Wide	9.99 klm	48.4 kcd

Table 3: Approximate illuminance and beam diameter at different projection distances, calculated with the inverse-square law. The approximation is valid only for large distances, compared to the size of the fixture output port.

Beam	Parameter	Factor	Projection Distance [m]								
			5	7.5	10	12.5	15	17.5	20	22.5	25
Full White, Narrow	Diameter [m]	0.14	0.70	1.0	1.4	1.7	2.1	2.4	2.8	3.1	3.5
	Illuminance [lx]	628k	25k	11k	6.3k	4.0k	2.8k	2.1k	1.6k	1.2k	1.0k
Full White, Medium	Diameter [m]	0.29	1.4	2.1	2.9	3.6	4.3	5.0	5.7	6.4	7.2
	Illuminance [lx]	162k	6.5k	2.9k	1.6k	1.0k	720	530	400	320	260
Full White, Wide	Diameter [m]	0.54	2.7	4.0	5.4	6.7	8.1	9.4	11	12	13
	Illuminance [lx]	47.2k	1.9k	840	470	300	210	150	120	93	75

## 1.1 Full White, Narrow Beam



Type B measurement, 1296 data points.

Table 4: Opening angles for different intensity thresholds. Full White, Narrow

		C0	C90
Beam Angle	50 %	7.9°	8.0°
Field Angle	10 %	8.5°	8.7°
Cutoff Angle	3 %	9.0°	9.1°

Table 5: Luminous flux, integrated over the beam for several minimum threshold intensities. Full White, Narrow

		Flux (lm)
Half-Peak Output	@50 %	8630
Tenth-Peak Output	@10 %	9040
Total Lumen Output	@3 %	9070

$$\text{diameter} = 0.14 \times \text{distance}$$

$$\text{illuminance} = \frac{628\,000 \text{ lx}}{(\text{distance [m]})^2}$$

Figure 1: Polar and cartesian light intensity distributions. Full White, Narrow

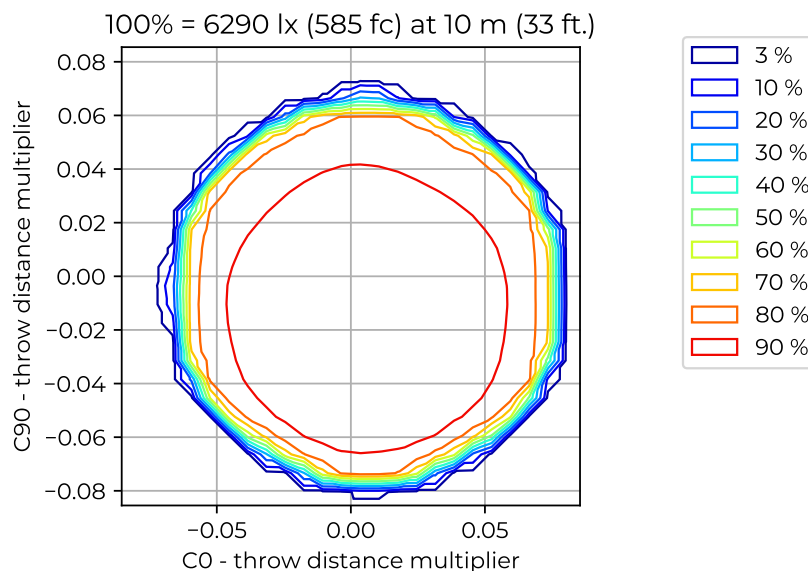
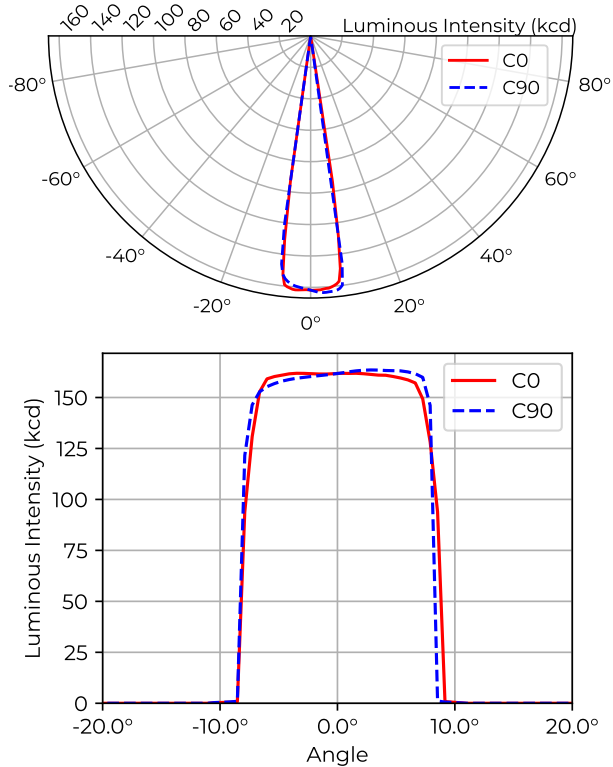


Figure 2: Iso-illuminance diagram of projected beam. Full White, Narrow  
dist. from origin = throw dist. × throw dist. multiplier

Table 6: Quick calculation diagram for illuminance and beam diameter. Full White, Narrow

Parameter	Factor	Projection Distance [m]									
		5	7.5	10	12.5	15	17.5	20	22.5	25	
Diameter [m]	0.14	0.70	1.0	1.4	1.7	2.1	2.4	2.8	3.1	3.5	
Illuminance [lx]	628k	25k	11k	6.3k	4.0k	2.8k	2.1k	1.6k	1.2k	1.0k	

## 1.2 Full White, Medium Beam



Type B measurement, 1296 data points.

Table 7: Opening angles for different intensity thresholds. Full White, Medium

		C0	C90
Beam Angle	50 %	16°	16°
Field Angle	10 %	18°	17°
Cutoff Angle	3 %	18°	18°

Table 8: Luminous flux, integrated over the beam for several minimum threshold intensities. Full White, Medium

		Flux (lm)
Half-Peak Output	@50 %	9670
Tenth-Peak Output	@10 %	9960
Total Lumen Output	@3 %	9980

$$\text{diameter} = 0.29 \times \text{distance}$$

$$\text{illuminance} = \frac{162\,000 \text{ lx}}{(\text{distance [m]})^2}$$

Figure 3: Polar and cartesian light intensity distributions. Full White, Medium

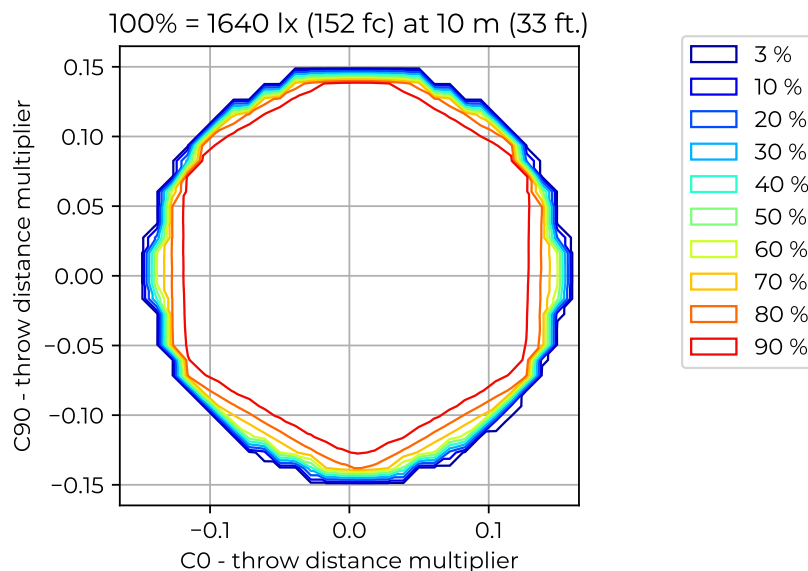
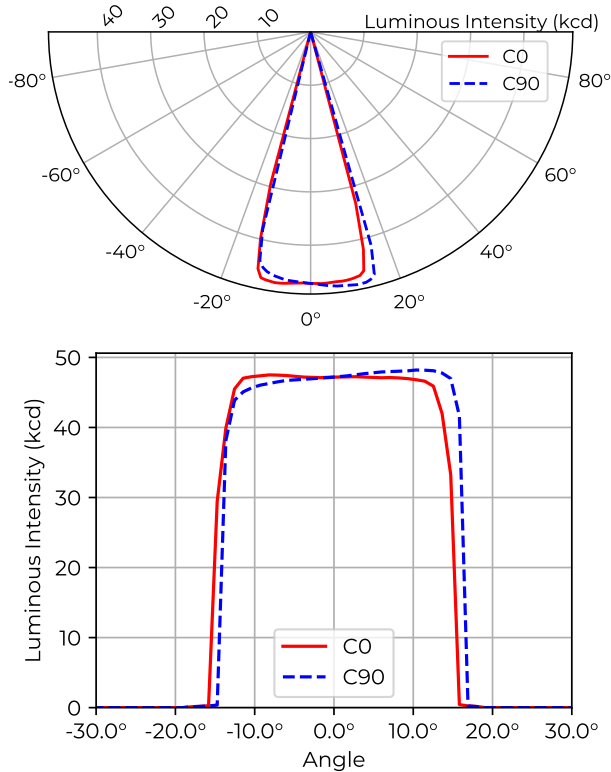


Figure 4: Iso-illuminance diagram of projected beam. Full White, Medium  
dist. from origin = throw dist. × throw dist. multiplier

Table 9: Quick calculation diagram for illuminance and beam diameter. Full White, Medium

Parameter	Factor	Projection Distance [m]									
		5	7.5	10	12.5	15	17.5	20	22.5	25	
Diameter [m]	0.29	1.4	2.1	2.9	3.6	4.3	5.0	5.7	6.4	7.2	
Illuminance [lx]	162k	6.5k	2.9k	1.6k	1.0k	720	530	400	320	260	

### 1.3 Full White, Wide Beam



Type B measurement, 1296 data points.

Table 10: Opening angles for different intensity thresholds. Full White, Wide

	C0	C90
Beam Angle 50 %	30°	30°
Field Angle 10 %	31°	31°
Cutoff Angle 3 %	32°	32°

Table 11: Luminous flux, integrated over the beam for several minimum threshold intensities. Full White, Wide

		Flux (lm)
Half-Peak Output	@50 %	9710
Tenth-Peak Output	@10 %	9980
Total Lumen Output	@3 %	9990

$$\text{diameter} = 0.54 \times \text{distance}$$

$$\text{illuminance} = \frac{47\,200 \text{ lx}}{(\text{distance [m]})^2}$$

Figure 5: Polar and cartesian light intensity distributions. Full White, Wide

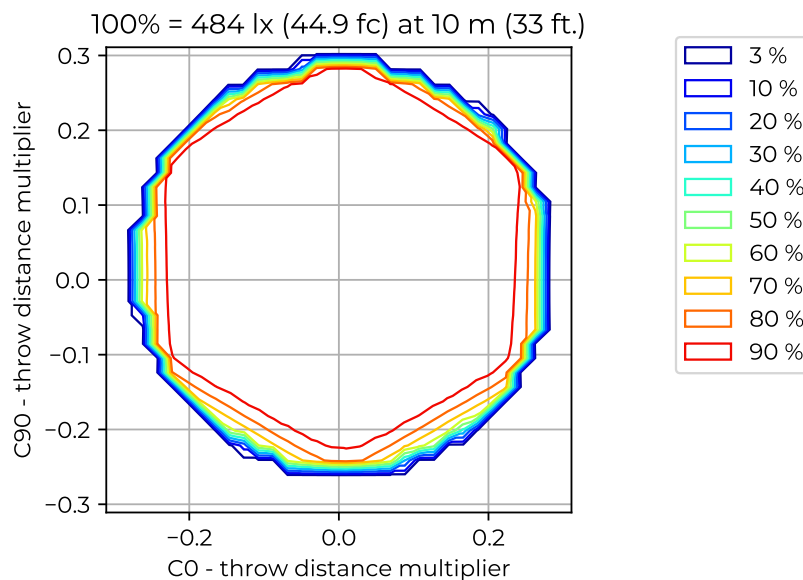


Figure 6: Iso-illuminance diagram of projected beam. Full White, Wide  
dist. from origin = throw dist. × throw dist. multiplier

Table 12: Quick calculation diagram for illuminance and beam diameter. Full White, Wide

Parameter	Factor	Projection Distance [m]									
		5	7.5	10	12.5	15	17.5	20	22.5	25	
Diameter [m]	0.54	2.7	4.0	5.4	6.7	8.1	9.4	11	12	13	
Illuminance [lx]	47.2k	1.9k	840	470	300	210	150	120	93	75	

## 2 White Quality – White LED

Table 13: Summary for White LED spectral measurement results and color metrics.

Metric	Value
CCT	6907 K
CCT $D_{uv}$	0.00095
CRI $R_a$	74
CRI $R_g$	-20
TLCI-2015	50
TM-30-15 $R_f$	94
TM-30-15 $R_g$	71
CIE 1931 x	0.307
CIE 1931 y	0.319
CIE 1960 u	0.198
CIE 1960 v	0.308

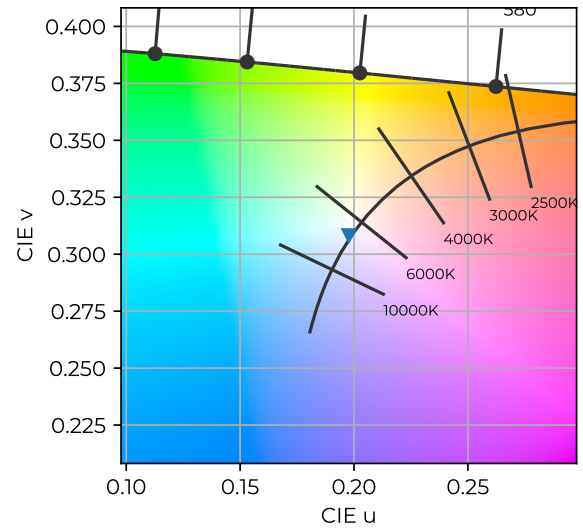


Figure 7: Color coordinates in CIE 1960 chromaticity diagram. White LED

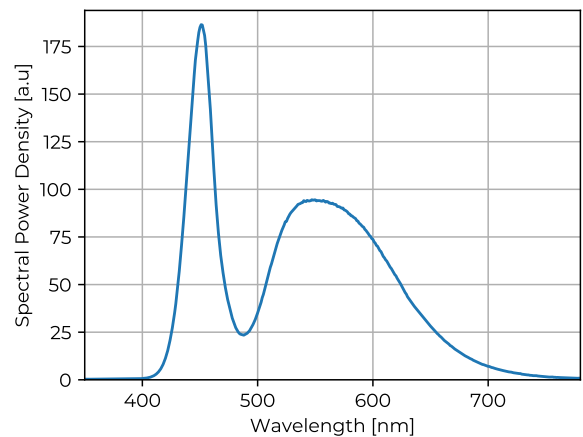
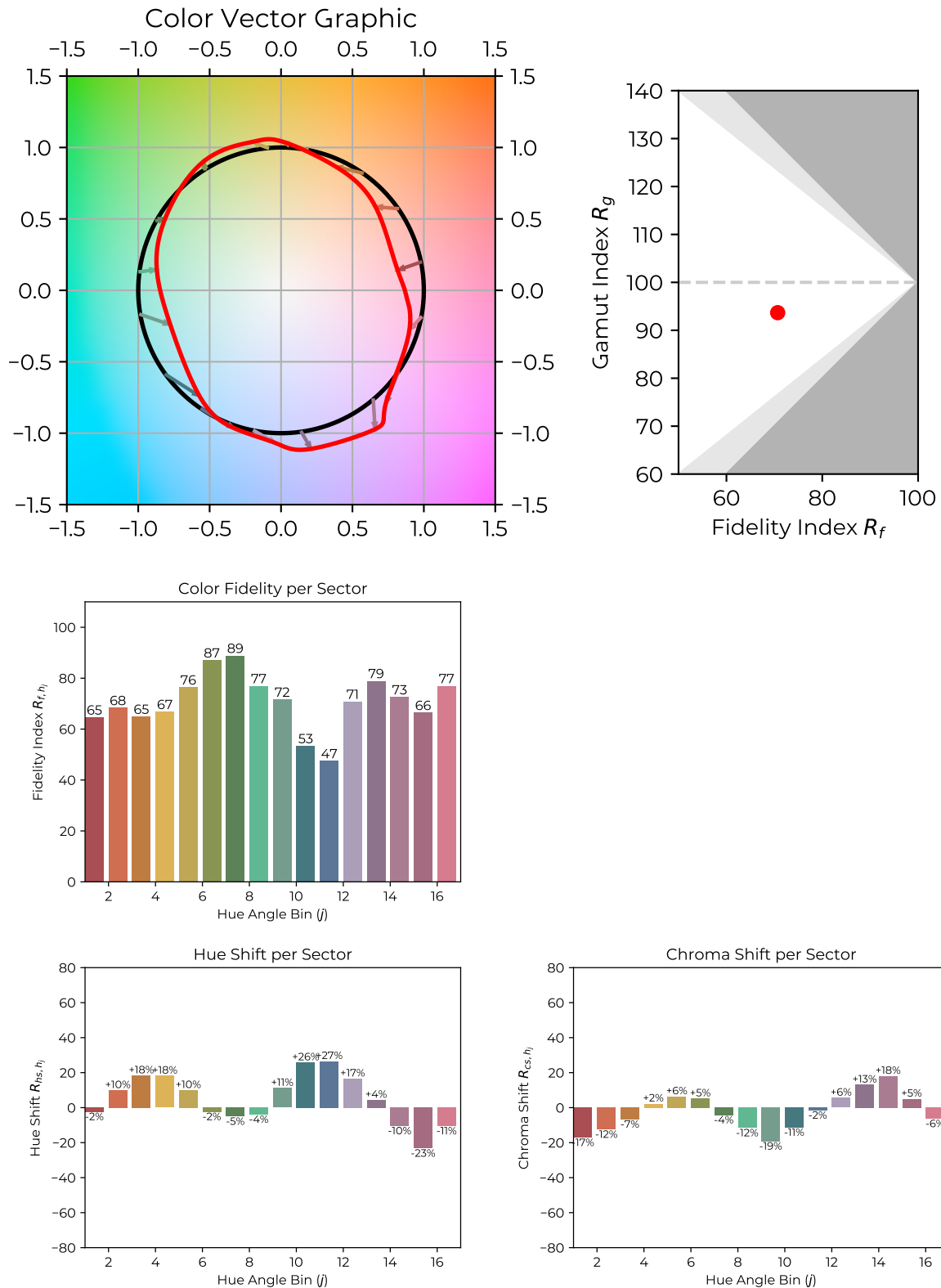
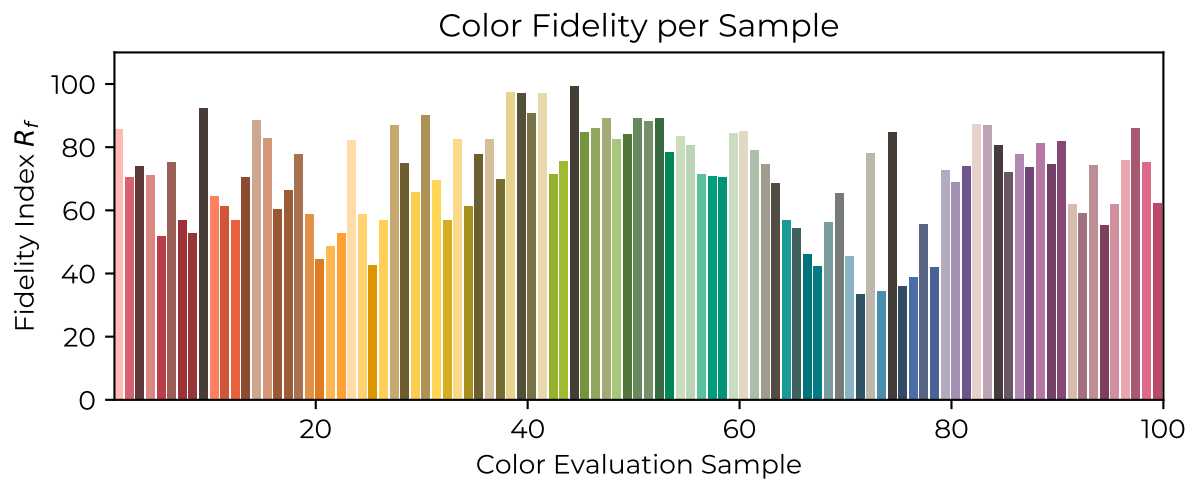


Figure 8: Measured Spectral Power Distribution of light source. White LED

## 2.1 TM-30-15 Detail Plots

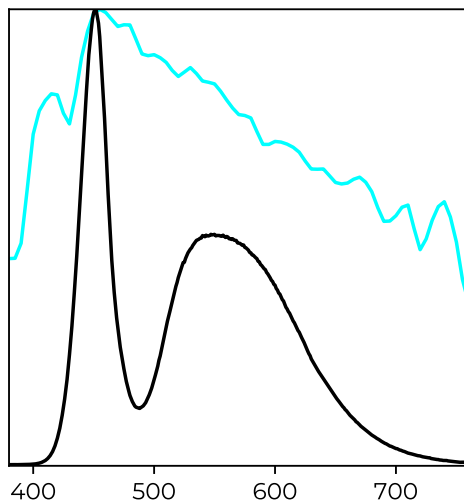
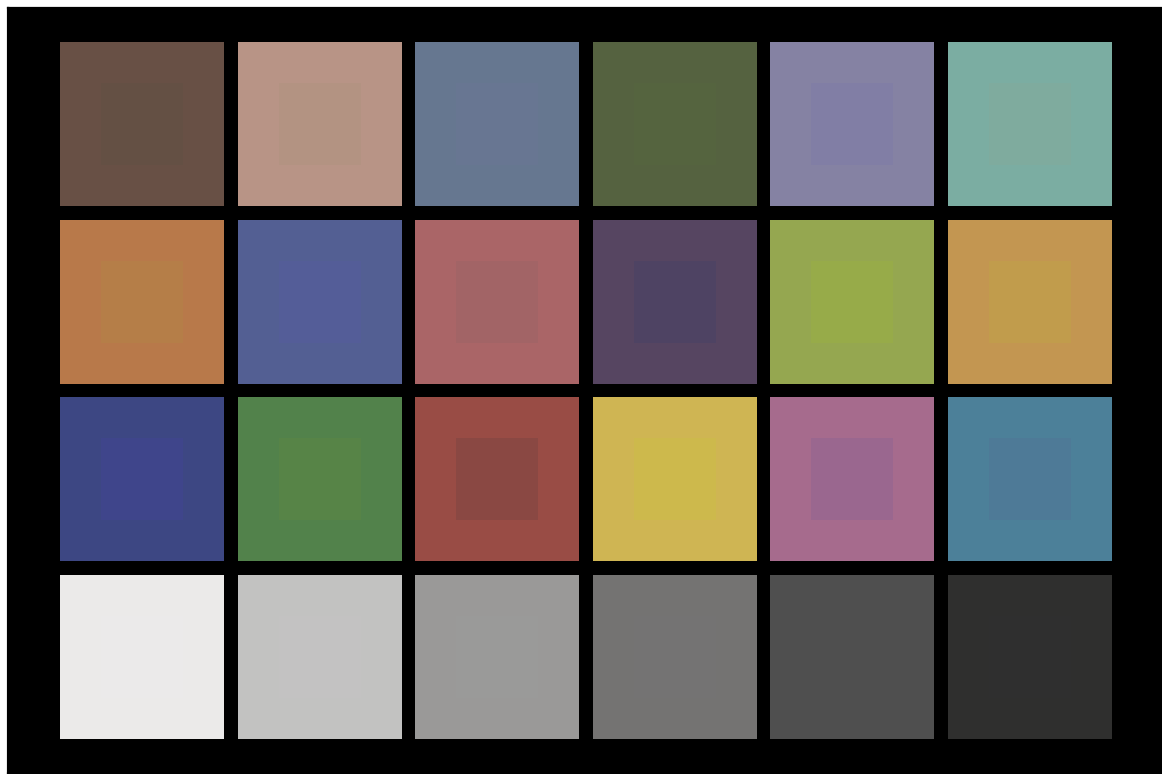






## 2.2 TLCI-2012 Results

FUSION Exo Spot 30 White LED : CCT = D6914 -0.42, TLCI = 50



Sector	Lightness	Chroma	Hue
R	6	6	6
R/Y	2	2	2
Y	6	6	6
Y/G	3	3	3
G	4	4	4
G/C	3	3	3
C	5	5	5
C/B	6	6	6
B	4	4	4
B/M	5	5	5
M	6	6	6
M/R	8	8	8

### 3 Colors

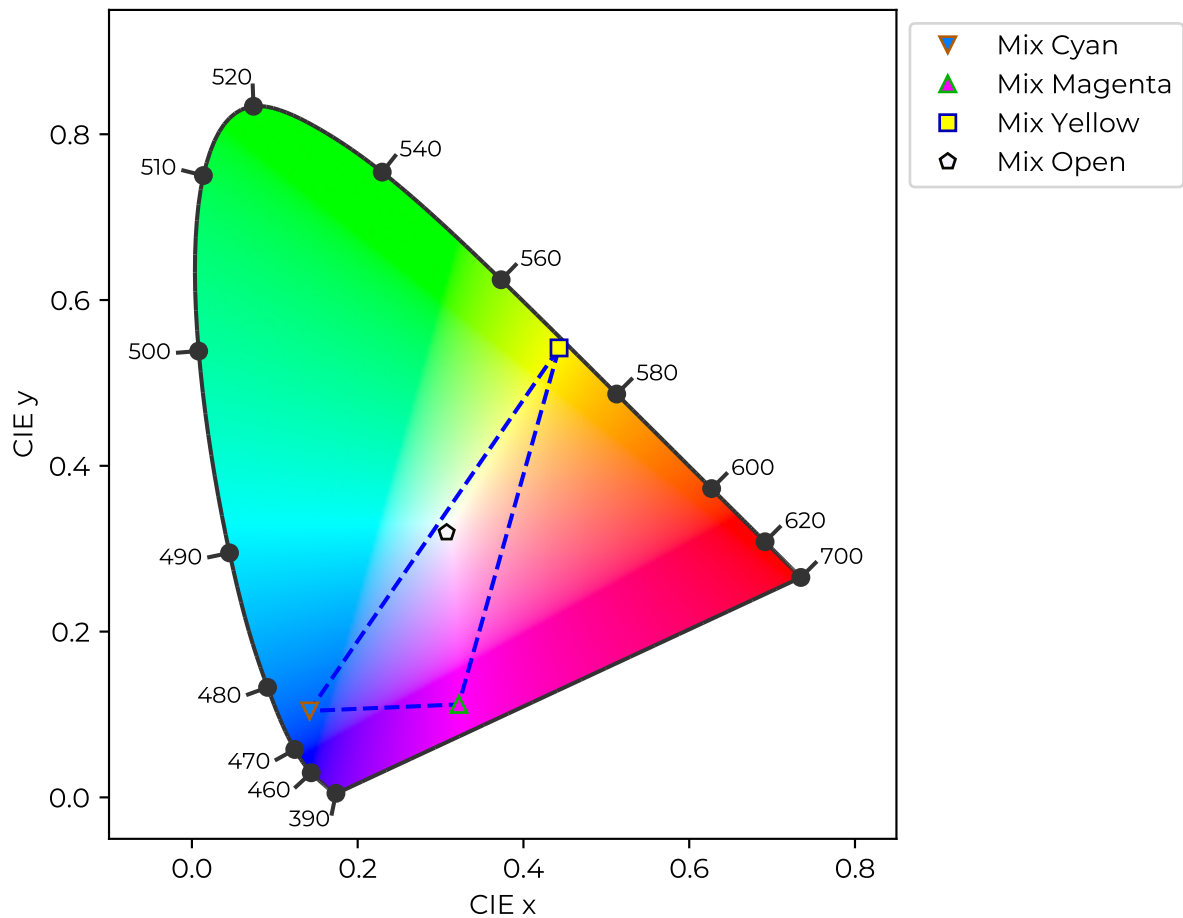






Figure 9: Chromaticity coordinates of device colors in a CIE 1931 chromaticity diagram. Gamut of color mixing system is outlined with dashed lines.

Table 14: Chromaticity coordinates for figure 9, in CIE 1931 xy and CIE 1960 UCS uv coordinates. Color swatches are illustrative only, limited by screen and print color space. Color appearance will be different when used for illumination.

Color	xy	uv
 Mix Cyan	0.142, 0.104	0.143, 0.158
 Mix Magenta	0.322, 0.112	0.348, 0.182
 Mix Yellow	0.443, 0.542	0.206, 0.377
 Mix Open	0.307, 0.32	0.198, 0.308