

## Lightsource Test Report

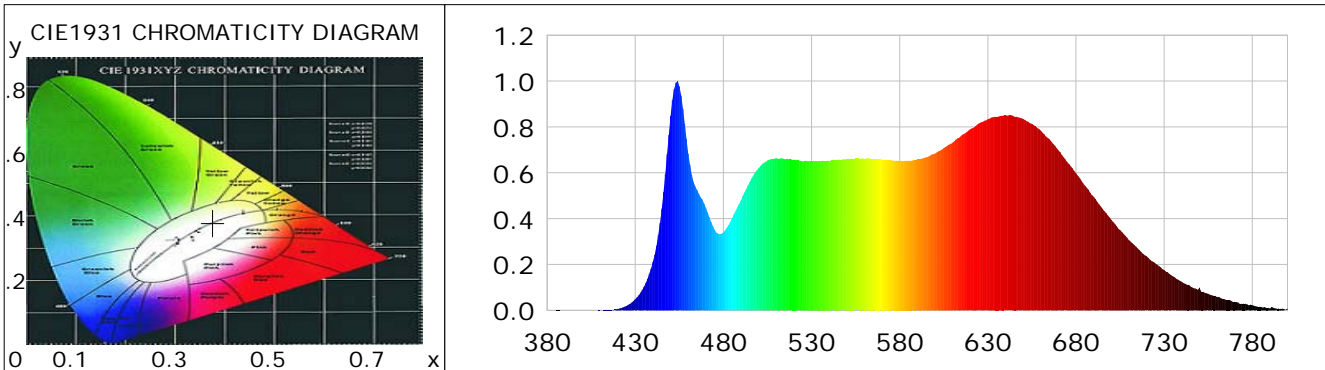
### Product Information

Product Category: LED-Röhre  
 Product Spec: LEDtube-090-8NWM-14W-CRI95  
 Manufacturer: METOLIGHT  
 Buyer: 4624

Product Type: LED-Röhre-Spezial  
 Product Number: 1  
 Submitted Unit: 103503

### CIE Colorimetric Parameters

Chromaticity coordinates:  $x=0.3763$   $y=0.3798$   $u(u')=0.2212$   $v=0.3349$   $v'=0.5023$   
 CCT:  $T_c=4137K$  ( $duv=0.00267$ ) Color Ratio:  $R=0.204$   $G=0.747$   $B=0.049$   
 Peak Wavelength: 453.7nm Half Bandwidth: 20.8nm  
 Dominant Wavelength: 577.1nm Color Purity: 0.269  
 CRI:  $R_a=95.9$ ,  $avgR(1\sim14)=93.4$ ,  $avgR(1\sim15)=93.4$  TM30:  $R_f=91$ ,  $R_g=100$   
 GAI:  $GAI\_BB\_8=97.7$ ,  $GAI\_BB\_15=102.7$ ,  $GAI\_EES=79.1$   
 R1 =95 R2 =98 R3 =98 R4 =96 R5 =96 R6 =97 R7 =95 R8 =92  
 R9 =82 R10=95 R11=93 R12=77 R13=95 R14=98 R15=93  
 Color Quality Scale:  $Q_a=95.0$ ,  $Q_f=94.3$ ,  $Q_p=96.7$ ,  $Q_g=100.6$   
 Q1 =90 Q2 =96 Q3 =97 Q4 =97 Q5 =98 Q6 =97 Q7 =98 Q8 =97  
 Q9 =95 Q10=93 Q11=94 Q12=93 Q13=95 Q14=98 Q15=94



### Photometric Parameters

Luminous Flux: 1465.1 lm Efficiency: 98.73 lm/W Radiant Power: 5.538 W  
 Total mains efficacy: 116.10 lm/W Energy Efficiency Class: E (EU 2019/2015)  
 Pupil Flux: 2458.20 Plm Pupil Lumens Per Watt: 165.65 Plm/W Pupil Factor (Kp): 1.678  
 Circopic Flux: 5287.05 lm

### Electric Parameters

Voltage: 231.00V Current: 0.0640A Power: 14.84W  
 Power Factor: 0.8990 Frequency: 49.99Hz

### Test Information

Scan Range: 380~800:1nm Photometric Method: sphere-spectroradiometer  
 Stabilization Time: 0 ms ALC.: 1.0000 Photometric Condition: Sphere diameter: 2.00m, 4PI  
 Max of Signal: 44562 (2529) CCD Integration Time: 151.90 ms

Condition: Tx:21.4'C, Ti:0.0'C, R.H.:60%  
 Test Lab:  
 Operator: CRE

Test Device: Lisun LMS-9000B  
 Test Time: 2021-02-15  
 Inspector:

## Lightsource Test Report

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| WL(nm) | PL     | PE(mW/nm) | WL(nm) | PL     | PE(mW/nm) | WL(nm) | PL     | PE(mW/nm) |
|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|
| 380    | 0.0006 | 0.0169    | 525    | 0.6488 | 19.5870   | 670    | 0.6987 | 21.0934   |
| 385    | 0.0009 | 0.0260    | 530    | 0.6512 | 19.6580   | 675    | 0.6466 | 19.5215   |
| 390    | 0.0006 | 0.0178    | 535    | 0.6510 | 19.6527   | 680    | 0.5978 | 18.0476   |
| 395    | 0.0001 | 0.0016    | 540    | 0.6524 | 19.6957   | 685    | 0.5440 | 16.4233   |
| 400    | 0.0002 | 0.0071    | 545    | 0.6566 | 19.8208   | 690    | 0.4951 | 14.9462   |
| 405    | 0.0001 | 0.0026    | 550    | 0.6600 | 19.9248   | 695    | 0.4427 | 13.3661   |
| 410    | 0.0008 | 0.0240    | 555    | 0.6620 | 19.9859   | 700    | 0.3953 | 11.9327   |
| 415    | 0.0018 | 0.0532    | 560    | 0.6616 | 19.9719   | 705    | 0.3501 | 10.5684   |
| 420    | 0.0066 | 0.1987    | 565    | 0.6615 | 19.9697   | 710    | 0.3063 | 9.2469    |
| 425    | 0.0193 | 0.5829    | 570    | 0.6572 | 19.8396   | 715    | 0.2703 | 8.1609    |
| 430    | 0.0485 | 1.4631    | 575    | 0.6548 | 19.7688   | 720    | 0.2360 | 7.1239    |
| 435    | 0.1038 | 3.1333    | 580    | 0.6521 | 19.6873   | 725    | 0.2046 | 6.1765    |
| 440    | 0.2110 | 6.3685    | 585    | 0.6525 | 19.6988   | 730    | 0.1764 | 5.3243    |
| 445    | 0.4443 | 13.4127   | 590    | 0.6585 | 19.8792   | 735    | 0.1481 | 4.4702    |
| 450    | 0.8478 | 25.5937   | 595    | 0.6680 | 20.1673   | 740    | 0.1248 | 3.7681    |
| 455    | 0.9780 | 29.5243   | 600    | 0.6841 | 20.6513   | 745    | 0.1035 | 3.1260    |
| 460    | 0.6845 | 20.6643   | 605    | 0.7079 | 21.3719   | 750    | 0.0985 | 2.9741    |
| 465    | 0.5256 | 15.8672   | 610    | 0.7312 | 22.0730   | 755    | 0.0724 | 2.1860    |
| 470    | 0.4481 | 13.5283   | 615    | 0.7621 | 23.0061   | 760    | 0.0576 | 1.7399    |
| 475    | 0.3512 | 10.6028   | 620    | 0.7902 | 23.8545   | 765    | 0.0456 | 1.3758    |
| 480    | 0.3399 | 10.2604   | 625    | 0.8159 | 24.6313   | 770    | 0.0372 | 1.1222    |
| 485    | 0.4029 | 12.1645   | 630    | 0.8339 | 25.1762   | 775    | 0.0287 | 0.8664    |
| 490    | 0.4795 | 14.4743   | 635    | 0.8442 | 25.4852   | 780    | 0.0226 | 0.6836    |
| 495    | 0.5604 | 16.9173   | 640    | 0.8505 | 25.6749   | 785    | 0.0148 | 0.4458    |
| 500    | 0.6205 | 18.7334   | 645    | 0.8449 | 25.5076   | 790    | 0.0078 | 0.2350    |
| 505    | 0.6537 | 19.7362   | 650    | 0.8356 | 25.2260   | 795    | 0.0077 | 0.2322    |
| 510    | 0.6632 | 20.0213   | 655    | 0.8136 | 24.5615   | 800    | 0.0086 | 0.2599    |
| 515    | 0.6588 | 19.8876   | 660    | 0.7845 | 23.6831   |        |        |           |
| 520    | 0.6573 | 19.8441   | 665    | 0.7456 | 22.5085   |        |        |           |

Condition: Tx:21.4'C, Ti:0.0'C, R.H.:60%  
 Test Lab:  
 Operator: CRE

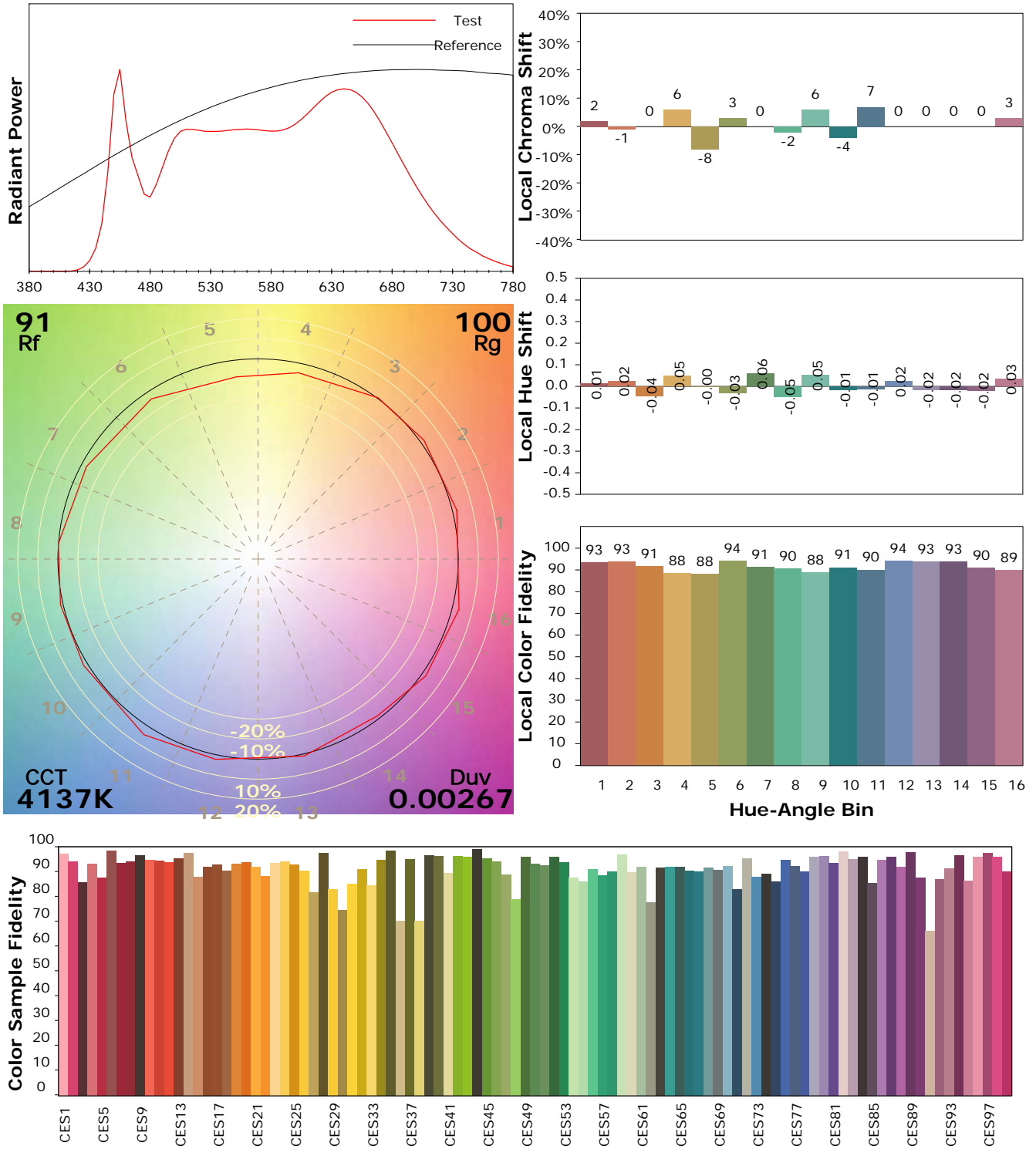
Test Device: Lisun LMS-9000B  
 Test Time: 2021-02-15  
 Inspector:

## IES TM-30-18 Color Rendition Report

### Product Information

Product Category: LED-Röhre  
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 Manufacturer: METOLIGHT  
 Buyer: 4624

Product Type: LED-Röhre-Spezial  
 Product Number: 1  
 Submitted Unit: 103503



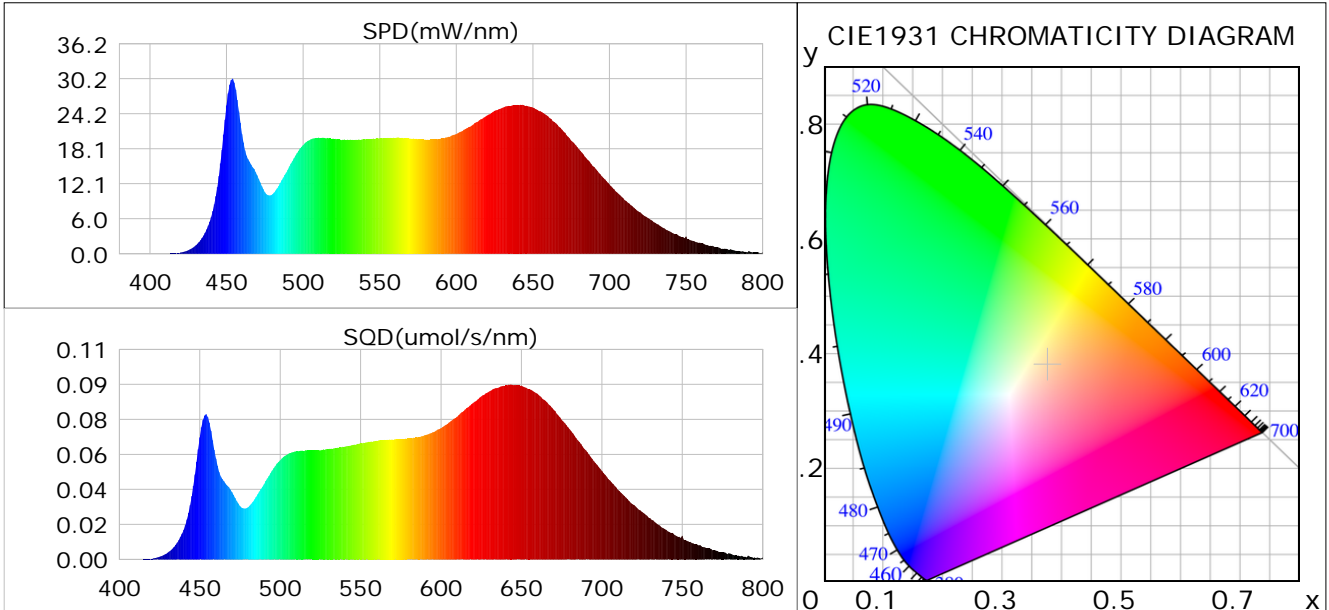
Condition: Tx:21.4°C, Ti:0.0°C, R.H.:60%  
 Test Lab:  
 Operator: CRE

Test Device: Lisun LMS-9000B  
 Test Time: 2021-02-15  
 Inspector:

## Plant optical param data

### CIE Colorimetric Parameters

Chromaticity coordinates:  $x=0.3763$   $y=0.3798$   $u(u')=0.2212$   $v=0.3349$   $v'=0.5023$   
 CCT:  $T_c=4137K$  ( $duv=0.00267$ ) Color Ratio:  $R=0.204$   $G=0.747$   $B=0.049$   
 Peak Wavelength: 453.7nm Half Bandwidth: 20.8nm  
 Dominant Wavelength: 577.1nm Color Purity: 0.269  
 CRI:  $R_a=95.9$



### Plant Optical Param

|                                   |                               |
|-----------------------------------|-------------------------------|
| $ \mu_v(lm): 1465.10$             | $Q_v(lm.s): 1465.10$          |
| $ \mu_e, \dot{E}(W/nm): 5.54$     | $Q_e(J): 5.54$                |
| $ \mu_e(W): 5.17$                 | $ \mu_{fr}(W): 0.38$          |
| $ \zeta_e: 0.35$                  | $ \zeta_{fr}: 0.03$           |
| $PPE(umol/s/w): 1.67$             | $K_{fr}: 0.15$                |
| $Erb\_Ratio: 2.10$                | $PPF(umol/s): 24.83$          |
| $PF_{uv}(360-400)(umol/s): 0.00$  | $PPF(400-500)(umol/s): 4.02$  |
| $PPF(500-600)(umol/s): 9.13$      | $PPF(600-700)(umol/s): 11.67$ |
| $PPF_{fr}(700-800)(umol/s): 2.26$ | $PPF.t(umol): 24.83$          |
| $ \mu_{ch-A.t}(J): 0.44$          | $ \mu_{ch-A}(W): 0.44$        |
| $ \mu_{ch-B.t}(J): 0.24$          | $ \mu_{ch-B}(W): 0.24$        |
| $ \mu_b.t(J): 1.03$               | $ \mu_b(W): 1.03$             |
| $ \mu_y.t(J): 2.00$               | $ \mu_y(W): 2.00$             |
| $ \mu_r.t(J): 2.18$               | $ \mu_r(W): 2.18$             |

### Electric Parameters

|                      |                    |               |
|----------------------|--------------------|---------------|
| Voltage: 231.00V     | Current: 0.0640A   | Power: 14.84W |
| Power Factor: 0.8990 | Frequency: 49.99Hz |               |

Condition:  $T_x: 21.4^\circ C$ ,  $T_i: 0.0^\circ C$ , R.H.: 60%  
 Test Lab:  
 Operator: CRE

Test Device: Lisun LMS-9000B  
 Test Time: 2021-02-15  
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