# LM-79-08 Test Report

For

## GREEN CREATIVE LTD

## (Brand Name: GREEN CREATIVE)

Room 3603, Level 36, Tower 1, Enterprise Square Five, 38 Wang Chiu Road, Kowloon Bay, KL, Hong Kong

## LED Lamps

Model name(s): 9A19DIM/840/R

Test & Report By:

Peter Zhou

Engineer: Peter Zhou
Date: Oct,20,2021

Review By:

Ryan Liang

Manager: Ryan Liang

## 1.1 Product Information:

| | | |
|---|---|---|
| Organization Name | GREEN CREATIVE LTD | |
| Brand Name | GREEN CREATIVE | |
| Model Number | 9A19DIM/840/R | |
| SKU (if available) | N/A | |
| Type of Luminaire<br>(for integral lamps, list base type and lamp type) | LED Lamps | |
| Rated Voltage / Frequency | 120Vac, 60 Hz | |
| Nominal Power | 9W | |
| Rated Initial Lamp Lumen | -- | |
| Declared CCT | 4000K | |
| LED Manufacturer | Bridgelux Inc. | |
| LED Model | BXVN-XXE-13H-9HV | |
| Sample Number | RHL21101804-901 | |
| Lamp Length | -- | mm |
| Lamp Width | -- | mm |
| Number of Units (modular products) | N/A | s |

**Photo**

## 1.2 Test Specifications:

| | |
|---|---|
| Date of Receipt | Oct. 18, 2021 |
| Date of Test | Oct. 18, 2021 |
| Test item | 1. Total Luminous Flux<br>2. Luminous Distribution Intensity<br>3. Luminous Efficacy<br>4. Correlated Color Temperature<br>5. Color Rendering Index<br>6. Chromaticity Coordinate<br>7. Electrical Parameters |
| Reference Standard | 1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products and IES-LM-79-2019 OPTICAL AND ELECTRICAL MEASUREMENTS OF SOLID-STATE LIGHTING PRODUCTS<br>2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products<br>3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources<br>4. CIE 15-2004 Technical Report Colorimetry<br>5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source<br>6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems |
| Reference Work Instruction | HL-WI-EE-001, HL-WI-EE-002 |

## 1.3 Test Methods

| |
|---|
| **1) Photometric and Light Distribution Measurement – Goniophotometer Method:**<br>Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. |
| **2) Chromaticity Measurement – Sphere-Spectroradiometer Method:**<br>Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º C. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm. |
| **3) Electrical Measurements:**<br>Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25º C ± 1º C. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter. |

## 2.1 Electrical, Photometric and Chromaticity Measurements

*(Refer to Work Instruction HL-WI-EE-001, HL-WI-EE-002)*

| Test date | 2021-10-18 | Test Ambient: | 25.1 ° C |
|---|---|---|---|
| Model Number | 9A19DIM/840/R | Stabilization Time (min) | 90 |

### Electrical Measurement:

| Sample No. | Voltage (Vac) | Frequency (Hz ) | Current (A) | Power (W) | Power Factor | THD % |
|---|---|---|---|---|---|---|
| RHL2110 1804-901 | 120.0 | 60 | 0.088 | 8.68 | 0.822 | 67.8 |

### Chromaticity Measurement - Sphere-Spectroradiometer Method:

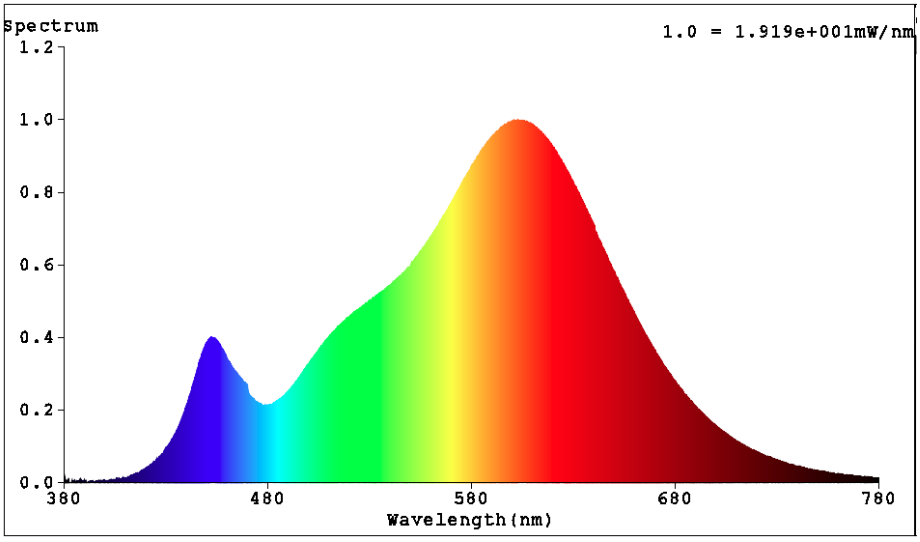
| Parameter | Result |
|---|---|
| Test Voltage (V) | 120.0 |
| Frequency (Hz) | 60 |
| CCT (K) | 4007 |
| Duv | -0.0004 |
| Chromaticity (x, y) | x = 0.3799 y = 0.3760 |
| Chromaticity (u', v') | u' = 0.2251 v' = 0.5012 |
| Color Rendering Index (CRI) | 83.4 |
| R9 | 10 |
| Rf | 85 |
| Rg | 96 |
| Rcs,h1(%) | -12 |

| Special Color Rendering Indices | | | |
|---|---|---|---|
| R1 | 82 | R9 | 10 |
| R2 | 89 | R10 | 75 |
| R3 | 95 | R11 | 81 |
| R4 | 82 | R12 | 66 |
| R5 | 82 | R13 | 84 |
| R6 | 85 | R14 | 97 |
| R7 | 86 | R15 | 76 |
| R8 | 65 | -- | -- |
| -- | -- | -- | -- |
| -- | -- | -- | -- |
| -- | -- | -- | -- |

### Photometric Measurement – Sphere-Spectroradiometer Method:

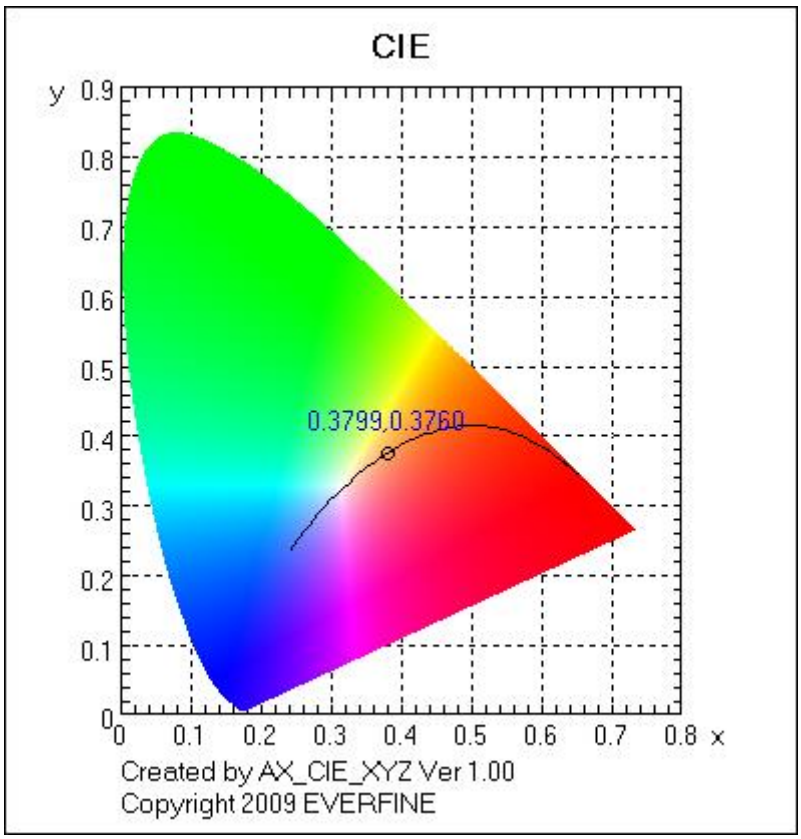
| Parameter | Result |
|---|---|
| Test Voltage (V) | 120.0 |
| Frequency (Hz) | 60 |
| Total Luminous (lm) | 935.18 |
| Luminous Efficacy (lm/W) | 107.74 |

## Relative Spectral Power Distribution

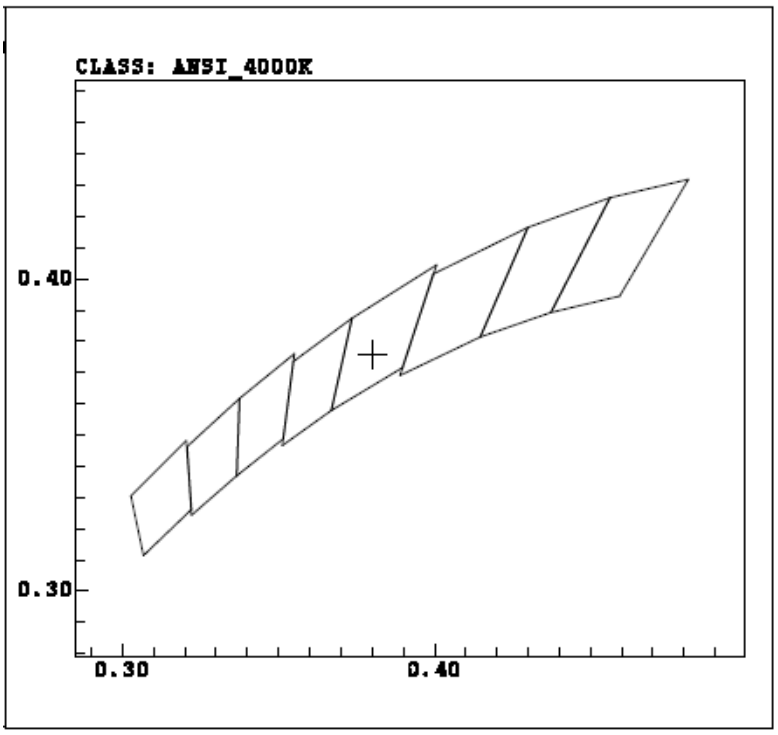



| Spectral Distribution over Visible Wavelength | | | | | | | |
|---|---|---|---|---|---|---|---|
| WL(nm) | Radiant(Watts) | WL(nm) | Radiant(Watts) | WL(nm) | Radiant(Watts) | WL(nm) | Radiant(Watts) |
| 380 | 0.0181 | 485 | 0.3266 | 590 | 0.9945 | 695 | 0.1536 |
| 385 | 0.0144 | 490 | 0.3555 | 595 | 0.9989 | 700 | 0.1327 |
| 390 | 0.0115 | 495 | 0.4088 | 600 | 0.9901 | 705 | 0.1139 |
| 395 | 0.0071 | 500 | 0.4680 | 605 | 0.9769 | 710 | 0.0975 |
| 400 | 0.0163 | 505 | 0.5268 | 610 | 0.9475 | 715 | 0.0829 |
| 405 | 0.0228 | 510 | 0.5781 | 615 | 0.9110 | 720 | 0.0716 |
| 410 | 0.0365 | 515 | 0.6209 | 620 | 0.8622 | 725 | 0.0613 |
| 415 | 0.0634 | 520 | 0.6572 | 625 | 0.8138 | 730 | 0.0529 |
| 420 | 0.1026 | 525 | 0.6852 | 630 | 0.7555 | 735 | 0.0446 |
| 425 | 0.1617 | 530 | 0.7095 | 635 | 0.6978 | 740 | 0.0375 |
| 430 | 0.2517 | 535 | 0.7301 | 640 | 0.6381 | 745 | 0.0319 |
| 435 | 0.3793 | 540 | 0.7531 | 645 | 0.5670 | 750 | 0.0282 |
| 440 | 0.5590 | 545 | 0.7755 | 650 | 0.5135 | 755 | 0.0246 |
| 445 | 0.7717 | 550 | 0.7957 | 655 | 0.4577 | 760 | 0.0210 |
| 450 | 0.9073 | 555 | 0.8211 | 660 | 0.4054 | 765 | 0.0179 |
| 455 | 0.8381 | 560 | 0.8505 | 665 | 0.3579 | 770 | 0.0157 |
| 460 | 0.6835 | 565 | 0.8821 | 670 | 0.3125 | 775 | 0.0135 |
| 465 | 0.5549 | 570 | 0.9108 | 675 | 0.2728 | 780 | 0.0119 |
| 470 | 0.4636 | 575 | 0.9387 | 680 | 0.2370 | | |
| 475 | 0.3475 | 580 | 0.9640 | 685 | 0.2062 | | |
| 480 | 0.3191 | 585 | 0.9824 | 690 | 0.1776 | | |

## CIE 1931xy Chromaticity Diagram




## Chromaticity Quadrangles



## 2.2 Electrical, Photometric and Chromaticity Measurements

*(Refer to Work Instruction HL-WI-EE-001, HL-WI-EE-002)*

| Test date | 2021-10-18 | Test Ambient: | 25.1 ° C |
|---|---|---|---|
| Model Number | 9A19DIM/840/R | Stabilization Time (min) | 90 |

### Electrical Measurement:

| Sample No. | Voltage (Vac) | Frequency (Hz ) | Current (A) | Power (W) | Power Factor | THD % |
|---|---|---|---|---|---|---|
| RHL2110 1804-901 | 120.0 | 60 | 0.090 | 8.93 | 0.828 | 65.23 |

### Photometric Measurement – Goniophotometer Method:

| Parameter | Result |
|---|---|
| Test Voltage (V) | 120.0 |
| Frequency (Hz) | 60 |
| Total Luminous (lm) | 902.2 |
| Luminous Efficacy (lm/W) | 101.03 |
| Beam Angle (°) | 148.1 |
| Center Beam Candle Power (cd) | 170 |

## Zonal Lumen Tabulation

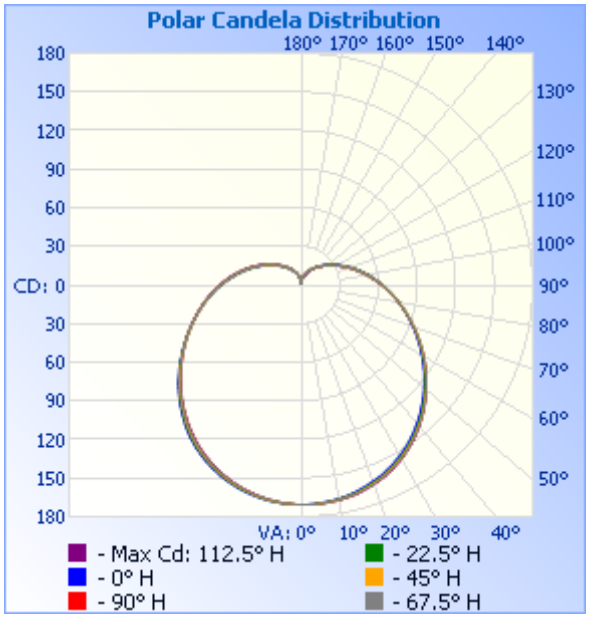
**Zonal Lumen Summary**

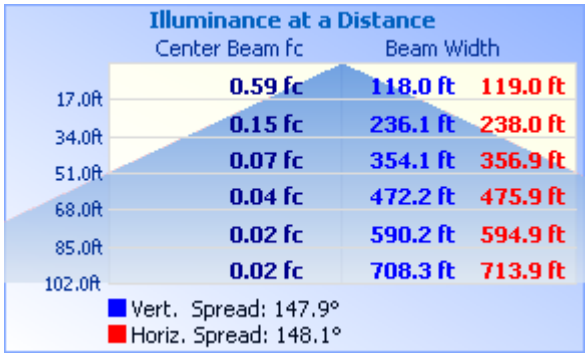
| Zone | Lumens | % Lamp | % Luminaire |
|---|---|---|---|
| 0-30 | 136.4 | 15.1% | 15.1% |
| 0-40 | 228.6 | 25.3% | 25.3% |
| 0-60 | 435.0 | 48.2% | 48.2% |
| 60-90 | 263.3 | 29.2% | 29.2% |
| 70-100 | 226.4 | 25.1% | 25.1% |
| 90-120 | 145.1 | 16.1% | 16.1% |
| 0-90 | 698.3 | 77.4% | 77.4% |
| 90-180 | 204.0 | 22.6% | 22.6% |
| 0-180 | 902.3 | 100% | 100% |

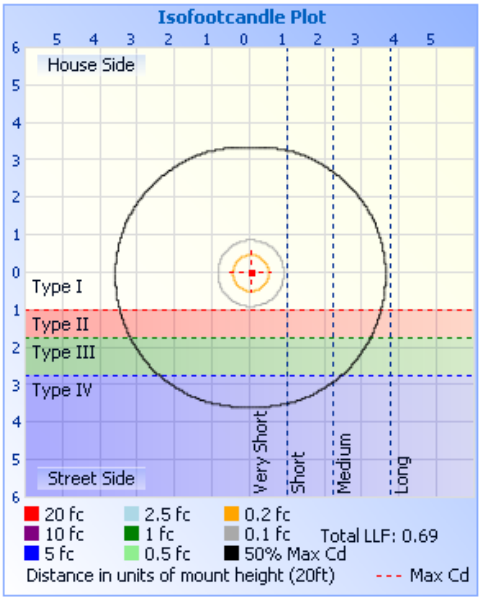
**Lumens Per Zone**

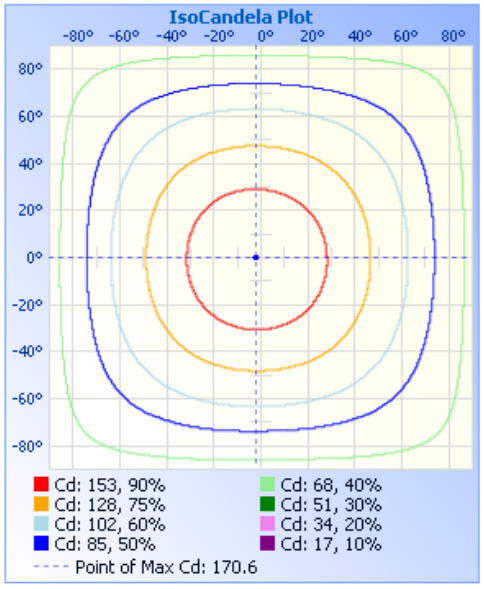
| Zone | Lumens | % Total | Zone | Lumens | % Total |
|---|---|---|---|---|---|
| 0-10 | 16.2 | 1.8% | 90-100 | 61.8 | 6.9% |
| 10-20 | 47.0 | 5.2% | 100-110 | 48.0 | 5.3% |
| 20-30 | 73.2 | 8.1% | 110-120 | 35.3 | 3.9% |
| 30-40 | 92.2 | 10.2% | 120-130 | 24.7 | 2.7% |
| 40-50 | 102.4 | 11.3% | 130-140 | 16.3 | 1.8% |
| 50-60 | 104.0 | 11.5% | 140-150 | 10.0 | 1.1% |
| 60-70 | 98.7 | 10.9% | 150-160 | 5.3 | 0.6% |
| 70-80 | 88.7 | 9.8% | 160-170 | 2.2 | 0.2% |
| 80-90 | 75.9 | 8.4% | 170-180 | 0.4 | 0% |

## Photometric Data



**Candela Table - Type C**

| | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 | 360 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| 1 | 170 | 170 | **171** | **171** | **171** | **171** | 170 | 170 | **171** | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| 2 | 170 | 170 | **171** | **171** | **171** | **171** | **171** | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| 3 | 170 | 170 | **171** | **171** | **171** | **171** | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| 4 | 170 | 170 | 170 | **171** | 170 | **171** | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| 5 | 170 | 170 | 170 | 170 | 170 | **171** | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| 6 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 169 | 169 | 169 | 169 | 169 | 170 |
| 7 | 169 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 169 | 169 | 169 | 169 | 169 | 169 | 169 | 169 |
| 8 | 169 | 169 | 170 | 170 | 170 | 170 | 170 | 170 | 169 | 169 | 169 | 169 | 169 | 169 | 169 | 169 | 169 |
| 9 | 169 | 169 | 169 | 170 | 170 | 170 | 170 | 169 | 169 | 169 | 169 | 168 | 168 | 168 | 168 | 168 | 169 |
| 10 | 168 | 169 | 169 | 169 | 169 | 170 | 169 | 169 | 169 | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 168 |
| 11 | 168 | 168 | 169 | 169 | 169 | 169 | 169 | 169 | 168 | 168 | 168 | 167 | 167 | 167 | 167 | 168 | 168 |
| 12 | 168 | 168 | 168 | 169 | 169 | 169 | 169 | 168 | 168 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 168 |
| 13 | 167 | 168 | 168 | 168 | 169 | 168 | 168 | 168 | 167 | 167 | 167 | 166 | 166 | 166 | 166 | 166 | 167 |
| 14 | 166 | 167 | 168 | 168 | 168 | 168 | 168 | 167 | 167 | 166 | 166 | 166 | 165 | 166 | 166 | 166 | 166 |
| 15 | 166 | 166 | 167 | 167 | 168 | 168 | 167 | 167 | 166 | 166 | 165 | 165 | 165 | 165 | 165 | 165 | 166 |
| 16 | 165 | 166 | 167 | 167 | 167 | 167 | 167 | 166 | 166 | 165 | 165 | 164 | 164 | 164 | 164 | 165 | 165 |
| 17 | 164 | 165 | 166 | 166 | 167 | 167 | 166 | 165 | 165 | 165 | 164 | 164 | 163 | 163 | 164 | 164 | 164 |
| 18 | 164 | 165 | 165 | 166 | 166 | 166 | 166 | 165 | 165 | 164 | 164 | 163 | 163 | 163 | 163 | 163 | 164 |
| 19 | 163 | 164 | 165 | 165 | 165 | 165 | 165 | 164 | 164 | 163 | 163 | 162 | 162 | 162 | 162 | 162 | 163 |
| 20 | 162 | 163 | 164 | 165 | 165 | 165 | 164 | 164 | 163 | 163 | 162 | 161 | 161 | 161 | 161 | 162 | 162 |
| 21 | 162 | 162 | 163 | 164 | 164 | 164 | 164 | 163 | 162 | 162 | 161 | 160 | 160 | 160 | 160 | 161 | 162 |
| 22 | 161 | 162 | 163 | 163 | 163 | 163 | 163 | 162 | 162 | 161 | 160 | 160 | 159 | 159 | 160 | 160 | 161 |
| 23 | 160 | 161 | 162 | 162 | 162 | 163 | 162 | 161 | 161 | 160 | 159 | 159 | 158 | 158 | 159 | 159 | 160 |
| 24 | 159 | 160 | 161 | 161 | 162 | 162 | 161 | 160 | 160 | 159 | 158 | 158 | 157 | 157 | 158 | 158 | 159 |
| 25 | 158 | 159 | 160 | 161 | 161 | 161 | 160 | 160 | 159 | 158 | 157 | 157 | 156 | 156 | 157 | 157 | 158 |
| 26 | 157 | 158 | 159 | 160 | 160 | 160 | 159 | 159 | 158 | 157 | 156 | 156 | 155 | 156 | 156 | 156 | 157 |
| 27 | 156 | 157 | 158 | 159 | 159 | 159 | 158 | 158 | 157 | 156 | 156 | 155 | 154 | 154 | 155 | 155 | 156 |
| 28 | 155 | 156 | 157 | 158 | 158 | 158 | 157 | 157 | 156 | 155 | 154 | 154 | 153 | 153 | 154 | 154 | 155 |
| 29 | 154 | 155 | 156 | 157 | 157 | 157 | 156 | 156 | 155 | 154 | 153 | 153 | 152 | 152 | 152 | 153 | 154 |
| 30 | 153 | 154 | 155 | 156 | 156 | 156 | 155 | 155 | 154 | 153 | 152 | 151 | 151 | 151 | 151 | 152 | 153 |
| 31 | 152 | 153 | 154 | 154 | 155 | 155 | 154 | 153 | 153 | 152 | 151 | 150 | 150 | 150 | 150 | 151 | 152 |
| 32 | 151 | 152 | 153 | 153 | 154 | 153 | 153 | 152 | 152 | 151 | 150 | 149 | 149 | 149 | 149 | 150 | 151 |
| 33 | 149 | 151 | 151 | 152 | 152 | 152 | 152 | 151 | 150 | 149 | 149 | 148 | 147 | 147 | 148 | 148 | 149 |
| 34 | 148 | 149 | 150 | 151 | 151 | 151 | 150 | 150 | 149 | 148 | 147 | 146 | 146 | 146 | 146 | 147 | 148 |
| 35 | 147 | 148 | 149 | 150 | 150 | 150 | 149 | 148 | 148 | 147 | 146 | 145 | 145 | 145 | 145 | 146 | 147 |
| 36 | 146 | 147 | 148 | 148 | 148 | 148 | 148 | 147 | 146 | 146 | 145 | 144 | 143 | 143 | 144 | 145 | 146 |
| 37 | 144 | 145 | 146 | 147 | 147 | 147 | 146 | 146 | 145 | 144 | 143 | 142 | 142 | 142 | 142 | 143 | 144 |
| 38 | 143 | 144 | 145 | 145 | 146 | 145 | 145 | 144 | 144 | 143 | 142 | 141 | 140 | 141 | 141 | 142 | 143 |
| 39 | 141 | 143 | 144 | 144 | 144 | 144 | 143 | 143 | 142 | 141 | 140 | 140 | 139 | 139 | 140 | 140 | 141 |
| 40 | 140 | 141 | 142 | 143 | 143 | 143 | 142 | 141 | 141 | 140 | 139 | 138 | 138 | 138 | 138 | 139 | 140 |
| 41 | 139 | 140 | 141 | 141 | 141 | 141 | 140 | 140 | 139 | 138 | 137 | 136 | 136 | 136 | 137 | 138 | 139 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 137 | 138 | 139 | 140 | 140 | 139 | 139 | 138 | 137 | 136 | 136 | 135 | 134 | 135 | 135 | 136 | 137 |
| 43 | 135 | 137 | 138 | 138 | 138 | 138 | 137 | 137 | 136 | 135 | 134 | 133 | 133 | 133 | 134 | 135 | 135 |
| 44 | 134 | 135 | 136 | 137 | 137 | 136 | 136 | 135 | 134 | 133 | 133 | 132 | 131 | 132 | 132 | 133 | 134 |
| 45 | 132 | 134 | 135 | 135 | 135 | 135 | 134 | 133 | 133 | 132 | 131 | 130 | 130 | 130 | 131 | 131 | 132 |
| 46 | 131 | 132 | 133 | 133 | 133 | 133 | 132 | 132 | 131 | 130 | 129 | 129 | 128 | 129 | 129 | 130 | 131 |
| 47 | 129 | 130 | 131 | 132 | 132 | 131 | 131 | 130 | 129 | 129 | 128 | 127 | 127 | 127 | 127 | 128 | 129 |
| 48 | 128 | 129 | 130 | 130 | 130 | 130 | 129 | 129 | 128 | 127 | 126 | 126 | 125 | 126 | 126 | 127 | 128 |
| 49 | 126 | 127 | 128 | 128 | 128 | 128 | 127 | 127 | 126 | 125 | 125 | 124 | 124 | 124 | 124 | 125 | 126 |
| 50 | 124 | 126 | 127 | 127 | 127 | 126 | 126 | 125 | 124 | 124 | 123 | 122 | 122 | 123 | 123 | 124 | 124 |
| 51 | 123 | 124 | 125 | 125 | 125 | 125 | 124 | 123 | 123 | 122 | 121 | 121 | 120 | 121 | 121 | 122 | 123 |
| 52 | 121 | 122 | 123 | 124 | 123 | 123 | 122 | 122 | 121 | 120 | 120 | 119 | 119 | 119 | 120 | 120 | 121 |
| 53 | 120 | 121 | 122 | 122 | 122 | 121 | 121 | 120 | 119 | 119 | 118 | 117 | 117 | 118 | 118 | 119 | 120 |
| 54 | 118 | 119 | 120 | 120 | 120 | 120 | 119 | 118 | 117 | 117 | 116 | 116 | 116 | 116 | 116 | 117 | 118 |
| 55 | 116 | 117 | 118 | 118 | 118 | 118 | 117 | 116 | 116 | 115 | 115 | 114 | 114 | 114 | 115 | 115 | 116 |
| 56 | 115 | 116 | 116 | 117 | 117 | 116 | 115 | 115 | 114 | 113 | 113 | 112 | 112 | 113 | 113 | 114 | 115 |
| 57 | 113 | 114 | 115 | 115 | 115 | 115 | 114 | 113 | 112 | 112 | 111 | 111 | 111 | 111 | 112 | 112 | 113 |
| 58 | 111 | 112 | 113 | 113 | 113 | 113 | 112 | 111 | 110 | 110 | 109 | 109 | 109 | 110 | 110 | 111 | 111 |
| 59 | 110 | 111 | 111 | 112 | 111 | 111 | 110 | 110 | 109 | 108 | 108 | 108 | 107 | 108 | 108 | 109 | 110 |
| 60 | 108 | 109 | 110 | 110 | 110 | 109 | 109 | 108 | 107 | 107 | 106 | 106 | 106 | 106 | 107 | 107 | 108 |
| 61 | 106 | 107 | 108 | 108 | 108 | 108 | 107 | 106 | 105 | 105 | 105 | 104 | 104 | 105 | 105 | 106 | 106 |
| 62 | 105 | 106 | 106 | 106 | 106 | 106 | 105 | 105 | 104 | 103 | 103 | 103 | 103 | 103 | 103 | 104 | 105 |
| 63 | 103 | 104 | 105 | 105 | 104 | 104 | 103 | 103 | 102 | 102 | 101 | 101 | 101 | 102 | 102 | 102 | 103 |
| 64 | 102 | 102 | 103 | 103 | 103 | 103 | 102 | 101 | 100 | 100 | 100 | 100 | 99 | 100 | 100 | 101 | 102 |
| 65 | 100 | 101 | 101 | 101 | 101 | 101 | 100 | 100 | 99 | 98 | 98 | 98 | 98 | 99 | 99 | 99 | 100 |
| 66 | 98 | 99 | 100 | 100 | 99 | 99 | 98 | 98 | 97 | 97 | 97 | 96 | 96 | 97 | 97 | 98 | 98 |
| 67 | 97 | 97 | 98 | 98 | 98 | 98 | 97 | 96 | 95 | 95 | 95 | 95 | 95 | 95 | 96 | 96 | 97 |
| 68 | 95 | 96 | 96 | 96 | 96 | 96 | 95 | 95 | 94 | 94 | 93 | 93 | 93 | 94 | 94 | 94 | 95 |
| 69 | 94 | 94 | 95 | 95 | 94 | 94 | 93 | 93 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 93 | 94 |
| 70 | 92 | 93 | 93 | 93 | 93 | 92 | 92 | 91 | 91 | 90 | 90 | 90 | 90 | 91 | 91 | 91 | 92 |
| 71 | 90 | 91 | 91 | 91 | 91 | 91 | 90 | 90 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 90 | 90 |
| 72 | 89 | 89 | 90 | 90 | 89 | 89 | 89 | 88 | 87 | 87 | 87 | 87 | 87 | 88 | 88 | 88 | 89 |
| 73 | 87 | 88 | 88 | 88 | 88 | 88 | 87 | 87 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 87 | 87 |
| 74 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 85 | 84 | 84 | 84 | 84 | 84 | 85 | 85 | 85 | 86 |
| 75 | 84 | 85 | 85 | 85 | 85 | 84 | 84 | 84 | 83 | 83 | 83 | 83 | 83 | 83 | 83 | 84 | 84 |
| 76 | 83 | 83 | 83 | 83 | 83 | 83 | 82 | 82 | 81 | 81 | 81 | 82 | 82 | 82 | 82 | 82 | 83 |
| 77 | 81 | 82 | 82 | 82 | 81 | 81 | 81 | 81 | 80 | 80 | 80 | 80 | 80 | 81 | 81 | 81 | 81 |
| 78 | 80 | 80 | 80 | 80 | 80 | 80 | 79 | 79 | 78 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 80 |
| 79 | 78 | 79 | 79 | 79 | 78 | 78 | 78 | 78 | 77 | 77 | 77 | 77 | 77 | 78 | 78 | 78 | 78 |
| 80 | 77 | 77 | 77 | 77 | 77 | 77 | 76 | 76 | 76 | 76 | 76 | 76 | 76 | 77 | 76 | 76 | 77 |
| 81 | 76 | 76 | 76 | 76 | 75 | 75 | 75 | 75 | 74 | 74 | 74 | 75 | 75 | 75 | 75 | 75 | 76 |
| 82 | 74 | 74 | 74 | 74 | 74 | 74 | 73 | 73 | 73 | 73 | 73 | 73 | 74 | 74 | 74 | 74 | 74 |
| 83 | 73 | 73 | 73 | 72 | 72 | 72 | 72 | 72 | 71 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 73 |
| 84 | 71 | 72 | 71 | 71 | 71 | 71 | 71 | 71 | 70 | 70 | 70 | 71 | 71 | 71 | 71 | 71 | 71 |
| 85 | 70 | 70 | 70 | 70 | 70 | 70 | 69 | 69 | 69 | 69 | 69 | 69 | 70 | 70 | 70 | 70 | 70 |
| 86 | 69 | 69 | 69 | 68 | 68 | 68 | 68 | 68 | 67 | 68 | 68 | 68 | 68 | 69 | 68 | 68 | 69 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | 67 | 67 | 67 | 67 | 67 | 67 | 67 | 67 | 66 | 66 | 67 | 67 | 67 | 67 | 67 | 67 | 67 |
| 88 | 66 | 66 | 66 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 66 | 66 | 66 | 66 | 66 | 66 |
| 89 | 65 | 65 | 64 | 64 | 64 | 64 | 64 | 64 | 63 | 64 | 64 | 64 | 65 | 65 | 65 | 64 | 65 |
| 90 | 64 | 63 | 63 | 63 | 63 | 63 | 62 | 62 | 62 | 62 | 63 | 63 | 63 | 64 | 63 | 63 | 64 |
| 91 | 62 | 62 | 62 | 61 | 61 | 61 | 61 | 61 | 61 | 61 | 61 | 62 | 62 | 62 | 62 | 62 | 62 |
| 92 | 61 | 61 | 60 | 60 | 60 | 60 | 60 | 60 | 59 | 60 | 60 | 60 | 61 | 61 | 61 | 61 | 61 |
| 93 | 60 | 59 | 59 | 59 | 58 | 59 | 59 | 58 | 58 | 58 | 59 | 59 | 60 | 60 | 60 | 59 | 60 |
| 94 | 58 | 58 | 58 | 57 | 57 | 57 | 57 | 57 | 57 | 57 | 58 | 58 | 58 | 59 | 58 | 58 | 58 |
| 95 | 57 | 57 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 57 | 57 | 57 | 57 | 57 | 57 |
| 96 | 56 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 55 | 55 | 56 | 56 | 56 | 56 | 56 | 56 |
| 97 | 55 | 54 | 54 | 54 | 54 | 54 | 54 | 54 | 53 | 54 | 54 | 55 | 55 | 55 | 55 | 55 | 55 |
| 98 | 54 | 53 | 53 | 52 | 52 | 52 | 52 | 52 | 52 | 53 | 53 | 53 | 54 | 54 | 54 | 53 | 54 |
| 99 | 52 | 52 | 52 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 52 | 52 | 53 | 53 | 53 | 52 | 52 |
| 100 | 51 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 51 | 51 | 51 | 52 | 52 | 51 | 51 |
| 101 | 50 | 50 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 50 | 50 | 50 | 51 | 50 | 50 | 50 |
| 102 | 49 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 49 | 49 | 49 | 50 | 49 | 49 | 49 |
| 103 | 48 | 48 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 48 | 48 | 48 | 48 | 48 | 48 |
| 104 | 47 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 47 | 47 | 47 | 47 | 47 | 47 |
| 105 | 46 | 45 | 45 | 45 | 44 | 44 | 44 | 45 | 45 | 45 | 45 | 46 | 46 | 46 | 46 | 46 | 46 |
| 106 | 45 | 44 | 44 | 44 | 43 | 43 | 43 | 44 | 44 | 44 | 44 | 45 | 45 | 45 | 45 | 45 | 45 |
| 107 | 44 | 43 | 43 | 42 | 42 | 42 | 42 | 43 | 43 | 43 | 43 | 44 | 44 | 44 | 44 | 44 | 44 |
| 108 | 43 | 42 | 42 | 41 | 41 | 41 | 41 | 42 | 42 | 42 | 42 | 43 | 43 | 43 | 43 | 43 | 43 |
| 109 | 42 | 41 | 41 | 40 | 40 | 40 | 40 | 41 | 41 | 41 | 41 | 42 | 42 | 42 | 42 | 42 | 42 |
| 110 | 41 | 40 | 40 | 39 | 39 | 39 | 39 | 40 | 40 | 40 | 40 | 41 | 41 | 41 | 41 | 41 | 41 |
| 111 | 40 | 39 | 39 | 38 | 38 | 38 | 38 | 39 | 39 | 39 | 39 | 40 | 40 | 40 | 40 | 40 | 40 |
| 112 | 39 | 38 | 38 | 37 | 37 | 37 | 37 | 38 | 38 | 38 | 38 | 39 | 39 | 39 | 39 | 39 | 39 |
| 113 | 38 | 37 | 37 | 37 | 36 | 36 | 37 | 37 | 37 | 37 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| 114 | 37 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| 115 | 36 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 116 | 35 | 35 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 35 | 35 | 35 | 36 | 35 | 35 | 35 |
| 117 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 34 | 34 | 34 | 35 | 35 | 35 | 34 | 34 |
| 118 | 33 | 33 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 34 | 34 | 34 | 33 | 33 |
| 119 | 32 | 32 | 32 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 33 | 32 |
| 120 | 32 | 31 | 31 | 31 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 32 | 32 |
| 121 | 31 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| 122 | 30 | 30 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| 123 | 29 | 29 | 29 | 28 | 28 | 28 | 28 | 28 | 28 | 29 | 29 | 29 | 30 | 30 | 30 | 29 | 29 |
| 124 | 29 | 28 | 28 | 27 | 27 | 27 | 28 | 28 | 28 | 28 | 28 | 29 | 29 | 29 | 29 | 29 | 29 |
| 125 | 28 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 126 | 27 | 27 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 |
| 127 | 26 | 26 | 26 | 25 | 25 | 25 | 25 | 26 | 26 | 26 | 26 | 26 | 27 | 27 | 27 | 26 | 26 |
| 128 | 26 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 26 | 26 | 26 | 26 | 26 | 26 |
| 129 | 25 | 25 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| 130 | 24 | 24 | 24 | 23 | 23 | 23 | 23 | 24 | 23 | 24 | 24 | 24 | 25 | 25 | 25 | 24 | 24 |
| 131 | 24 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 24 | 24 | 24 | 24 | 24 | 24 |

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| 132 | 23 | 23 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| 133 | 23 | 22 | 22 | 22 | 21 | 21 | 22 | 22 | 22 | 22 | 22 | 22 | 23 | 23 | 23 | 23 | 23 |
| 134 | 22 | 22 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 135 | 21 | 21 | 21 | 20 | 20 | 20 | 20 | 21 | 20 | 21 | 21 | 21 | 21 | 22 | 22 | 21 | 21 |
| 136 | 21 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 21 | 21 | 21 | 21 | 21 | 21 |
| 137 | 20 | 20 | 20 | 19 | 19 | 19 | 19 | 19 | 19 | 20 | 20 | 20 | 20 | 21 | 20 | 20 | 20 |
| 138 | 20 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 20 | 20 | 20 | 20 | 20 | 20 |
| 139 | 19 | 19 | 19 | 18 | 18 | 18 | 18 | 18 | 18 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| 140 | 19 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 19 | 19 | 19 | 19 | 19 | 19 |
| 141 | 18 | 18 | 18 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| 142 | 18 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 18 | 18 | 18 | 18 | 18 | 18 |
| 143 | 17 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |
| 144 | 17 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 17 | 17 | 17 | 17 |
| 145 | 16 | 16 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 146 | 16 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 16 |
| 147 | 15 | 15 | 15 | 14 | 14 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 15 |
| 148 | 15 | 15 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 149 | 14 | 14 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | 14 | 14 | 14 | 14 | 15 | 14 | 14 | 14 |
| 150 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 151 | 14 | 13 | 13 | 13 | 12 | 12 | 12 | 12 | 13 | 13 | 13 | 13 | 14 | 14 | 14 | 14 | 14 |
| 152 | 13 | 13 | 13 | 12 | 12 | 11 | 12 | 12 | 12 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| 153 | 13 | 12 | 12 | 12 | 12 | 11 | 11 | 12 | 12 | 12 | 12 | 13 | 13 | 13 | 13 | 13 | 13 |
| 154 | 12 | 12 | 12 | 12 | 11 | 10 | 10 | 11 | 11 | 12 | 12 | 12 | 12 | 13 | 12 | 12 | 12 |
| 155 | 12 | 12 | 12 | 11 | 11 | 10 | 9 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 156 | 12 | 11 | 11 | 11 | 10 | 9 | 8 | 10 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 |
| 157 | 11 | 11 | 11 | 11 | 10 | 9 | 7 | 10 | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| 158 | 11 | 11 | 10 | 10 | 10 | 8 | 7 | 10 | 10 | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| 159 | 11 | 10 | 10 | 10 | 9 | 8 | 7 | 9 | 9 | 10 | 10 | 10 | 10 | 11 | 11 | 10 | 11 |
| 160 | 10 | 10 | 10 | 10 | 9 | 8 | 7 | 9 | 9 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 161 | 10 | 10 | 9 | 9 | 9 | 8 | 7 | 8 | 9 | 9 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 162 | 9 | 9 | 9 | 9 | 8 | 8 | 7 | 8 | 8 | 9 | 9 | 9 | 9 | 10 | 9 | 9 | 9 |
| 163 | 9 | 9 | 9 | 8 | 8 | 7 | 7 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| 164 | 9 | 9 | 8 | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 |
| 165 | 8 | 8 | 8 | 8 | 7 | 7 | 6 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 166 | 8 | 8 | 8 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 167 | 8 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 7 | 8 |
| 168 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 169 | 7 | 7 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 |
| 170 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 171 | 6 | 6 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 172 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 173 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 |
| 174 | 4 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| 175 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 |
| 176 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 1 |

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| 177 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 178 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 179 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 180 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## 3. Test Equipment

| Equipment Name | Model No. | Serial No. | Next Calibration Date |
|---|---|---|---|
| Goniophotometeric System | GPM-3000 | 91N827816 | 2022-09-26 |
| AC Power Source | CHP-1000 | 213630 | 2022-09-19 |
| Total Luminous Flux Standard Lamp | 24V150W | 24V150W | 2022-08-10 |
| Digital Power Meter | WT500 | TBS1012 C020506 | 2022-09-19 |
| Integral Sphere (2M) | 2m sphere | N.A | N/A |
| Digital Power Meter | PF310A | P609877CD1391157 | 2022-04-02 |
| Optical Color and Electrical Measurement System | HAAS-2000 | M108544CM5351115 | 2022-09-26 |
| Expand Uncertainty:<br>Photometric Measurement (Sphere): 2.08%, k=2<br>Chromaticity Measurement(Sphere):25.6K, k=2<br>Photometric Measurement(Goniophotometer):2.645%, k=2 | | | |

******** END OF REPORT ********