HERCULUX 恒坤光电 Chengdu HercuLux Photoelectric Technology Co.,Ltd

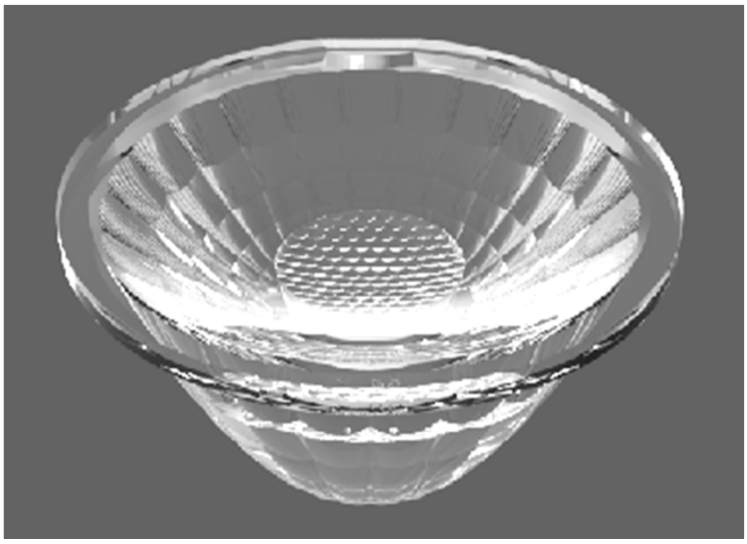
# Product Approval

Approval number :

Customer :

Manufacturer：Chengdu HercuLux Photoelectric Technology Co.,Ltd

| PN | Code | Product |
|---|---|---|
| HK-44@20-15-D9-20-1g-1 | 1.01.5423 | NM-44@20-15° Lens |
| HK-44@20-24-D9-20-1g-1 | 1.01.5413 | NM-44@20-24° Lens |
| HK-44@20-36-D9-20-1g-1 | 1.01.4357 | NM-44@20-36° Lens |
| HK-44@20-60-D9-20-1g-1 | 1.01.4358 | NM-44@20-60° Lens |



| Supplier confirmation | | | | Client confirmation | | | |
|---|---|---|---|---|---|---|---|
| Proposed | | DATE | | Qualified☐ | | DATE | |
| Project manager | | DATE | | Unqualified☐ | | | |
| Audit | | DATE | | Audit | | DATE | |
| Approved | | DATE | | Approved | | DATE | |
| Stamp | | DATE | | Stamp | | DATE | |

( Confirmation of acceptance by both parties must be signed and sealed )

Factory: Chengdu Shuangliu District, Iot industrial park 2 road HercuLux Photoelectric Park
Phone： 028-85887727 ( 801 ) 028-85887990 ( 801 ) Fax： 028-85887730 www.hkoptics.com
Sales Dept: Shenzhen Nanshan District Nanshan Cloud Valley Innovation Industrial Park Comprehensive Service Building,
TEL: 0755-2937 1541 FAX: 0755-2907 5140

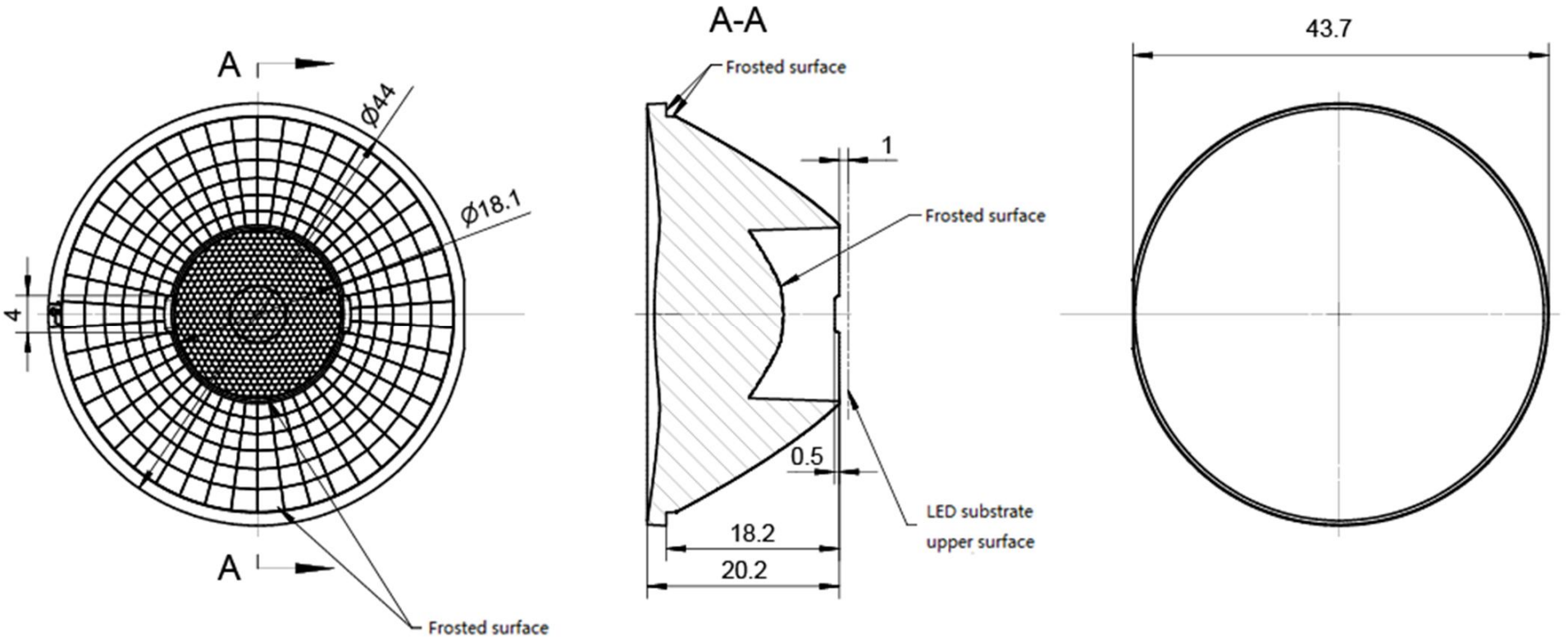
*Approval In duplicate， for both supplier and customer.

HERCULUX 恒坤光电

# Product Approval

TEL: 0755-2937 1541 FAX: 0755-2907 5140 www.hkoptics.com Date updated: 2019/4/9

| | |
|---|---|
| Product Picture: |  |
| PN: | HK-44@20-15-D9-20-1g-1 |
| Size(L*W*H/Φ*H): | Φ:44mm; H:20.2mm |
| 1.07.81418_HK-166@03-0223-S | PC |
| Effiency: | \ |
| Temperature(Topr): | -40℃ to +120℃ |
| FWHM: | 15°/24°/36°/60° |
| Matched LES: | D9 |

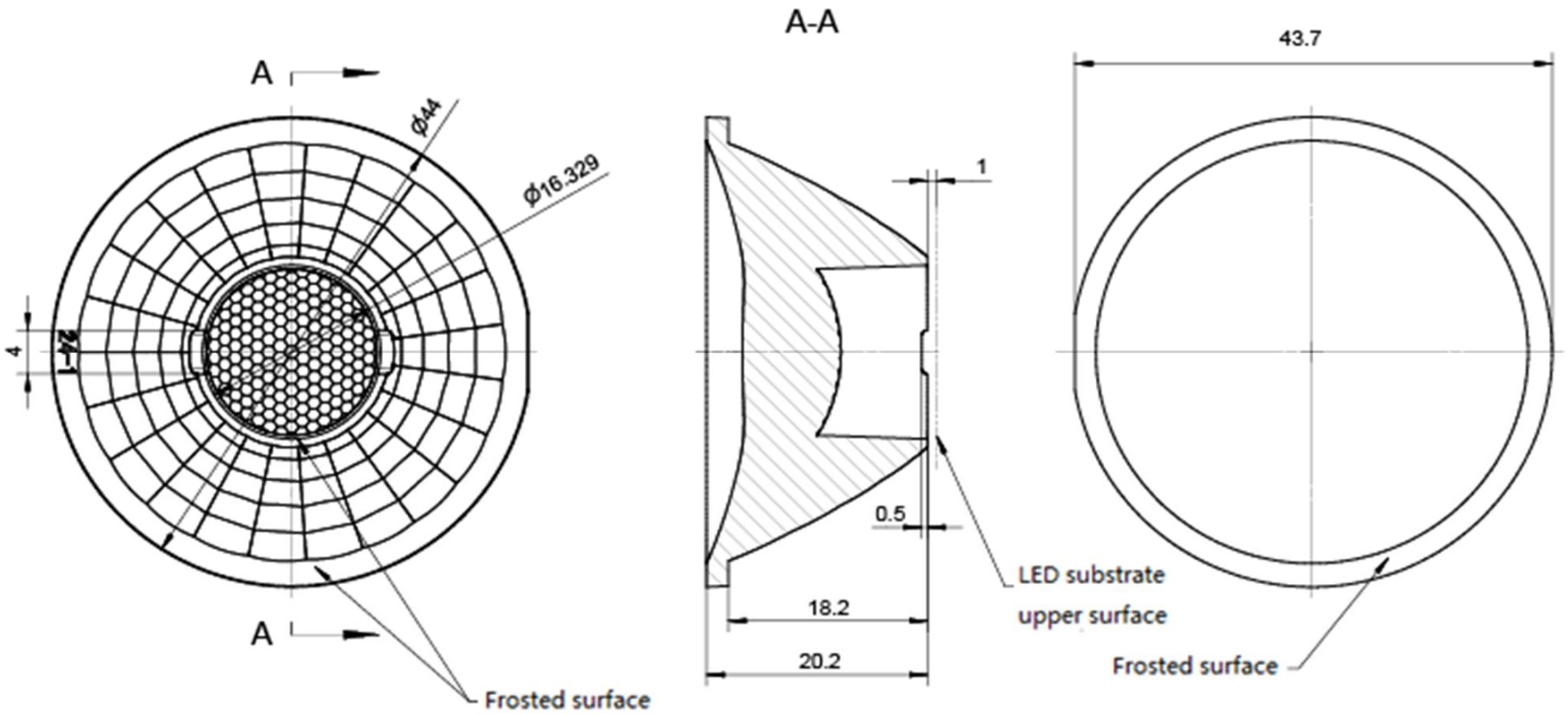



**Technical remark:**

1. The 3D map is not indicated for rounded corners and draft angle.
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.
3, The surface has no flash, shrinkage, bubbles and other defects.

| | | | | | |
|---|---|---|---|---|---|
| Optical design | | | NM-44@20-15°Lens | HK-44@20-15-D9-20-1g-1 | |
| Structure desig | | | | 1.01.5423 | |
| Review | | | | umber of drawin | qty / weight |
| Validation | | | Material: | PC | CDHK |

| MT5 Tolerance table（mm） | Basic size | ＜3 | 3～10 | 24～65 | 65～140 | 140～250 | 250～450 | ＞450 |
|---|---|---|---|---|---|---|---|---|
| | olerance valu | ±0.1 | ±0.15 | ±0.35 | ±0.50 | ±0.80 | ±1.2 | ±2.0 |

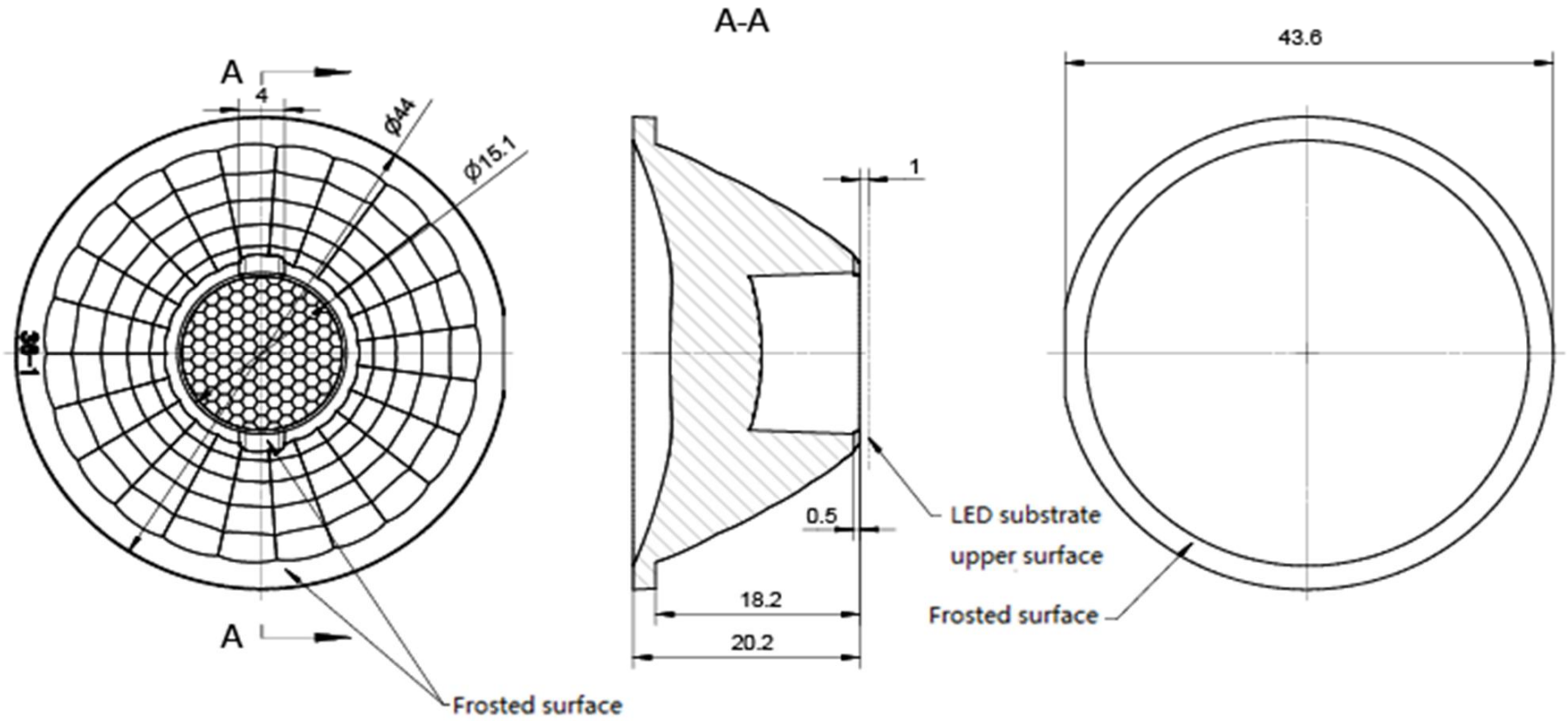



**Technical remark:**

1. The 3D map is not indicated for rounded corners and draft angle.
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.
3, The surface has no flash, shrinkage, bubbles and other defects.

| | | | | | |
|---|---|---|---|---|---|
| Optical design | | | NM-44@20-24°Lens | HK-44@20-24-D9-20-1g-1 | |
| Structure desig | | | | 1.01.5413 | |
| Review | | | | umber of drawin | qty / weight |
| Validation | | | Material： | PC | CDHK |

| MT5 Tolerance table（mm） | Basic size | ＜3 | 3～10 | 24～65 | 65～140 | 140～250 | 250～450 | ＞450 |
|---|---|---|---|---|---|---|---|---|
| | olerance valu | ±0.1 | ±0.15 | ±0.35 | ±0.50 | ±0.80 | ±1.2 | ±2.0 |

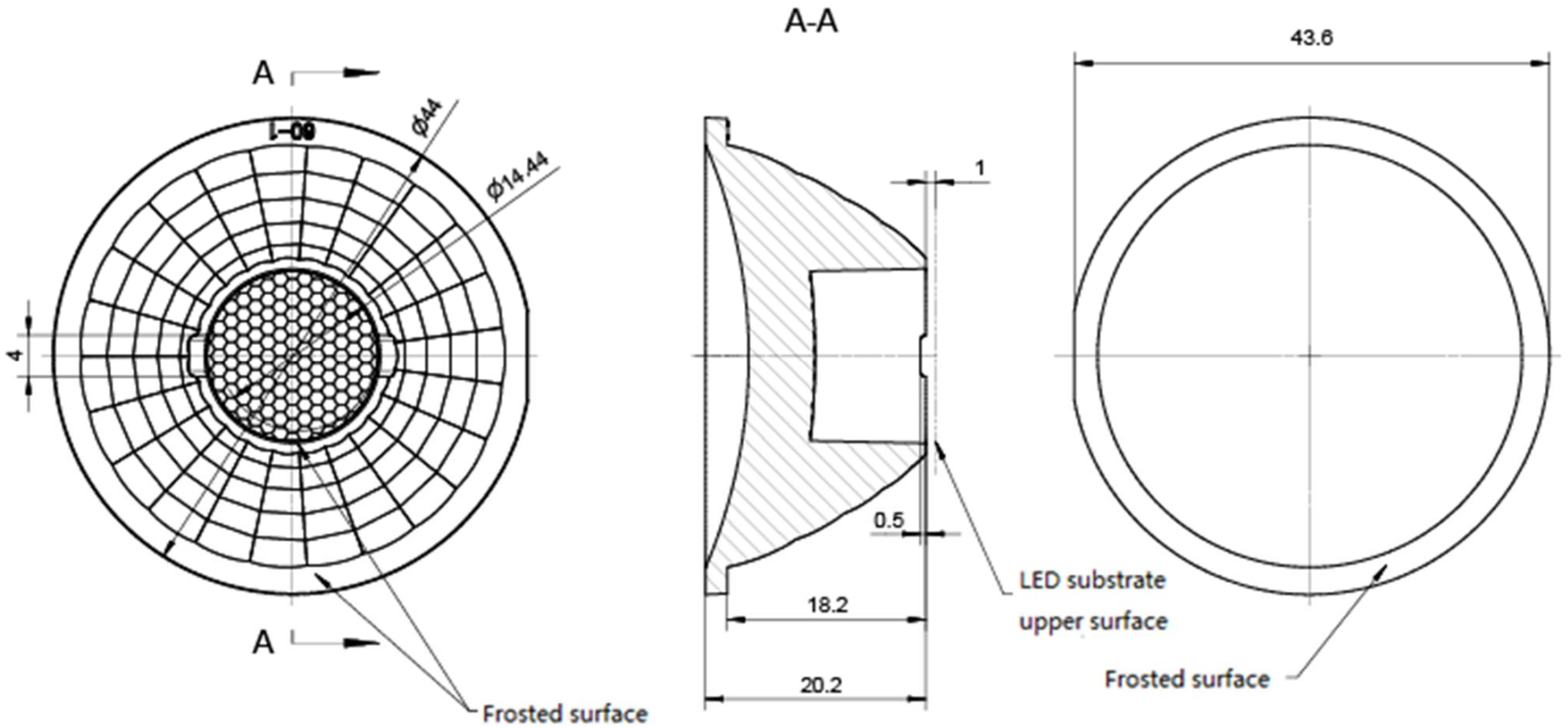



**Technical remark:**

1. The 3D map is not indicated for rounded corners and draft angle.
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.
3, The surface has no flash, shrinkage, bubbles and other defects.

| | | | | | |
|---|---|---|---|---|---|
| Optical design | | | NM-44@20-36°Lens | HK-44@20-36-D9-20-1g-1 | |
| Structure desig | | | | 1.01.4357 | |
| Review | | | | umber of drawin | qty / weight |
| Validation | | | Material: | PC | CDHK |

| MT5 Tolerance table（mm） | Basic size | ＜3 | 3～10 | 24～65 | 65～140 | 140～250 | 250～450 | ＞450 |
|---|---|---|---|---|---|---|---|---|
| | olerance valu | ±0.1 | ±0.15 | ±0.35 | ±0.50 | ±0.80 | ±1.2 | ±2.0 |

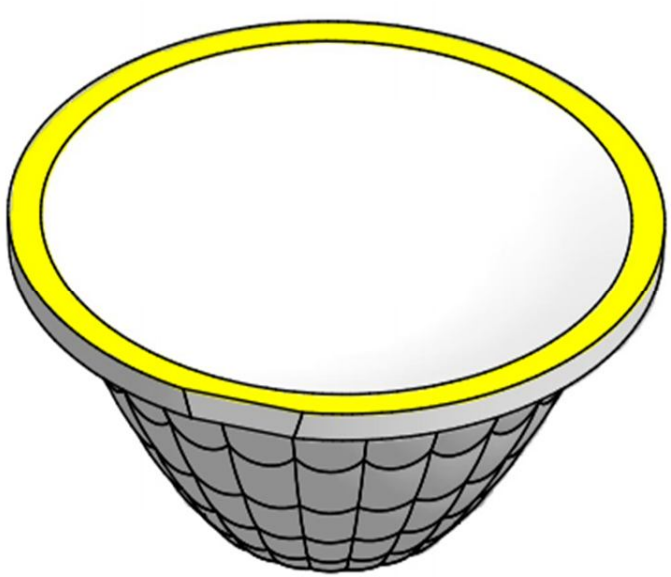


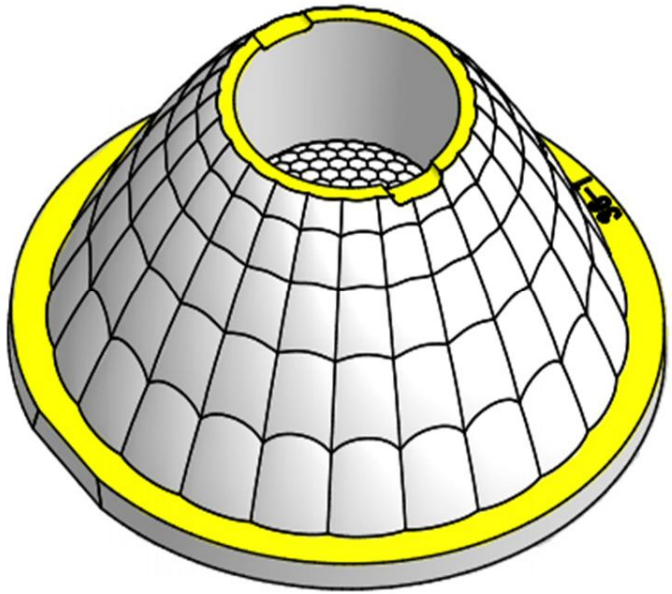

**Technical remark:**

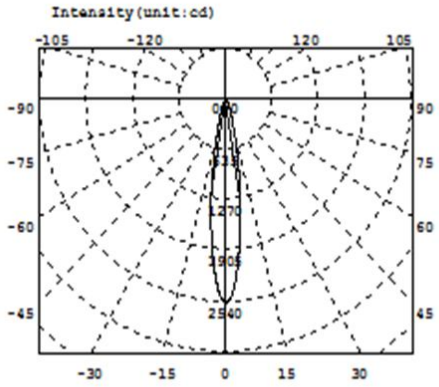
1. The 3D map is not indicated for rounded corners and draft angle.
2. The dimensional tolerances are not specified according to GB/T 14486 2008 MT5.
3, The surface has no flash, shrinkage, bubbles and other defects.

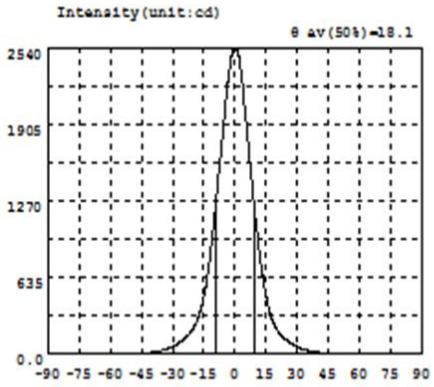
| | | | | | |
|---|---|---|---|---|---|
| Optical design | | | NM-44@20-60°Lens | HK-44@20-60-D9-20-1g-1 | |
| Structure desig | | | | 1.01.4358 | |
| Review | | | | umber of drawin | qty / weight |
| Validation | | | Material： | PC | CDHK |

| MT5 Tolerance table（mm） | Basic size | ＜3 | 3～10 | 24～65 | 65～140 | 140～250 | 250～450 | ＞450 |
|---|---|---|---|---|---|---|---|---|
| | olerance valu | ±0.1 | ±0.15 | ±0.35 | ±0.50 | ±0.80 | ±1.2 | ±2.0 |








Intensity data:(deg , cd)　C0-180

| A | I | A | I | A | I | A | I | A | I | A | I |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -90.0 | 0.2930 | -58.5 | 3.708 | -27.0 | 93.79 | 4.5 | 2079 | 36.0 | 27.58 | 67.5 | 2.297 |
| -88.5 | 0.3569 | -57.0 | 3.923 | -25.5 | 111.9 | 6.0 | 1810 | 37.5 | 22.34 | 69.0 | 2.132 |
| -87.0 | 0.4208 | -55.5 | 4.195 | -24.0 | 132.9 | 7.5 | 1538 | 39.0 | 18.06 | 70.5 | 2.009 |
| -85.5 | 0.4583 | -54.0 | 4.517 | -22.5 | 158.1 | 9.0 | 1275 | 40.5 | 14.71 | 72.0 | 1.836 |
| -84.0 | 0.4713 | -52.5 | 4.905 | -21.0 | 190.2 | 10.5 | 1030 | 42.0 | 12.09 | 73.5 | 1.633 |
| -82.5 | 0.5096 | -51.0 | 5.392 | -19.5 | 229.7 | 12.0 | 812.6 | 43.5 | 10.07 | 75.0 | 1.425 |
| -81.0 | 0.5339 | -49.5 | 6.010 | -18.0 | 286.1 | 13.5 | 627.2 | 45.0 | 8.504 | 76.5 | 1.148 |
| -79.5 | 0.5250 | -48.0 | 6.797 | -16.5 | 367.1 | 15.0 | 480.0 | 46.5 | 7.279 | 78.0 | 0.9467 |
| -78.0 | 0.5771 | -46.5 | 7.803 | -15.0 | 478.1 | 16.5 | 362.1 | 48.0 | 6.404 | 79.5 | 0.9879 |
| -76.5 | 0.8876 | -45.0 | 9.140 | -13.5 | 627.7 | 18.0 | 282.7 | 49.5 | 5.656 | 81.0 | 1.013 |
| -75.0 | 1.252 | -43.5 | 10.82 | -12.0 | 815.8 | 19.5 | 226.4 | 51.0 | 5.105 | 82.5 | 1.082 |
| -73.5 | 1.486 | -42.0 | 12.95 | -10.5 | 1041 | 21.0 | 185.3 | 52.5 | 4.686 | 84.0 | 1.146 |
| -72.0 | 1.703 | -40.5 | 15.69 | -9.0 | 1291 | 22.5 | 154.3 | 54.0 | 4.352 | 85.5 | 1.235 |
| -70.5 | 1.929 | -39.0 | 19.17 | -7.5 | 1550 | 24.0 | 129.8 | 55.5 | 4.043 | 87.0 | 1.285 |
| -69.0 | 2.080 | -37.5 | 23.44 | -6.0 | 1812 | 25.5 | 108.9 | 57.0 | 3.835 | 88.5 | 1.336 |
| -67.5 | 2.196 | -36.0 | 28.68 | -4.5 | 2079 | 27.0 | 90.99 | 58.5 | 3.602 | 90.0 | 1.363 |
| -66.0 | 2.400 | -34.5 | 35.24 | -3.0 | 2321 | 28.5 | 75.34 | 60.0 | 3.417 | | |
| -64.5 | 2.828 | -33.0 | 43.08 | -1.5 | 2482 | 30.0 | 62.29 | 61.5 | 3.209 | | |
| -63.0 | 3.045 | -31.5 | 52.53 | 0.0 | 2537 | 31.5 | 51.13 | 63.0 | 2.976 | | |
| -61.5 | 3.270 | -30.0 | 63.83 | 1.5 | 2489 | 33.0 | 41.77 | 64.5 | 2.764 | | |
| -60.0 | 3.474 | -28.5 | 77.85 | 3.0 | 2323 | 34.5 | 34.01 | 66.0 | 2.414 | | |

## Electricity Parameter:

Current I:　0.1000A　　Power:　3.660W

Voltage V:　36.59V　　PF:　1.000

## Optical Parameter(Distance=2.559m):

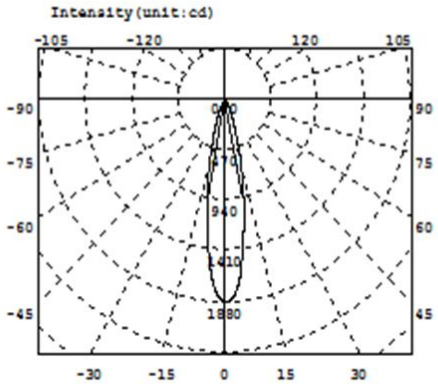
Equivalent Luminous flux: Φ eff= 393.7lm　　Efficiency: Eff=107.58lm/W

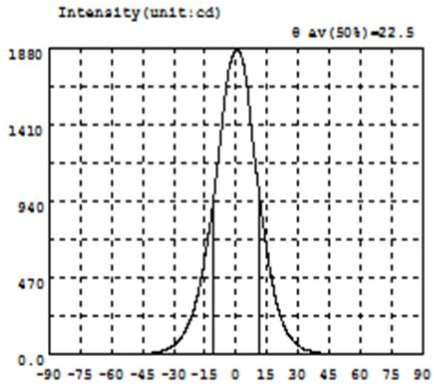
Diffuse angle:　@(25%): 26.8deg @(50%): 18.1deg @(75%): 10.8deg @(50%): 18.1deg

Diffuse angle:　@(25%): 26.8deg @(50%): 18.1deg @(75%): 10.8deg @(50%): 18.1deg

Imax=2537cd (C=0.0deg,G=0.0deg)　　C0-180Plane Imax= 2537cd(G=0.0deg)

C0-180Plane I0= 2537cd




Intensity data:(deg , cd)　C0-180

| A | I | A | I | A | I | A | I | A | I | A | I |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -90.0 | 0.3057 | -58.5 | 5.334 | -27.0 | 98.02 | 4.5 | 1715 | 36.0 | 21.76 | 67.5 | 3.611 |
| -88.5 | 0.3442 | -57.0 | 5.498 | -25.5 | 125.2 | 6.0 | 1563 | 37.5 | 17.50 | 69.0 | 3.200 |
| -87.0 | 0.4333 | -55.5 | 5.624 | -24.0 | 159.4 | 7.5 | 1374 | 39.0 | 14.13 | 70.5 | 2.768 |
| -85.5 | 0.4849 | -54.0 | 5.726 | -22.5 | 200.9 | 9.0 | 1204 | 40.5 | 11.62 | 72.0 | 2.370 |
| -84.0 | 0.5609 | -52.5 | 5.843 | -21.0 | 251.0 | 10.5 | 1046 | 42.0 | 9.845 | 73.5 | 1.948 |
| -82.5 | 0.6502 | -51.0 | 5.971 | -19.5 | 315.4 | 12.0 | 896.9 | 43.5 | 8.585 | 75.0 | 1.540 |
| -81.0 | 0.7139 | -49.5 | 6.153 | -18.0 | 393.9 | 13.5 | 755.7 | 45.0 | 7.678 | 76.5 | 1.199 |
| -79.5 | 0.7905 | -48.0 | 6.380 | -16.5 | 489.0 | 15.0 | 626.5 | 46.5 | 6.990 | 78.0 | 1.084 |
| -78.0 | 0.8423 | -46.5 | 6.759 | -15.0 | 596.5 | 16.5 | 512.1 | 48.0 | 6.536 | 79.5 | 1.070 |
| -76.5 | 0.9759 | -45.0 | 7.351 | -13.5 | 715.8 | 18.0 | 408.1 | 49.5 | 6.268 | 81.0 | 1.033 |
| -75.0 | 1.386 | -43.5 | 8.210 | -12.0 | 848.3 | 19.5 | 317.4 | 51.0 | 6.074 | 82.5 | 0.9988 |
| -73.5 | 1.810 | -42.0 | 9.412 | -10.5 | 993.6 | 21.0 | 249.4 | 52.5 | 5.894 | 84.0 | 0.9953 |
| -72.0 | 2.258 | -40.5 | 11.10 | -9.0 | 1149 | 22.5 | 195.4 | 54.0 | 5.781 | 85.5 | 1.004 |
| -70.5 | 2.715 | -39.0 | 13.52 | -7.5 | 1320 | 24.0 | 153.5 | 55.5 | 5.679 | 87.0 | 1.017 |
| -69.0 | 3.137 | -37.5 | 16.86 | -6.0 | 1505 | 25.5 | 119.8 | 57.0 | 5.615 | 88.5 | 1.055 |
| -67.5 | 3.593 | -36.0 | 21.29 | -4.5 | 1664 | 27.0 | 93.74 | 58.5 | 5.439 | 90.0 | 1.057 |
| -66.0 | 3.962 | -34.5 | 27.22 | -3.0 | 1775 | 28.5 | 73.13 | 60.0 | 5.219 | | |
| -64.5 | 4.291 | -33.0 | 35.08 | -1.5 | 1837 | 30.0 | 56.95 | 61.5 | 4.856 | | |
| -63.0 | 4.559 | -31.5 | 45.54 | 0.0 | 1872 | 31.5 | 44.34 | 63.0 | 4.603 | | |
| -61.5 | 4.800 | -30.0 | 58.99 | 1.5 | 1862 | 33.0 | 34.71 | 64.5 | 4.325 | | |
| -60.0 | 5.156 | -28.5 | 76.34 | 3.0 | 1811 | 34.5 | 27.35 | 66.0 | 3.996 | | |

## Electricity Parameter:

Current I:　0.1000A　　Power:　3.380W

Voltage V:　33.79V　　PF:　1.000

## Optical Parameter(Distance=2.559m):

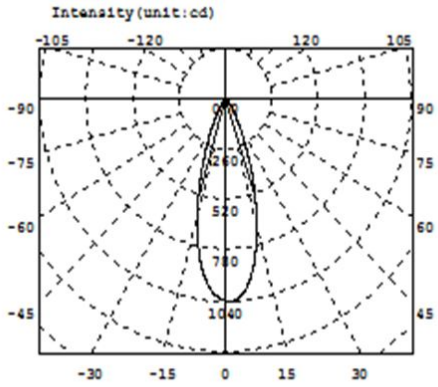
Equivalent Luminous flux: Φ eff= 404.4lm　Efficiency: Eff=119.66lm/W

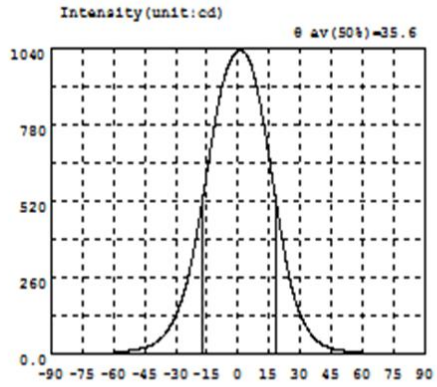
Diffuse angle:　@(25%): 33.9deg @(50%): 22.5deg @(75%): 14.0deg @(50%): 22.5deg

Diffuse angle:　@(25%): 33.9deg @(50%): 22.6deg @(75%): 14.0deg @(50%): 22.6deg

Imax=1873cd (C=0.0deg,G=0.5deg)　C0-180Plane Imax= 1873cd(G=0.5deg)

C0-180Plane I0= 1872cd




Intensity data:(deg , cd)　C0-180

| A | I | A | I | A | I | A | I | A | I | A | I |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -90.0 | 0.2147 | -58.5 | 7.226 | -27.0 | 189.1 | 4.5 | 1011 | 36.0 | 61.29 | 67.5 | 3.404 |
| -88.5 | 0.2600 | -57.0 | 8.450 | -25.5 | 223.9 | 6.0 | 987.8 | 37.5 | 50.23 | 69.0 | 2.983 |
| -87.0 | 0.3508 | -55.5 | 9.536 | -24.0 | 264.7 | 7.5 | 952.2 | 39.0 | 41.37 | 70.5 | 2.555 |
| -85.5 | 0.4414 | -54.0 | 10.99 | -22.5 | 313.0 | 9.0 | 907.8 | 40.5 | 34.43 | 72.0 | 2.158 |
| -84.0 | 0.5324 | -52.5 | 12.67 | -21.0 | 365.7 | 10.5 | 856.1 | 42.0 | 28.92 | 73.5 | 1.807 |
| -82.5 | 0.6440 | -51.0 | 14.33 | -19.5 | 424.0 | 12.0 | 797.9 | 43.5 | 24.49 | 75.0 | 1.477 |
| -81.0 | 0.6794 | -49.5 | 16.28 | -18.0 | 486.8 | 13.5 | 733.2 | 45.0 | 21.11 | 76.5 | 1.201 |
| -79.5 | 0.7909 | -48.0 | 18.49 | -16.5 | 551.8 | 15.0 | 665.3 | 46.5 | 18.40 | 78.0 | 1.067 |
| -78.0 | 0.8368 | -46.5 | 20.98 | -15.0 | 618.0 | 16.5 | 596.3 | 48.0 | 16.15 | 79.5 | 0.9898 |
| -76.5 | 0.9393 | -45.0 | 23.91 | -13.5 | 685.3 | 18.0 | 529.8 | 49.5 | 14.25 | 81.0 | 0.9814 |
| -75.0 | 1.103 | -43.5 | 27.53 | -12.0 | 751.3 | 19.5 | 463.5 | 51.0 | 12.63 | 82.5 | 0.9069 |
| -73.5 | 1.410 | -42.0 | 31.88 | -10.5 | 813.1 | 21.0 | 400.9 | 52.5 | 11.22 | 84.0 | 0.8714 |
| -72.0 | 1.739 | -40.5 | 37.46 | -9.0 | 867.9 | 22.5 | 339.3 | 54.0 | 9.947 | 85.5 | 0.8149 |
| -70.5 | 2.138 | -39.0 | 44.20 | -7.5 | 914.6 | 24.0 | 283.0 | 55.5 | 8.802 | 87.0 | 0.7696 |
| -69.0 | 2.568 | -37.5 | 52.61 | -6.0 | 953.5 | 25.5 | 236.8 | 57.0 | 7.797 | 88.5 | 0.7356 |
| -67.5 | 3.021 | -36.0 | 63.07 | -4.5 | 983.9 | 27.0 | 196.5 | 58.5 | 6.933 | 90.0 | 0.7005 |
| -66.0 | 3.520 | -34.5 | 76.25 | -3.0 | 1006 | 28.5 | 162.6 | 60.0 | 6.145 | | |
| -64.5 | 4.005 | -33.0 | 92.22 | -1.5 | 1021 | 30.0 | 134.7 | 61.5 | 5.483 | | |
| -63.0 | 4.618 | -31.5 | 110.9 | 0.0 | 1030 | 31.5 | 111.0 | 63.0 | 4.891 | | |
| -61.5 | 5.595 | -30.0 | 132.9 | 1.5 | 1032 | 33.0 | 91.25 | 64.5 | 4.282 | | |
| -60.0 | 6.317 | -28.5 | 159.3 | 3.0 | 1026 | 34.5 | 74.82 | 66.0 | 3.823 | | |

## Electricity Parameter:

Current I:　0.1000A　　Power:　3.230W

Voltage V:　32.29V　　PF:　1.000

## Optical Parameter(Distance=2.410m):

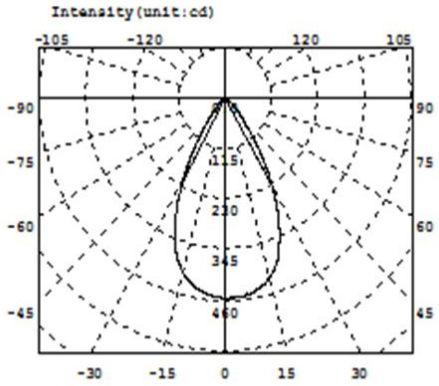
Equivalent Luminous flux: Φ eff= 459.2lm　Efficiency: Eff=142.19lm/W

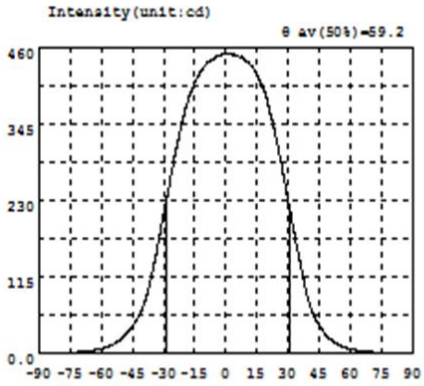
Diffuse angle:　@(25%): 48.9deg @(50%): 35.6deg @(75%): 23.9deg @(50%): 35.6deg

Diffuse angle:　@(25%): 49.0deg @(50%): 35.6deg @(75%): 24.0deg @(50%): 35.6deg

Imax=1032cd (C=0.0deg,G=1.0deg)　C0-180Plane Imax= 1032cd(G=1.0deg)

C0-180Plane I0= 1030cd




Intensity data:(deg , cd) C0-180

| A | I | A | I | A | I | A | I | A | I | A | I |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -90.0 | 0.3185 | -58.5 | 9.405 | -27.0 | 258.1 | 4.5 | 448.3 | 36.0 | 131.3 | 67.5 | 3.731 |
| -88.5 | 0.4465 | -57.0 | 10.99 | -25.5 | 282.5 | 6.0 | 447.6 | 37.5 | 108.5 | 69.0 | 3.289 |
| -87.0 | 0.7020 | -55.5 | 12.73 | -24.0 | 307.9 | 7.5 | 446.1 | 39.0 | 88.22 | 70.5 | 2.845 |
| -85.5 | 0.9438 | -54.0 | 15.02 | -22.5 | 327.2 | 9.0 | 442.6 | 40.5 | 72.24 | 72.0 | 2.459 |
| -84.0 | 1.097 | -52.5 | 17.73 | -21.0 | 349.3 | 10.5 | 438.2 | 42.0 | 59.76 | 73.5 | 2.127 |
| -82.5 | 1.250 | -51.0 | 21.08 | -19.5 | 367.6 | 12.0 | 432.3 | 43.5 | 50.03 | 75.0 | 1.902 |
| -81.0 | 1.390 | -49.5 | 24.96 | -18.0 | 382.1 | 13.5 | 426.1 | 45.0 | 42.04 | 76.5 | 1.753 |
| -79.5 | 1.518 | -48.0 | 29.94 | -16.5 | 394.9 | 15.0 | 417.6 | 46.5 | 35.21 | 78.0 | 1.615 |
| -78.0 | 1.658 | -46.5 | 35.20 | -15.0 | 407.0 | 16.5 | 407.9 | 48.0 | 29.12 | 79.5 | 1.541 |
| -76.5 | 1.812 | -45.0 | 41.01 | -13.5 | 415.5 | 18.0 | 397.7 | 49.5 | 24.12 | 81.0 | 1.450 |
| -75.0 | 2.028 | -43.5 | 48.29 | -12.0 | 424.1 | 19.5 | 384.8 | 51.0 | 20.08 | 82.5 | 1.364 |
| -73.5 | 2.312 | -42.0 | 56.64 | -10.5 | 431.0 | 21.0 | 364.8 | 52.5 | 16.54 | 84.0 | 1.273 |
| -72.0 | 2.620 | -40.5 | 66.66 | -9.0 | 436.3 | 22.5 | 345.8 | 54.0 | 13.97 | 85.5 | 1.165 |
| -70.5 | 3.002 | -39.0 | 78.95 | -7.5 | 439.6 | 24.0 | 325.0 | 55.5 | 11.81 | 87.0 | 1.051 |
| -69.0 | 3.572 | -37.5 | 95.22 | -6.0 | 443.0 | 25.5 | 302.4 | 57.0 | 10.21 | 88.5 | 0.9138 |
| -67.5 | 4.078 | -36.0 | 114.4 | -4.5 | 446.1 | 27.0 | 278.5 | 58.5 | 8.801 | 90.0 | 0.8178 |
| -66.0 | 4.674 | -34.5 | 136.4 | -3.0 | 448.0 | 28.5 | 253.8 | 60.0 | 7.770 | | |
| -64.5 | 5.288 | -33.0 | 160.1 | -1.5 | 449.8 | 30.0 | 228.7 | 61.5 | 6.801 | | |
| -63.0 | 6.008 | -31.5 | 184.6 | 0.0 | 450.0 | 31.5 | 203.8 | 63.0 | 5.410 | | |
| -61.5 | 6.991 | -30.0 | 209.5 | 1.5 | 449.5 | 33.0 | 178.0 | 64.5 | 4.636 | | |
| -60.0 | 8.206 | -28.5 | 233.4 | 3.0 | 449.3 | 34.5 | 154.4 | 66.0 | 4.167 | | |

## Electricity Parameter:

Current I: 0.1000A Power: 3.340W

Voltage V: 33.40V PF: 1.000

## Optical Parameter(Distance=2.559m):

Equivalent Luminous flux: Φ eff= 433.4lm Efficiency: Eff=129.78lm/W

Diffuse angle: @(25%): 73.3deg @(50%): 59.2deg @(75%): 44.7deg @(50%): 59.2deg

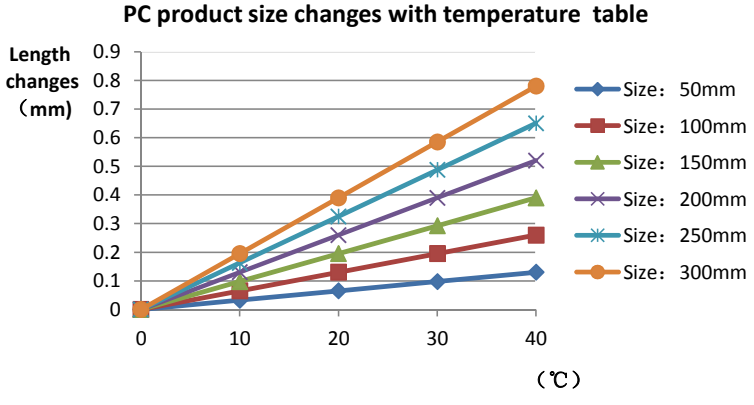
Diffuse angle: @(25%): 73.3deg @(50%): 59.2deg @(75%): 44.9deg @(50%): 59.2deg

Imax=450.7cd (C=0.0deg,G=1.0deg) C0-180Plane Imax= 450.7cd(G=1.0deg)

C0-180Plane I0= 450.0cd

| | | Standard size | Upper Size limit | Lower size limit | Test result1 | Test result2 | Test result3 | Test result4 | Judgment | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.Size | diameter | 44 | | | 44.08 | 44.07 | 43.99 | 44.06 | | Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test. |
| | height1 | 20.2 | | | 18.27 | 18.24 | 18.3 | 18.26 | | |
| | height2 | 18.2 | | | 20.24 | 20.21 | 20.29 | 20.22 | | |
| | Gate shear can not affect the appearance of the lamp | | | | | | | | | |
| | See attachment "Appearance Inspection Standards" | | | | | | | | | |
| 2.Appearance Quality | | See attachment "Appearance Inspection Standards" | E | No burr | No burr | No burr | No burr | | | OK |
| | | | | No stains | No stains | No stains | No stains | | | |
| 3.Material | | PC | | | Color | Transparent | | | | OK |
| 4.Optical index | Testing LED | D9 | | | | | | | | |
| | The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life. | | | | | | | | | |
| | FWHM | See light distribution curve | | | | | | | | |
| | angle | | | | 17.9° | 17.5° | 17.6° | 17.1° | | |
| | K-value | | | | 6.21 | 6.42 | 6.25 | 6.48 | | |
| | Efficiency | | | | | | | | | |
| | Facula | See the signature sample | | | | | | | | |
| Comprehensive judgment | | Qualified | | | | | | | | |

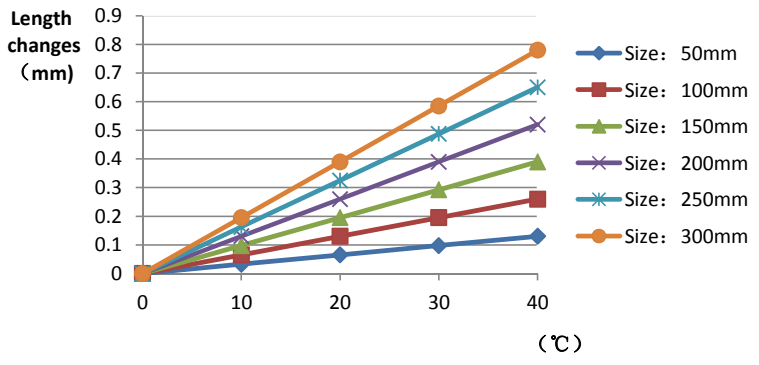
Remarks：
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right




Precautions:
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

| | | Standard size | Upper Size limit | Lower size limit | Test result1 | Test result2 | Test result3 | Test result4 | Judgment | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.Size | diameter | 44 | | | 43.89 | 43.9 | 43.88 | 43.93 | | Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test. |
| | height1 | 20.2 | | | 20.18 | 20.2 | 20.16 | 20.2 | | |
| | height2 | 18.2 | | | 18.20 | 18.19 | 18.18 | 18.2 | | |
| | Gate shear can not affect the appearance of the lamp | | | | | | | | | |
| | See attachment "Appearance Inspection Standards" | | | | | | | | | |
| 2.Appearance Quality | | See attachment "Appearance Inspection Standards" | E | | No burr | No burr | No burr | No burr | | OK |
| | | | | | No stains | No stains | No stains | No stains | | |
| 3.Material | | PC | | | | Color | Transparent | | | OK |
| 4.Optical index | Testing LED | D9 | | | | | | | | |
| | The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life. | | | | | | | | | |
| | FWHM | See light distribution curve | | | | | | | | |
| | angle | | | | 21.9° | 21.5° | 21.8° | 21.8° | | |
| | K-value | | | | 4.74 | 4.61 | 4.6 | 4.48 | | |
| | Efficiency | | | | 93.45% | 91.10% | 90.88% | 91.10% | | |
| | Facula | See the signature sample | | | | | | | | |
| Comprehensive judgment | | Qualified | | | | | | | | |

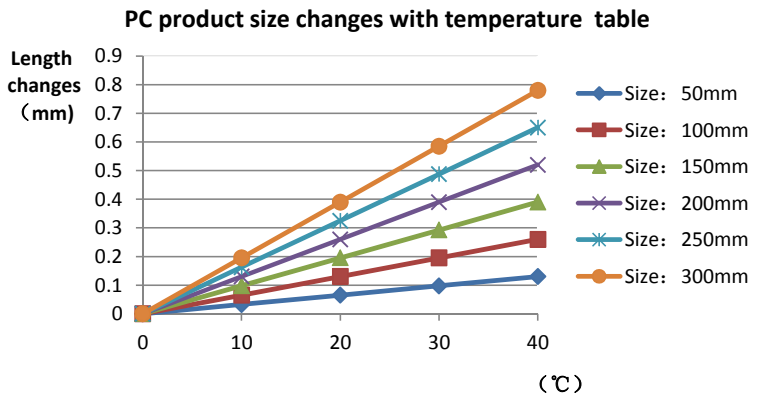
Remarks:
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right




Precautions:
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

| | | Standard size | Upper Size limit | Lower size limit | Test result1 | Test result2 | Test result3 | Test result4 | Judgment | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.Size | diameter | 44 | | | 44 | 43.93 | 44 | 43.98 | | Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test. |
| | height1 | 20.2 | | | | | | | | |
| | height2 | 18.2 | | | 18.18 | 18.21 | 18.2 | 18.2 | | |
| | Gate shear can not affect the appearance of the lamp | | | | | | | | | |
| | See attachment "Appearance Inspection Standards" | | | | | | | | | |
| 2.Appearance Quality | | See attachment "Appearance Inspection Standards" | E | No burr | No burr | No burr | No burr | | | OK |
| | | | | No stains | No stains | No stains | No stains | | | |
| 3.Material | | PC | | | Color | Transparent | | | | OK |
| 4.Optical index | Testing LED | D9 | | | | | | | | |
| | The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life. | | | | | | | | | |
| | FWHM | See light distribution curve | | | | | | | | |
| | angle | | | | 36.6° | 36.7° | 36.1° | 36.2° | | |
| | K-value | | | | 2.09 | 2.11 | 2.17 | 2.13 | | |
| | Efficiency | | | | 89.49% | 90.65% | 90.89% | 90.16% | | |
| | Facula | See the signature sample | | | | | | | | |
| Comprehensive judgment | | Qualified | | | | | | | | |

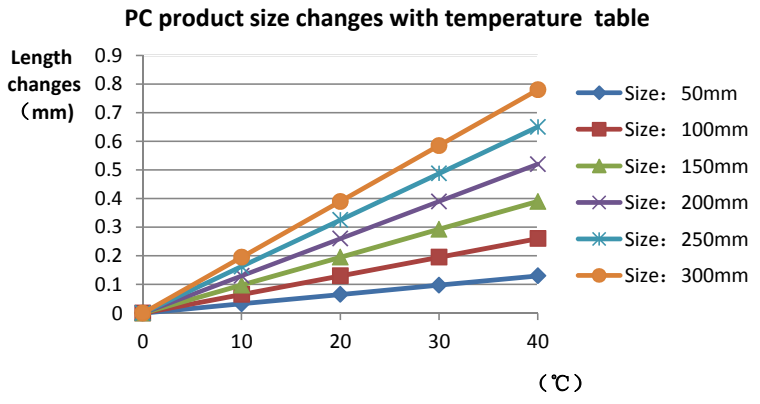
Remarks:
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right




Precautions:
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

| | | Standard size | Upper Size limit | Lower size limit | Test result1 | Test result2 | Test result3 | Test result4 | Judgment | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.Size | diameter | 44 | | | 43.94 | 44.01 | 43.96 | 44.03 | | Test environment: In 20 ℃ -25 ℃ environment to achieve thermal equilibrium after the test. |
| | height1 | 20.2 | | | | | | | | |
| | height2 | 18.2 | | | 18.26 | 18.27 | 18.24 | 18.27 | | |
| | Gate shear can not affect the appearance of the lamp | | | | | | | | | |
| | See attachment "Appearance Inspection Standards" | | | | | | | | | |
| 2.Appearance Quality | | See attachment "Appearance Inspection Standards" | E | No burr | No burr | No burr | No burr | | | OK |
| | | | | No stains | No stains | No stains | No stains | | | |
| 3.Material | | PC | | | Color | Transparent | | | | OK |
| 4.Optical index | Testing LED | D9 | | | | | | | | |
| | The recommended size and power rating of the LED light source recommended for this lens should be comparable to the source of the test, if it is required to be out of range. According to the heat dissipation capability of the lamp and the actual conditions of the use environment, the lens should be fully tested and tested to prevent the lens life. | | | | | | | | | |
| | FWHM | See light distribution curve | | | | | | | | |
| | angle | | | | 59.3° | 59.2° | 59.4° | 59.2° | | |
| | K-value | | | | | | | | | |
| | Efficiency | | | | 87.40% | 87.30% | 87.50% | 87.00% | | |
| | Facula | See the signature sample | | | | | | | | |
| Comprehensive judgment | | Qualified | | | | | | | | |

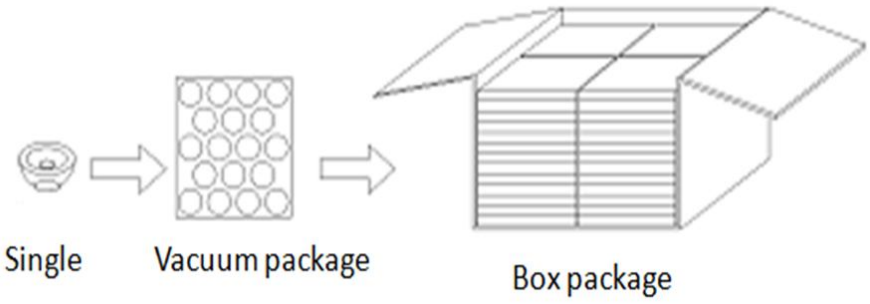
Remarks:
1、Tool Number: V-Vernier Caliper 2D-Quadratic H-Height Gauge M-Tool Microscope P-Needle T-Thick Gauge R-Radius Gauge E-Visual.
2、 Ambient temperature on the size of the product refer to the table on the right




Precautions:
1、Wear clean gloves during lens assembly to prevent contamination of the lens surface.
2、Take the lens try to avoid touching the total reflection surface.
3、When the lens surface contamination, you can only gently wipe with soft cotton sticky neat neutral solvent, not allowed to wipe with industrial solvents.
4. The working temperature of the lens should be within the temperature limit of the lens material. Exceeding the temperature limit will cause damage to the lens and affect the service life of the lens.

| PN | HK-44@20-15-D9-20-1g-1 | Product Name | NM-44@20-15°Lens |
|---|---|---|---|
| Product material | PC | Customer | |

Package diagram




| Product packing | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 18 | A/ Box | 4 | Box/Layer | | |
| | 14 | Layer/Box | 1008 | A/ Carton | | |

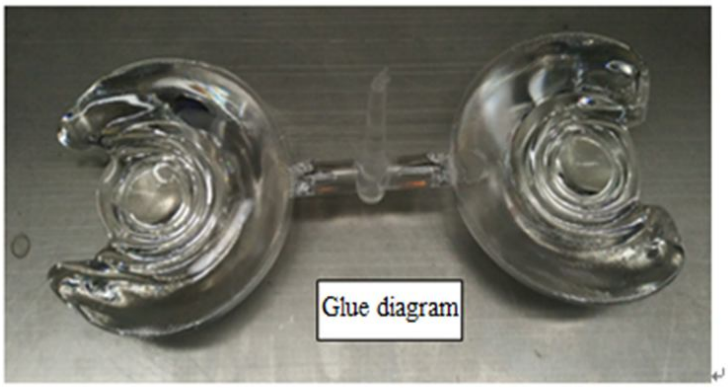
| Packaging Materials | NO. | Part No | Part name | Size | Dosage | Unit | Remarks |
|---|---|---|---|---|---|---|---|
| | 1 | 2.07.0018 | Blister box | 23cm*21cm | 56 | BAG | |
| | 2 | 2.08.0001 | PE film | 30cm*30cm | 56 | PCS | |
| | 3 | 2.06.0005 | Reel label paper | 6.2cm*8cm | 56 | PCS | |
| | 4 | 2.06.0005 | Box label paper | 6.2cm*9.2cm | 1 | PCS | |
| | 5 | 2.06.0003 | big plate | 46.8cm*42.8cm | 15 | PCS | |
| | 6 | 2.06.0015 | big flat carton | 48cm*44cm*19cm | 1 | PCS | |

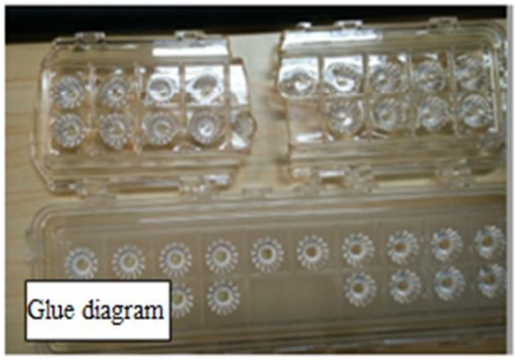
| Remarks | The loose packing is not subject to this specification. Customer's requirements shall prevail |
|---|---|

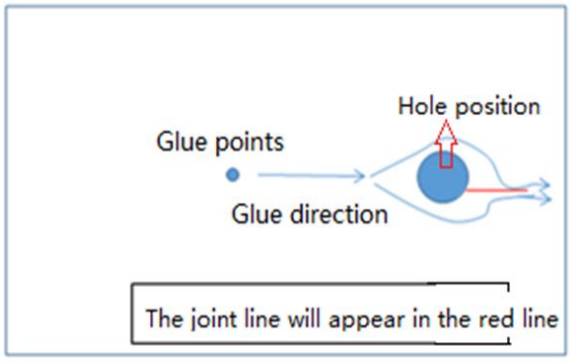
Special notice

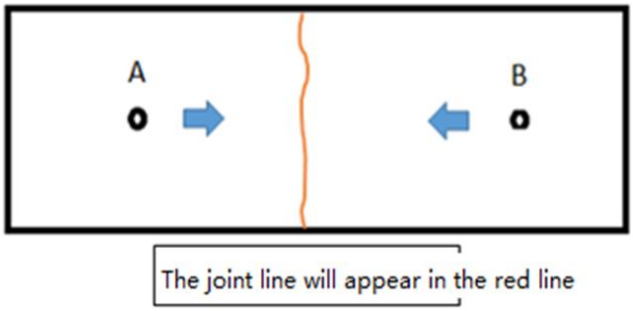
When gule pass through holes, columns and other structures, or part of the thin structure, will form a weld line. The product which uses multi-point injection welding line will appear because of the combination of sol, as shown below:

Synthetl


Please note：

The appearance of lines in the structure of the product as well as at the screw hole is a normal phenomenon, will not affect the actual use of the product, and can not be avoided at this stage.

Appearance inspection standards

1 Operating procedures

1.1.1Sampling standards, sampling plan and AQL

Test level：GB/T2828.1-2012The first part is according to the acceptance quality limit (AQL) retrieval batch inspection sampling plan, general inspection level Ⅱ level, CR class defect coefficient 0, MA defect rejection level AQL = 0.65, MI class defect rejection level AQL = 1.0; defect level please see 5.4.

2 Code table

| Code | Code description | Unit | Code | | Code description | Unit |
|---|---|---|---|---|---|---|
| N | Amount/pcs | pcs | D | | Diameter | mm |
| L | Length | mm | H | | Depth | mm |
| W | Width | mm | DS | | Distance | mm |
| S | Proportion | mm² | SS | | Offset | mm |

3 Test conditions

3.1 Sight distance and working hours:Sight distance should be 30-35cm, each side of the inspection time does not exceed 12s, the visual angle of 45-135 degrees;

3.2 Light: 2x40w cool white fluorescent lamp, the light source is 500-550mm away from the lens surface; in order to make the appearance defect can be correctly recognized, the illumination should be 500-1000Lux, and the observation time is 10 seconds.

3.3 Visual inspection staff should be 1.0 (including corrected visual acuity) above, no color blindness, color weakness.

4 Appearance inspection standards

| Test items | Judging standard | Inspection equipment | Defect level | | |
|---|---|---|---|---|---|
| | | Testing method | MI | MA | CR |
| Check the sample | When start the machine and process, all products have to check the appearance of the sample, the appearance of the sample is divided into qualified samples and limited samples.<br>1: Qualified sample refers to the appearance and structure standard of the product which recognized by the client, the sample size should be confirmed before mass production; | Sample comparison, visual | | | √ |

| | | | | | |
|---|---|---|---|---|---|
| | 2: The limited sample refers to the limit of a particular exceptionally developed sample. Limit the sample only for its specific point of exception to confirm;<br>The priority is higher than the other criteria in this table. When there is a limited sample, the limit sample shall prevail. | | | | |
| Raw edge | Not allowed to affect the size and assembly | Visual, point card | | √ | |
| Scratch | 1: Non-optical surface and non-exposed surface scratches should be visually insignificant and the length is less than 1/10 of the maximum surface size. | Visual, point card, calipers | | √ | |
| Fingerprint | Fingerprints are not allowed on all products | Visual | | √ | |
| Foreign objects, black spots, white spots | The product may not be attached to foreign objects, including oil, fiber, dregs of water gap and so on | | | | √ |
| Deformation | Insufficient filling shall not affect the appearance of the assembly and the exposed surfaces. | Visual, feeler | | | √ |
| Poor ejection | Products may not appear bad ejection, including no convex top, thimble printed on the assembly surface shall not be higher than the product surface, non-assembled surface thimble height should not exceed the product size tolerances; thimble printing should be less than the product surface and no more than 0.3; thimble surface treatment should be consistent with the product side. | Visual, point card | | √ | |
| | Ejection strain: the optical surface and the appearance of the exposed surface after assembly are not allowed to have a strain, and the structural surface does not allow visual obvious strain. | | | | |
| Insufficient filling | Insufficient filling shall not affect the appearance of the assembly and the exposed surfaces，The signature sample shall prevail. | Visual, point card | | √ | |
| Shrink | When the entire surface of the product shrinks, the optical properties and dimensions must meet the requirements, and the visual will not significantly affect the appearance.Part shrink reference point defects | Visual, point card | | √ | |
| Flow marks、Welding line | 1：Product does not allow the presence of flow marks and welding lines unless the structure can not be avoided; | Visual | | √ | |
| | 2: The remaining flow marks shall not appear in the optical surface, a single L ≤ 10mm, no more than two | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Bubble | No bubbles are allowed | Visual | | √ | |
| Foreign objects, black spots, white spots | Not obvious or D ≤ 0.3mm black spots and foreign bodies in the area of 100x100mm not more than 1;<br>Exceeded foreign matter black spots is judged bad. | Visual, point card | √ | | |
| Damaged | No damage is allowed | Visual | | | √ |
| Cold glue | Optical surface may not have cold glue, non-optical surface cold glue should meet the visual is not obvious. | Visual | √ | | |
| Bad incision | 1: Do not affect the product size, shall not penetrate the optical surface, the cut should be smooth; | Visual | | | √ |
| | 2: Laser cutting products, the optical surface burns shall not occur after the processing is completed. Beading must not affect product installation | | | | |
| | 3: Three molds and hot runner gate shall not appear residue. | | | | |
| Scrub | Scrub surface should be uniform, off the scrub phenomenon should not be obvious，A single off scrub imprint requires D ≤ 1 mm and no more than 1 area within a 50x50 mm area | Visual | | √ | |