

Light Output of U.S., European, and Japanese Low-Beam Headlamps

MICHAEL SIVAK, MICHAEL J. FLANNAGAN, AND TAKASHI SATO

The light outputs of 150 production low-beam headlamps manufactured for use in the United States, Europe, and Japan were analyzed. The information is presented in tabular form by jurisdiction for the 25th-percentile, the median (50th-percentile), and the 75th-percentile luminous intensities from 20 degrees left to 20 degrees right and from 5 degrees down to 5 degrees up. The median luminous intensities by jurisdiction are also shown in a graphical form. To illustrate the utility of these data, calculations are presented for median illuminances from U.S. low-beam headlamps falling on points in space corresponding to sample locations of rearview mirrors, traffic signs, and road delineation.

The proper functioning of a variety of roadway and vehicle devices depends on correctly estimating the typical amount of headlamp illumination that reaches such devices. For example, the designers of retroreflective traffic signs and retroreflective lane markings need to know the range of headlamp illumination likely to impinge on the signs and markings so they can ensure that their retroreflective efficiencies will provide sufficient nighttime performance. Similarly, the designers of variable-reflectance rearview mirrors need to know the range of headlamp illuminations on the surfaces of rearview mirrors to make the best use of their variable reflectance.

Can the required information be obtained by examining headlamp light-output regulations in various jurisdictions? There are at least two reasons regulations do not yield such information. First, the light-output regulations (such as the U.S. Federal Motor Vehicle Safety Standard 108) specify a minimum or maximum light output at only a limited number of test points; they do not constrain the headlamp beam to a unique light pattern. Second, not all production lamps meet the relevant regulations (1).

Consequently, the designers of roadway and vehicle components that depend on headlamp illumination have had to rely on light-output information from a sample of actual headlamps. Those samples have typically been small. The present study was designed to fill this void by providing information about the light output for a relatively large sample of 150 production lamps. These lamps were manufactured for use in the United States, Europe, and Japan, and the data are presented by the jurisdiction for which they were manufactured.

To illustrate the utility of these data, calculations will be presented for median illuminances from U.S. low-beam headlamps falling on points in space corresponding to sample locations of rearview mirrors, traffic signs, and road delineation.

METHOD

Approach

We determined the luminous intensities at the 25th percentile, the median (the 50th percentile), and the 75th percentile for 1,701 test points. The percentile values were obtained by linear interpolation. These test points were in a rectangular matrix defined by the following ranges of vertical and horizontal angles. In the horizontal direction the angles ranged from 20 degrees left (L) to 20 degrees right (R) in steps of 0.5 degree. In the vertical direction the angles ranged from 5 degrees down (D) to 5 degrees up (U) in steps of 0.5 degree.

Sample

We used the same sample of 150 low-beam headlamps that we used in recent studies on international harmonization of low-beam patterns (1) and on the effect of misaim on light output of low beams (2). The sample consists of 107 lamps photometered by the Japan Automobile Research Institute (courtesy of Kiyokazu Yokoi), 28 lamps photometered for NHTSA by the University of Michigan, and 15 lamps photometered for the study by Sivak and Flannagan (1). The sample includes low beams that were produced by 17 different manufacturers for the U.S., European, and Japanese markets. Table 1 lists the number of lamps by the market for which they were manufactured and by the source and the year of the respective photometric information. Table 2 provides a breakdown of the lamps by construction.

The photometric information for each lamp consisted of a candela matrix (in 0.5 degree steps). All lamps were measured at 12.8 V. To facilitate comparisons across jurisdictions, the candela matrices of lamps manufactured for left-hand traffic were converted to right-hand traffic. The European lamps were measured by using a standard bulb.

RESULTS

Light-Output Distributions by Jurisdiction

Tables 3 through 6 present the 25th percentile, the median (the 50th percentile), and the 75th percentile (indicated from top to bottom, respectively, in each cell) of luminous intensities by jurisdiction. The horizontal steps in these tables are 0.5 degree between 0 and 5 degrees, 1 degree between 5 and 10 degrees, and 5 degrees between 10 and 20 degrees (all for left or right). The vertical steps are 0.5 degree. Table 3 presents the information for 43 U.S. lamps, and Table

4 presents the information for 37 European lamps. Because of the differences in lamp construction, the Japanese lamps are summarized in two tables—Table 5 for the SAE-J lamps and Table 6 for the ECE-J lamps. Figure 1 presents isocandela diagrams corresponding to the median luminous intensities.

Calculations of Illuminance from U.S. Low Beams on Sample Spatial Locations

This section presents calculations of median illuminances from U.S. low beams falling on sample locations of rearview mirrors, retroreflective traffic signs, and road delineation. We considered three locations of rearview mirrors (left outside, center inside, and right outside, all at 20 m), two locations of retroreflective traffic signs (right shoulder-mounted, center overhead, and left shoulder-mounted, all at 150 m), and two locations of road delineation (the right edge line of the lane of travel and the left edge line of a lane adjacent to the left, both at 50 m). These calculations assumed that (a) the mounting height of the headlamps is 0.6 m, (b) the lateral separation between the two headlamps is 1.14 m, and (c) the vehicle is in the center of a lane with a width of 3.7 m.

Table 7 presents the x , y , and z coordinates of the sample locations relative to the ground at the front edge of the vehicle in the center of the lane. Table 8 lists the corresponding angles with respect to the headlamp axes. Finally, Table 9 shows the calculated luminous intensities directed toward the sample locations and the resulting illuminances.

DISCUSSION OF RESULTS

Sample

We do not have information about the years of manufacture of the lamps in the sample. However, it is reasonable to assume that they were manufactured shortly before they were photometered. With this assumption, the U.S. lamps provide a reasonable sample of lamps from late 1980s and early 1990s (they were photometered in 1990–1993). By using a similar argument, the European and Japanese lamps are more representative of lamps from early to mid-1980s (they were photometered in 1983–1987).

Headlamp Misaim on In-Traffic Vehicles

The present data are for perfectly aimed headlamps. However, these data can also be used to calculate light output in particular directions for different levels of misaim. As a guideline, a recent U.S. survey of headlamp aim in 768 in-service cars, vans, and light trucks (3) found that the mean horizontal aim was about 0.20 degree left with

a standard deviation of 0.55 degree, and the mean vertical aim was about 0.04 degree up with a standard deviation of 0.65 degree.

Limitations of Present Analyses

Tables 3 through 6 provide valid estimates of the luminous intensity that can be expected at a certain angle from lamps of a certain vintage (see the preceding paragraph). However, these tables should not be used to calculate maximum gradients of luminous intensities for adjacent points in space (e.g., for estimating the sharpness of the cutoff that is important for visual aiming of the beam pattern). This is because the transitions from the more intense to the less intense parts of the beam pattern are not precisely in the same locations for all lamps. Consequently, although the present data provide valid estimates of luminous intensities for individual points, a computation of gradients between points based on the present analysis would likely underestimate the actual gradients.

ACKNOWLEDGMENTS

Appreciation is extended to the members of the University of Michigan Industry Affiliation Program for Human Factors in Transportation Safety for support of this research. The current members of the Affiliation Program are Adac Plastics, Bosch, Chrysler, Delphi Interior and Lighting Systems, Ford (Plastic and Trim Products Division), General Electric, GM NAO Safety Center, Hella, Ichikoh Industries, Koito Manufacturing, LESCOA, Libbey-Owens-Ford, Magneti Marelli, North American Lighting, Osram Sylvania, Philips Lighting, PPG Industries, Reflexite, Stanley Electric, TEXTRON Automotive, United Technologies Automotive Systems, Valeo, Wagner Lighting, and 3M.

We thank Kiyokazu Yokoi of the Japan Automobile Research Institute for providing photometric information on 107 European and Japanese lamps, and Eric Traube and Masami Aoki for assistance with this research.

REFERENCES

1. Sivak, M., and M. J. Flannagan. *Partial Harmonization of International Standards for Low-Beam Headlighting Patterns*. Report UMTRI-93-11. University of Michigan Transportation Research Institute, Ann Arbor, 1993.
2. Sivak, M., M. J. Flannagan, and T. Sato. *The Relative Importance of Horizontal and Vertical Aim of Low-Beam Headlamps*. Report UMTRI-93-26. University of Michigan Transportation Research Institute, Ann Arbor, 1993.
3. Copenhaver, M. M., and R. E. Jones. *Measurement of Headlamp Aim and the Electrical and Photometric Performance Characteristics of Rear Lighting Systems*. Report DOT HS 807 930. U.S. Department of Transportation, 1992.

Publication of this paper sponsored by Committee on Visibility.

TABLE 1 Number of Lamps by Market, and Source and Year of Photometric Information

| Market | Number | Year of the photometry | Source of the photometric data |
|--------|--------|------------------------|--|
| U.S.A. | 43 | 1990-1993 | II Stanley (33*), GE Lighting (5), Inland Fisher Guide Division of GM (5) |
| Europe | 37 | 1983-1987 | Japan Automobile Research Institute |
| Japan | 70** | 1983-1987 | (courtesy of Mr. Kiyokazu Yokoi) |

*Of the 33 lamps photometered by II Stanley, 28 lamps were photometered in 1990 and 1991 as a part of a research contract between the National Highway Traffic Safety Administration and the University of Michigan, and 5 were photometered in 1993 for the study by Sivak and Flannagan (*J*).

**Of the 70 Japanese lamps, 22 had a U.S. type beam pattern (the so-called SAE-J lamps), and 48 had a European-type beam pattern (the so-called ECE-J lamps).

TABLE 2 Breakdown of Lamps by Construction

| Lamp type | Tungsten or halogen | Filament orientation | U.S. lamps | European lamps | Japanese lamps |
|-------------|---------------------|----------------------|------------|----------------|----------------|
| 9004 | halogen | transverse | 8 | | |
| 9006 | halogen | axial | 9 | | |
| 9007 | halogen | axial | | | 2 |
| H1 | halogen | axial | | 4 | |
| H4 | halogen | axial | | 33 | 40 |
| H6 | halogen | transverse | | | 4 |
| D4 | tungsten | axial | | | 8 |
| sealed beam | tungsten | transverse | 1 | | 10 |
| sealed beam | halogen | transverse | 20 | | 6 |
| sealed beam | halogen | axial | 5 | | |
| Total | | | 43 | 37 | 70 |

TABLE 3 Distributions of Luminous Intensities of U.S. Lamps

| | 20L | 15L | 10L | 9L | 8L | 7L | 6L | 5L | 4.5L | 4L | 3.5L | 3L | 2.5L | 2L | 1.5L | 1L | 0.5L | 0 |
|-------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|----------|
| 5U | 38 | 56 | 80 | 82 | 86 | 92 | 99 | 101 | 103 | 103 | 107 | 111 | 114 | 116 | 122 | 128 | 134 | 140 |
| | 50 | 70 | 89 | 95 | 103 | 109 | 118 | 130 | 136 | 141 | 144 | 151 | 159 | 162 | 167 | 170 | 178 | 186 |
| | 63 | 82 | 112 | 115 | 120 | 135 | 148 | 159 | 166 | 172 | 179 | 184 | 190 | 194 | 198 | 202 | 207 | 213 |
| 4.5U | 39 | 60 | 89 | 92 | 94 | 100 | 105 | 113 | 115 | 120 | 123 | 126 | 129 | 132 | 135 | 147 | 158 | 163 |
| | 57 | 74 | 92 | 99 | 109 | 121 | 133 | 141 | 152 | 155 | 161 | 166 | 169 | 171 | 176 | 184 | 196 | 205 |
| | 66 | 88 | 117 | 125 | 132 | 147 | 159 | 177 | 186 | 193 | 197 | 206 | 211 | 219 | 221 | 226 | 234 | 245 |
| 4U | 42 | 64 | 95 | 100 | 103 | 109 | 116 | 125 | 129 | 133 | 136 | 142 | 143 | 147 | 156 | 167 | 175 | 182 |
| | 63 | 78 | 103 | 110 | 122 | 132 | 146 | 158 | 166 | 173 | 178 | 186 | 184 | 194 | 202 | 210 | 220 | 234 |
| | 68 | 94 | 125 | 133 | 143 | 161 | 178 | 189 | 203 | 210 | 221 | 224 | 229 | 238 | 246 | 259 | 266 | 274 |
| 3.5U | 44 | 72 | 100 | 109 | 114 | 122 | 130 | 138 | 146 | 149 | 154 | 159 | 164 | 171 | 179 | 192 | 199 | 205 |
| | 67 | 86 | 117 | 125 | 136 | 150 | 164 | 174 | 183 | 188 | 197 | 209 | 217 | 226 | 232 | 244 | 255 | 270 |
| | 74 | 101 | 138 | 146 | 160 | 178 | 193 | 213 | 235 | 242 | 249 | 256 | 264 | 270 | 278 | 293 | 315 | 338 |
| 3U | 45 | 80 | 111 | 123 | 132 | 141 | 148 | 154 | 164 | 168 | 174 | 181 | 189 | 197 | 210 | 226 | 233 | 237 |
| | 71 | 93 | 131 | 143 | 156 | 170 | 180 | 198 | 207 | 214 | 222 | 235 | 248 | 261 | 272 | 284 | 297 | 313 |
| | 79 | 112 | 157 | 167 | 181 | 202 | 223 | 248 | 267 | 276 | 286 | 302 | 306 | 314 | 325 | 341 | 374 | 383 |
| 2.5U | 49 | 86 | 122 | 134 | 150 | 160 | 171 | 176 | 187 | 191 | 197 | 209 | 217 | 236 | 248 | 260 | 275 | 293 |
| | 74 | 104 | 148 | 158 | 178 | 198 | 210 | 224 | 234 | 244 | 253 | 263 | 278 | 293 | 313 | 337 | 363 | 378 |
| | 86 | 119 | 172 | 185 | 201 | 218 | 247 | 282 | 303 | 315 | 330 | 345 | 355 | 368 | 385 | 405 | 425 | 478 |
| 2U | 56 | 96 | 139 | 155 | 167 | 181 | 198 | 208 | 212 | 224 | 231 | 248 | 259 | 284 | 301 | 322 | 347 | 353 |
| | 77 | 113 | 166 | 180 | 201 | 223 | 245 | 260 | 277 | 296 | 307 | 313 | 341 | 355 | 368 | 388 | 443 | 482 |
| | 90 | 132 | 191 | 209 | 228 | 247 | 273 | 305 | 328 | 351 | 374 | 389 | 423 | 446 | 458 | 515 | 586 | 665 |
| 1.5U | 64 | 117 | 162 | 177 | 193 | 209 | 229 | 250 | 256 | 270 | 279 | 298 | 314 | 346 | 371 | 397 | 422 | 457 |
| | 85 | 131 | 188 | 209 | 236 | 252 | 280 | 306 | 324 | 342 | 353 | 374 | 407 | 416 | 438 | 476 | 558 | 650 |
| | 98 | 149 | 220 | 240 | 261 | 291 | 321 | 377 | 386 | 394 | 423 | 439 | 487 | 539 | 599 | 674 | 750 | 825 |
| 1U | 71 | 138 | 192 | 207 | 238 | 254 | 278 | 307 | 316 | 329 | 353 | 373 | 403 | 422 | 467 | 502 | 554 | 630 |
| | 95 | 158 | 226 | 247 | 276 | 301 | 335 | 374 | 396 | 422 | 446 | 466 | 494 | 535 | 552 | 639 | 700 | 794 |
| | 116 | 175 | 269 | 297 | 319 | 355 | 394 | 455 | 465 | 490 | 516 | 526 | 564 | 629 | 743 | 876 | 962 | 1127 |
| 0.5U | 80 | 173 | 243 | 265 | 289 | 315 | 344 | 394 | 402 | 418 | 436 | 476 | 519 | 540 | 581 | 676 | 767 | 908 |
| | 113 | 190 | 284 | 316 | 350 | 383 | 420 | 473 | 485 | 506 | 549 | 585 | 633 | 676 | 779 | 880 | 1063 | 1217 |
| | 133 | 219 | 364 | 379 | 425 | 484 | 545 | 605 | 638 | 648 | 665 | 702 | 762 | 862 | 969 | 1096 | 1321 | 1662 |
| 0 | 103 | 214 | 337 | 369 | 412 | 439 | 473 | 522 | 550 | 572 | 594 | 610 | 676 | 750 | 873 | 1040 | 1291 | 1616 |
| | 141 | 262 | 392 | 439 | 477 | 554 | 612 | 663 | 703 | 727 | 774 | 825 | 852 | 947 | 1116 | 1436 | 1778 | 2450 |
| | 170 | 332 | 520 | 582 | 647 | 768 | 832 | 883 | 900 | 944 | 994 | 1059 | 1153 | 1341 | 1626 | 1927 | 2665 | 3780 |
| 0.5D | 141 | 295 | 489 | 567 | 656 | 724 | 826 | 894 | 932 | 974 | 1035 | 1082 | 1125 | 1301 | 1598 | 1994 | 2845 | 3875 |
| | 202 | 407 | 637 | 731 | 817 | 931 | 979 | 1059 | 1084 | 1140 | 1222 | 1297 | 1434 | 1568 | 1899 | 2548 | 3538 | 5380 |
| | 244 | 537 | 883 | 967 | 1081 | 1337 | 1470 | 1595 | 1678 | 1741 | 1780 | 1925 | 2160 | 2749 | 3490 | 5695 | 8255 | |
| 1D | 198 | 473 | 860 | 921 | 1094 | 1293 | 1390 | 1476 | 1513 | 1609 | 1728 | 1774 | 1855 | 1997 | 2450 | 3565 | 5044 | 7471 |
| | 294 | 635 | 1182 | 1334 | 1449 | 1542 | 1645 | 1761 | 1847 | 1992 | 2180 | 2400 | 2580 | 2900 | 3338 | 4217 | 6362 | 8960 |
| | 361 | 867 | 1482 | 1761 | 1966 | 2260 | 2440 | 2784 | 2965 | 3100 | 3205 | 3345 | 3685 | 4124 | 4650 | 6093 | 9115 | 13045 |
| 1.5D | 311 | 738 | 1389 | 1576 | 1758 | 1891 | 2070 | 2240 | 2265 | 2355 | 2478 | 2627 | 2854 | 3186 | 3773 | 5120 | 7526 | 10673 |
| | 421 | 984 | 1738 | 1934 | 2170 | 2480 | 2820 | 2980 | 3070 | 3200 | 3420 | 3616 | 4078 | 4630 | 5440 | 6850 | 9244 | 12640 |
| | 538 | 1348 | 2360 | 2565 | 2961 | 3271 | 3515 | 3965 | 4240 | 4505 | 4893 | 5084 | 5825 | 6625 | 7698 | 9680 | 11865 | 14745 |
| 2D | 378 | 1129 | 1990 | 2160 | 2401 | 2575 | 2660 | 2825 | 2875 | 3020 | 3205 | 3435 | 3607 | 4235 | 4965 | 5972 | 7523 | 9595 |
| | 542 | 1331 | 2260 | 2520 | 2740 | 3070 | 3158 | 3350 | 3580 | 3838 | 4447 | 4535 | 4997 | 5576 | 6390 | 7610 | 9650 | 12310 |
| | 831 | 1677 | 2898 | 3185 | 3849 | 4204 | 4504 | 4919 | 5110 | 5330 | 5675 | 5873 | 6715 | 7556 | 8425 | 10085 | 12275 | 16150 |
| 2.5D | 405 | 1380 | 2180 | 2345 | 2424 | 2505 | 2740 | 2900 | 2955 | 3039 | 3179 | 3650 | 4205 | 4550 | 4896 | 5217 | 6050 | 7433 |
| | 698 | 1588 | 2540 | 2860 | 3010 | 3300 | 3500 | 3930 | 4299 | 4396 | 4517 | 4977 | 5250 | 5740 | 6537 | 7290 | 8590 | 10250 |
| | 1296 | 1927 | 3058 | 3441 | 3794 | 4170 | 4420 | 4805 | 5105 | 5423 | 5593 | 5918 | 6885 | 7750 | 8415 | 9310 | 11670 | 13821 |
| 3D | 343 | 1264 | 2025 | 2019 | 2125 | 2280 | 2454 | 2645 | 2745 | 2830 | 2991 | 3210 | 3415 | 3825 | 4140 | 4407 | 4833 | 5340 |
| | 817 | 1652 | 2540 | 2650 | 2880 | 3070 | 3337 | 3540 | 3840 | 4000 | 4127 | 4490 | 4820 | 5200 | 5650 | 6480 | 7225 | 7740 |
| | 1417 | 2090 | 2974 | 3260 | 3775 | 4100 | 4195 | 4472 | 4645 | 4801 | 5005 | 5425 | 5750 | 6420 | 7278 | 8254 | 8995 | 9987 |
| 3.5D | 273 | 1061 | 1706 | 1785 | 1820 | 1898 | 2040 | 2165 | 2270 | 2320 | 2390 | 2490 | 2700 | 3030 | 3275 | 3475 | 3725 | 3990 |
| | 681 | 1497 | 2040 | 2150 | 2240 | 2320 | 2600 | 2780 | 2838 | 3060 | 3238 | 3434 | 3600 | 3820 | 4147 | 4740 | 5787 | 6196 |
| | 1191 | 1818 | 2830 | 3190 | 3305 | 3261 | 3355 | 3585 | 3685 | 3880 | 4130 | 4465 | 4847 | 5335 | 5671 | 6120 | 6840 | 7685 |
| 4D | 196 | 732 | 1117 | 1151 | 1181 | 1271 | 1382 | 1474 | 1505 | 1574 | 1632 | 1737 | 1815 | 1923 | 2042 | 2227 | 2374 | 2565 |
| | 596 | 1063 | 1644 | 1702 | 1745 | 1746 | 1885 | 1953 | 1995 | 2040 | 2150 | 2350 | 2420 | 2470 | 2810 | 3031 | 3179 | 3540 |
| | 1166 | 1593 | 2160 | 2405 | 2580 | 2601 | 2655 | 2880 | 2945 | 3005 | 3175 | 3385 | 3701 | 4021 | 4286 | 4570 | 5269 | 5548 |
| 4.5D | 135 | 449 | 637 | 653 | 683 | 726 | 776 | 837 | 886 | 939 | 973 | 1020 | 1064 | 1147 | 1222 | 1304 | 1446 | 1567 |
| | 355 | 706 | 1088 | 1123 | 1157 | 1162 | 1212 | 1275 | 1304 | 1357 | 1401 | 1469 | 1509 | 1618 | 1740 | 1906 | 2120 | 2442 |
| | 998 | 1303 | 1713 | 1843 | 1925 | 2003 | 2123 | 2200 | 2230 | 2258 | 2385 | 2565 | 2810 | 3025 | 3328 | 3535 | 3760 | 4212 |
| 5D | 115 | 281 | 439 | 460 | 500 | 519 | 542 | 578 | 602 | 634 | 666 | 688 | 710 | 744 | 797 | 850 | 933 | 1043 |
| | 247 | 360 | 699 | 724 | 695 | 724 | 789 | 850 | 870 | 914 | 929 | 956 | 989 | 1012 | 1055 | 1158 | 1337 | 1432 |
| | 759 | 888 | 1293 | 1307 | 1339 | 1404 | 1474 | 1612 | 1697 | 1813 | 1871 | 1926 | 1969 | 2044 | 2156 | 2356 | 2945 | 2860 |

NOTE: The three entries in each cell are (from top to bottom) the 25th percentile, the median (the 50th percentile), and the 75th percentile.

(continued on next page)

TABLE 3 (continued)

| | 0.5R | 1R | 1.5R | 2R | 2.5R | 3R | 3.5R | 4R | 4.5R | 5R | 6R | 7R | 8R | 9R | 10R | 15R | 20R |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|
| 5U | 146 | 157 | 161 | 164 | 167 | 172 | 174 | 176 | 176 | 166 | 147 | 135 | 122 | 118 | 110 | 78 | 48 |
| | 195 | 203 | 210 | 216 | 218 | 220 | 218 | 212 | 206 | 198 | 186 | 162 | 154 | 140 | 129 | 88 | 65 |
| | 219 | 235 | 249 | 246 | 256 | 261 | 252 | 247 | 244 | 238 | 220 | 203 | 190 | 173 | 160 | 103 | 70 |
| 4.5U | 176 | 183 | 187 | 183 | 186 | 194 | 193 | 193 | 191 | 188 | 162 | 147 | 135 | 131 | 123 | 85 | 52 |
| | 214 | 232 | 241 | 247 | 247 | 242 | 239 | 241 | 231 | 226 | 204 | 179 | 170 | 155 | 138 | 94 | 67 |
| | 257 | 270 | 277 | 281 | 291 | 294 | 294 | 285 | 279 | 274 | 247 | 225 | 215 | 196 | 173 | 111 | 75 |
| 4U | 190 | 203 | 208 | 209 | 213 | 211 | 208 | 209 | 209 | 206 | 183 | 169 | 157 | 146 | 137 | 92 | 57 |
| | 251 | 274 | 284 | 287 | 282 | 278 | 277 | 271 | 262 | 253 | 229 | 211 | 190 | 169 | 152 | 101 | 72 |
| | 304 | 320 | 321 | 333 | 333 | 336 | 335 | 337 | 327 | 319 | 283 | 257 | 244 | 214 | 194 | 121 | 81 |
| 3.5U | 214 | 223 | 231 | 233 | 236 | 235 | 233 | 229 | 225 | 222 | 208 | 189 | 178 | 166 | 152 | 101 | 63 |
| | 292 | 307 | 321 | 310 | 313 | 307 | 300 | 296 | 283 | 274 | 255 | 232 | 211 | 187 | 171 | 115 | 77 |
| | 354 | 365 | 368 | 396 | 396 | 388 | 388 | 385 | 383 | 364 | 321 | 302 | 279 | 238 | 220 | 133 | 88 |
| 3U | 248 | 261 | 266 | 271 | 275 | 266 | 266 | 260 | 255 | 244 | 234 | 220 | 203 | 188 | 171 | 110 | 71 |
| | 336 | 359 | 366 | 375 | 377 | 376 | 367 | 359 | 349 | 333 | 287 | 265 | 250 | 213 | 194 | 133 | 84 |
| | 416 | 461 | 498 | 490 | 497 | 486 | 471 | 456 | 447 | 435 | 384 | 331 | 310 | 270 | 247 | 150 | 96 |
| 2.5U | 301 | 309 | 314 | 332 | 329 | 315 | 299 | 295 | 291 | 284 | 262 | 251 | 233 | 214 | 189 | 124 | 77 |
| | 401 | 427 | 428 | 441 | 449 | 442 | 449 | 432 | 410 | 389 | 341 | 308 | 279 | 245 | 217 | 150 | 91 |
| | 538 | 609 | 648 | 649 | 618 | 606 | 578 | 563 | 549 | 514 | 464 | 393 | 352 | 312 | 276 | 173 | 105 |
| 2U | 372 | 380 | 400 | 404 | 396 | 376 | 355 | 346 | 347 | 333 | 305 | 292 | 271 | 238 | 210 | 136 | 88 |
| | 527 | 544 | 574 | 608 | 613 | 608 | 564 | 543 | 511 | 451 | 418 | 365 | 314 | 285 | 251 | 164 | 100 |
| | 737 | 794 | 829 | 812 | 801 | 744 | 731 | 719 | 667 | 626 | 545 | 476 | 407 | 363 | 315 | 194 | 118 |
| 1.5U | 475 | 487 | 503 | 506 | 478 | 454 | 439 | 435 | 427 | 412 | 373 | 346 | 318 | 282 | 252 | 158 | 101 |
| | 686 | 756 | 798 | 825 | 805 | 742 | 672 | 633 | 600 | 580 | 476 | 417 | 382 | 348 | 290 | 185 | 119 |
| | 926 | 1006 | 1039 | 1041 | 1040 | 981 | 918 | 838 | 769 | 726 | 670 | 567 | 485 | 436 | 384 | 225 | 138 |
| 1U | 683 | 726 | 699 | 680 | 650 | 632 | 645 | 615 | 574 | 525 | 476 | 421 | 374 | 336 | 293 | 183 | 118 |
| | 890 | 981 | 1039 | 1047 | 987 | 961 | 880 | 844 | 787 | 722 | 604 | 502 | 461 | 408 | 343 | 225 | 143 |
| | 1265 | 1361 | 1418 | 1436 | 1444 | 1359 | 1221 | 1086 | 1001 | 924 | 809 | 698 | 590 | 529 | 474 | 278 | 164 |
| 0.5U | 1096 | 1160 | 1191 | 1200 | 1191 | 1138 | 1054 | 950 | 862 | 804 | 625 | 556 | 482 | 402 | 347 | 219 | 146 |
| | 1407 | 1537 | 1640 | 1759 | 1754 | 1628 | 1527 | 1370 | 1173 | 1070 | 830 | 732 | 581 | 498 | 434 | 288 | 181 |
| | 2106 | 2505 | 2755 | 2895 | 2920 | 2565 | 2265 | 2004 | 1908 | 1716 | 1288 | 957 | 816 | 752 | 669 | 372 | 215 |
| 0 | 2245 | 2407 | 2548 | 2656 | 2780 | 2502 | 2412 | 1881 | 1704 | 1482 | 1177 | 862 | 720 | 567 | 470 | 304 | 189 |
| | 3270 | 4149 | 4630 | 4680 | 4610 | 4260 | 3530 | 2740 | 2586 | 2420 | 1523 | 1123 | 859 | 743 | 630 | 407 | 231 |
| | 4867 | 5625 | 6615 | 7405 | 6325 | 5712 | 5083 | 4545 | 3985 | 3330 | 2407 | 1627 | 1268 | 1140 | 993 | 588 | 317 |
| 0.5D | 5825 | 7665 | 8825 | 9590 | 8785 | 7490 | 6230 | 4780 | 4150 | 3550 | 2419 | 1597 | 1310 | 942 | 833 | 495 | 294 |
| | 7830 | 10440 | 11843 | 12780 | 12560 | 11323 | 9250 | 8090 | 6432 | 5110 | 3020 | 2060 | 1718 | 1267 | 1121 | 709 | 359 |
| | 10955 | 12420 | 14395 | 15160 | 14225 | 12573 | 11222 | 10023 | 9112 | 7495 | 4590 | 3225 | 2260 | 1967 | 1784 | 1086 | 564 |
| 1D | 10605 | 14303 | 16750 | 17420 | 16910 | 14355 | 12045 | 9580 | 8230 | 7075 | 4509 | 2812 | 2220 | 1799 | 1519 | 848 | 494 |
| | 13000 | 16370 | 18660 | 19580 | 19400 | 18186 | 15400 | 13560 | 11390 | 9490 | 5810 | 3940 | 2860 | 2320 | 2092 | 1328 | 542 |
| | 16730 | 20200 | 21959 | 22750 | 21800 | 19874 | 17753 | 15010 | 13429 | 11322 | 7883 | 5478 | 4119 | 3605 | 3110 | 1737 | 981 |
| 1.5D | 14805 | 17745 | 19759 | 19850 | 19345 | 17500 | 15660 | 13405 | 11285 | 9110 | 6305 | 4500 | 3405 | 2791 | 2332 | 1378 | 728 |
| | 15790 | 19788 | 22400 | 22400 | 21600 | 19837 | 17720 | 15530 | 13781 | 11712 | 8076 | 5300 | 4280 | 3590 | 3140 | 1968 | 856 |
| | 18424 | 22511 | 25250 | 26317 | 25000 | 23250 | 20545 | 18049 | 16560 | 13820 | 10122 | 7570 | 5796 | 5044 | 4230 | 2374 | 1399 |
| 2D | 11946 | 14760 | 16305 | 16440 | 15935 | 15710 | 14940 | 13235 | 11495 | 9670 | 7090 | 5245 | 4330 | 3739 | 3415 | 1856 | 934 |
| | 15920 | 17200 | 19000 | 20084 | 19740 | 18631 | 16710 | 15380 | 13340 | 11660 | 8623 | 6110 | 5220 | 4327 | 3690 | 2300 | 1303 |
| | 18675 | 21400 | 22700 | 23567 | 23200 | 21638 | 20743 | 18965 | 16712 | 14034 | 10522 | 8157 | 6840 | 5949 | 5235 | 2950 | 1722 |
| 2.5D | 9145 | 10305 | 11475 | 11968 | 11720 | 11789 | 11187 | 10307 | 9417 | 8360 | 6492 | 5071 | 4185 | 3605 | 3260 | 2095 | 1132 |
| | 11910 | 12940 | 13590 | 13790 | 14110 | 13700 | 13110 | 12220 | 11590 | 10430 | 8010 | 6185 | 5290 | 4720 | 4340 | 2730 | 1498 |
| | 15770 | 16790 | 18105 | 17960 | 18175 | 17480 | 16515 | 15317 | 13262 | 11661 | 9535 | 7758 | 6768 | 5930 | 5420 | 3285 | 2117 |
| 3D | 6505 | 7310 | 7678 | 7797 | 7985 | 8295 | 8154 | 7915 | 7395 | 6840 | 5340 | 4450 | 3430 | 3030 | 2725 | 1844 | 1072 |
| | 8750 | 9290 | 9615 | 9940 | 9940 | 9730 | 9410 | 9280 | 8580 | 7990 | 6490 | 5615 | 4990 | 4340 | 3880 | 2830 | 1748 |
| | 11410 | 11890 | 12366 | 12835 | 12630 | 12560 | 12505 | 11830 | 10905 | 9957 | 7993 | 6823 | 6195 | 5718 | 5413 | 3655 | 2430 |
| 3.5D | 4447 | 4745 | 4964 | 5270 | 5625 | 5740 | 5615 | 5386 | 5110 | 4860 | 3920 | 3049 | 2530 | 2291 | 2136 | 1605 | 876 |
| | 6425 | 6880 | 7480 | 7520 | 7860 | 7500 | 7010 | 6741 | 6447 | 5940 | 5380 | 4600 | 4240 | 3820 | 3450 | 2320 | 1718 |
| | 8678 | 9060 | 9170 | 8940 | 8885 | 8820 | 8826 | 8615 | 7970 | 7485 | 6155 | 5427 | 4850 | 4500 | 4490 | 3379 | 2284 |
| 4D | 2950 | 3090 | 3290 | 3434 | 3640 | 3690 | 3575 | 3345 | 3165 | 3120 | 2565 | 2019 | 1807 | 1711 | 1590 | 1222 | 693 |
| | 4010 | 4290 | 4530 | 4700 | 4860 | 5010 | 5090 | 5090 | 4572 | 4250 | 3670 | 3060 | 2798 | 2380 | 2070 | 1701 | 1234 |
| | 6095 | 6605 | 6905 | 7290 | 7432 | 7210 | 7091 | 6707 | 6196 | 5761 | 4900 | 4570 | 3867 | 3794 | 3695 | 2665 | 2071 |
| 4.5D | 1711 | 1919 | 2050 | 2105 | 2140 | 2157 | 2092 | 2004 | 1878 | 1771 | 1540 | 1296 | 1158 | 1091 | 1037 | 766 | 466 |
| | 2730 | 2960 | 3160 | 3310 | 3440 | 3220 | 3170 | 3110 | 3010 | 2751 | 2175 | 1863 | 1666 | 1490 | 1291 | 1057 | 808 |
| | 4449 | 4685 | 4930 | 5226 | 5389 | 5482 | 5505 | 5328 | 4945 | 4232 | 3610 | 3300 | 3154 | 3015 | 2835 | 2097 | 1827 |
| 5D | 1203 | 1375 | 1439 | 1493 | 1521 | 1495 | 1446 | 1372 | 1252 | 1165 | 1015 | 856 | 759 | 656 | 592 | 477 | 291 |
| | 1763 | 1911 | 2040 | 2220 | 2347 | 2310 | 2220 | 2060 | 1836 | 1661 | 1351 | 1085 | 1108 | 1139 | 979 | 698 | 497 |
| | 2976 | 3230 | 3554 | 3722 | 3872 | 3824 | 3738 | 3575 | 3255 | 2985 | 2627 | 2390 | 2154 | 2015 | 1919 | 1662 | 1559 |

TABLE 4 Distributions of Luminous Intensities of European Lamps

| | 20L | 15L | 10L | 9L | 8L | 7L | 6L | 5L | 4.5L | 4L | 3.5L | 3L | 2.5L | 2L | 1.5L | 1L | 0.5L | 0 |
|-------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|----------|
| 5U | 41 | 46 | 53 | 53 | 55 | 55 | 56 | 58 | 57 | 57 | 58 | 60 | 59 | 63 | 61 | 62 | 63 | 65 |
| | 56 | 66 | 64 | 66 | 67 | 69 | 69 | 72 | 72 | 76 | 75 | 75 | 72 | 75 | 75 | 77 | 77 | 78 |
| | 70 | 91 | 91 | 88 | 90 | 91 | 94 | 96 | 95 | 96 | 98 | 97 | 101 | 102 | 101 | 105 | 103 | 108 |
| 4.5U | 41 | 46 | 56 | 58 | 58 | 61 | 60 | 61 | 61 | 66 | 65 | 65 | 64 | 66 | 66 | 67 | 65 | 69 |
| | 58 | 69 | 67 | 68 | 73 | 73 | 78 | 78 | 78 | 80 | 80 | 80 | 81 | 81 | 81 | 84 | 84 | 85 |
| | 71 | 88 | 94 | 93 | 94 | 98 | 100 | 101 | 100 | 103 | 104 | 106 | 106 | 108 | 114 | 113 | 116 | 121 |
| 4U | 44 | 48 | 60 | 61 | 65 | 65 | 66 | 67 | 66 | 68 | 69 | 67 | 70 | 71 | 71 | 76 | 74 | 77 |
| | 56 | 66 | 73 | 74 | 76 | 79 | 83 | 87 | 85 | 87 | 86 | 89 | 88 | 90 | 90 | 93 | 93 | 95 |
| | 71 | 91 | 98 | 102 | 101 | 102 | 104 | 106 | 108 | 109 | 109 | 115 | 112 | 117 | 118 | 119 | 119 | 124 |
| 3.5U | 42 | 54 | 66 | 66 | 69 | 68 | 72 | 70 | 75 | 75 | 76 | 75 | 76 | 77 | 78 | 80 | 82 | 83 |
| | 59 | 70 | 80 | 82 | 82 | 85 | 90 | 92 | 93 | 95 | 93 | 95 | 96 | 100 | 99 | 104 | 105 | 106 |
| | 76 | 95 | 105 | 106 | 106 | 108 | 115 | 113 | 116 | 117 | 118 | 122 | 123 | 126 | 128 | 135 | 136 | 139 |
| 3U | 46 | 54 | 71 | 71 | 73 | 75 | 74 | 80 | 80 | 81 | 83 | 86 | 85 | 88 | 90 | 91 | 95 | 94 |
| | 59 | 73 | 86 | 89 | 92 | 93 | 99 | 101 | 100 | 104 | 101 | 104 | 102 | 106 | 109 | 115 | 115 | 118 |
| | 76 | 96 | 110 | 111 | 115 | 117 | 118 | 121 | 124 | 130 | 128 | 133 | 133 | 138 | 141 | 150 | 155 | 155 |
| 2.5U | 43 | 53 | 73 | 78 | 78 | 82 | 82 | 91 | 96 | 96 | 94 | 93 | 93 | 95 | 96 | 98 | 100 | 105 |
| | 63 | 78 | 95 | 99 | 106 | 110 | 109 | 108 | 110 | 110 | 111 | 117 | 115 | 127 | 130 | 131 | 132 | 137 |
| | 79 | 105 | 123 | 126 | 127 | 131 | 138 | 141 | 141 | 142 | 150 | 153 | 160 | 165 | 167 | 185 | 182 | 194 |
| 2U | 48 | 59 | 90 | 90 | 93 | 100 | 97 | 98 | 96 | 101 | 108 | 108 | 110 | 115 | 116 | 120 | 120 | 128 |
| | 65 | 76 | 108 | 116 | 126 | 130 | 130 | 130 | 130 | 135 | 133 | 134 | 135 | 141 | 147 | 151 | 156 | 162 |
| | 78 | 108 | 132 | 140 | 151 | 155 | 161 | 161 | 163 | 167 | 172 | 182 | 183 | 194 | 195 | 206 | 216 | |
| 1.5U | 53 | 65 | 91 | 100 | 106 | 122 | 133 | 134 | 129 | 128 | 128 | 131 | 133 | 136 | 136 | 138 | 148 | 148 |
| | 71 | 88 | 123 | 131 | 145 | 156 | 155 | 154 | 162 | 158 | 157 | 167 | 169 | 179 | 182 | 185 | 195 | 195 |
| | 86 | 119 | 159 | 165 | 175 | 184 | 193 | 201 | 206 | 213 | 220 | 222 | 240 | 240 | 251 | 263 | 273 | 286 |
| 1U | 55 | 73 | 108 | 132 | 144 | 166 | 165 | 159 | 157 | 161 | 161 | 164 | 162 | 168 | 171 | 179 | 186 | 195 |
| | 79 | 96 | 146 | 162 | 193 | 198 | 203 | 206 | 205 | 206 | 207 | 212 | 214 | 218 | 225 | 230 | 237 | 251 |
| | 90 | 126 | 172 | 188 | 211 | 224 | 233 | 248 | 257 | 260 | 259 | 260 | 271 | 283 | 292 | 300 | 312 | 334 |
| 0.5U | 58 | 77 | 121 | 140 | 163 | 198 | 213 | 227 | 221 | 228 | 235 | 234 | 235 | 241 | 249 | 260 | 276 | 288 |
| | 82 | 110 | 157 | 195 | 228 | 256 | 254 | 277 | 279 | 288 | 280 | 273 | 285 | 291 | 302 | 314 | 333 | 350 |
| | 98 | 152 | 216 | 234 | 266 | 288 | 313 | 312 | 321 | 333 | 338 | 345 | 351 | 373 | 383 | 408 | 430 | 446 |
| 0 | 70 | 101 | 176 | 216 | 257 | 297 | 323 | 341 | 351 | 348 | 350 | 369 | 395 | 420 | 435 | 462 | 426 | 415 |
| | 90 | 132 | 223 | 259 | 291 | 330 | 361 | 389 | 390 | 393 | 413 | 439 | 450 | 471 | 499 | 531 | 545 | 606 |
| | 108 | 164 | 248 | 307 | 359 | 393 | 423 | 453 | 463 | 465 | 494 | 523 | 536 | 558 | 574 | 568 | 625 | 724 |
| 0.5D | 68 | 123 | 283 | 351 | 453 | 504 | 664 | 798 | 916 | 951 | 1023 | 1083 | 1206 | 1287 | 1456 | 1656 | 1818 | 2287 |
| | 102 | 189 | 416 | 483 | 596 | 733 | 891 | 1081 | 1200 | 1337 | 1406 | 1456 | 1562 | 1631 | 1675 | 1850 | 2200 | 2956 |
| | 152 | 293 | 564 | 655 | 765 | 995 | 1071 | 1400 | 1556 | 1612 | 1775 | 1968 | 2462 | 2662 | 2718 | 2606 | 2756 | 3250 |
| 1D | 92 | 185 | 681 | 1150 | 1643 | 2181 | 2650 | 3587 | 4137 | 4600 | 4925 | 5450 | 6112 | 6537 | 6993 | 7375 | 7937 | 9187 |
| | 120 | 329 | 1300 | 1850 | 2437 | 2937 | 3737 | 4425 | 4781 | 5587 | 5906 | 6337 | 6631 | 7156 | 7700 | 8500 | 10087 | 12025 |
| | 202 | 670 | 1906 | 2331 | 3050 | 3806 | 4631 | 5912 | 6462 | 6650 | 7006 | 7137 | 7400 | 7887 | 8662 | 9656 | 11125 | 13250 |
| 1.5D | 112 | 281 | 1768 | 2162 | 2668 | 3231 | 3937 | 4731 | 5125 | 5637 | 5975 | 6312 | 6750 | 7193 | 7787 | 8175 | 9043 | 10662 |
| | 178 | 497 | 2056 | 2543 | 3581 | 4556 | 5381 | 5950 | 6181 | 6381 | 6650 | 7012 | 7350 | 8300 | 8525 | 9368 | 10506 | 11718 |
| | 419 | 1125 | 2656 | 3500 | 4218 | 5037 | 6000 | 6656 | 7018 | 7468 | 7750 | 8043 | 8518 | 9312 | 9750 | 11125 | 12437 | 14125 |
| 2D | 147 | 473 | 2006 | 2381 | 2825 | 3581 | 4125 | 4625 | 4925 | 5362 | 5956 | 6181 | 6356 | 6625 | 6768 | 7050 | 7281 | 7743 |
| | 275 | 868 | 2662 | 3112 | 4243 | 4662 | 5256 | 5800 | 6012 | 6206 | 6462 | 6812 | 7087 | 7493 | 8012 | 8375 | 8625 | 8931 |
| | 594 | 1231 | 3375 | 4131 | 4725 | 5606 | 6337 | 6812 | 6968 | 7106 | 7125 | 7500 | 8018 | 8637 | 9050 | 9656 | 10225 | 11437 |
| 2.5D | 209 | 606 | 2200 | 2600 | 2987 | 3550 | 4131 | 4675 | 4806 | 4900 | 4918 | 5406 | 5537 | 5856 | 5893 | 6025 | 6618 | 6812 |
| | 365 | 1078 | 2768 | 3218 | 3787 | 4250 | 4668 | 5043 | 5362 | 5606 | 5862 | 6093 | 6187 | 6687 | 7193 | 7693 | 7750 | 7831 |
| | 750 | 1506 | 3543 | 4206 | 4868 | 5300 | 5775 | 5968 | 6431 | 6750 | 6893 | 7375 | 7575 | 7812 | 8062 | 8656 | 8875 | 9418 |
| 3D | 290 | 1018 | 2193 | 2437 | 2768 | 3150 | 3568 | 3825 | 3968 | 4118 | 4243 | 4525 | 4868 | 4943 | 5025 | 5112 | 5456 | 5600 |
| | 580 | 1250 | 2881 | 3293 | 3825 | 4200 | 4525 | 4912 | 5112 | 5306 | 5368 | 5406 | 5543 | 5575 | 6206 | 6768 | 6975 | 7006 |
| | 868 | 1618 | 3781 | 4231 | 4656 | 5118 | 5437 | 5743 | 5968 | 6343 | 6731 | 7106 | 7331 | 7587 | 7775 | 7562 | 7931 | 8718 |
| 3.5D | 365 | 1093 | 2193 | 2412 | 2631 | 2881 | 3175 | 3518 | 3700 | 3856 | 3956 | 4156 | 4362 | 4468 | 4718 | 4768 | 4931 | |
| | 704 | 1375 | 2687 | 3200 | 3712 | 3987 | 4250 | 4512 | 4681 | 4812 | 4862 | 4881 | 4918 | 4950 | 5425 | 5800 | 6050 | 6343 |
| | 975 | 1881 | 3693 | 4012 | 4325 | 4587 | 5106 | 5375 | 5743 | 6193 | 6543 | 6850 | 7037 | 7143 | 7181 | 7243 | 7375 | 7512 |
| 4D | 524 | 1153 | 2025 | 2187 | 2437 | 2643 | 2875 | 3225 | 3312 | 3381 | 3525 | 3700 | 3843 | 3912 | 4018 | 4181 | 4218 | 4325 |
| | 821 | 1450 | 2712 | 3100 | 3487 | 3693 | 3875 | 4093 | 4181 | 4231 | 4287 | 4400 | 4568 | 4737 | 4668 | 4625 | 4975 | 5281 |
| | 1137 | 1950 | 3556 | 3831 | 4143 | 4568 | 4806 | 5412 | 5706 | 5787 | 6218 | 6400 | 6525 | 6675 | 6750 | 6850 | 7118 | 7325 |
| 4.5D | 515 | 1200 | 1937 | 2100 | 2306 | 2487 | 2725 | 2918 | 3056 | 3200 | 3268 | 3262 | 3312 | 3362 | 3468 | 3506 | 3543 | 3656 |
| | 887 | 1600 | 2650 | 2893 | 3287 | 3443 | 3518 | 3587 | 3618 | 3693 | 3837 | 3943 | 4043 | 4156 | 4293 | 4412 | 4406 | 4350 |
| | 1256 | 2006 | 3268 | 3650 | 3900 | 4137 | 4575 | 4950 | 5212 | 5418 | 5612 | 5731 | 5862 | 6043 | 6206 | 6112 | 6131 | 6393 |
| 5D | 725 | 1128 | 1787 | 1868 | 2087 | 2250 | 2462 | 2650 | 2687 | 2731 | 2743 | 2743 | 2806 | 2850 | 2906 | 2937 | 2943 | 2975 |
| | 920 | 1550 | 2412 | 2687 | 2856 | 2931 | 3000 | 3043 | 3062 | 3131 | 3237 | 3356 | 3456 | 3537 | 3618 | 3675 | 3775 | 3850 |
| | 1256 | 2062 | 3062 | 3325 | 3581 | 3862 | 4168 | 4468 | 4637 | 4831 | 4975 | 5087 | 5137 | 5331 | 5368 | 5437 | 5593 | |

NOTE: The three entries in each cell are (from top to bottom) the 25th percentile, the median (the 50th percentile), and the 75th percentile.

(continued on next page)

TABLE 4 (continued)

| | 0.5R | 1R | 1.5R | 2R | 2.5R | 3R | 3.5R | 4R | 4.5R | 5R | 6R | 7R | 8R | 9R | 10R | 15R | 20R |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| 5U | 68 | 67 | 68 | 69 | 70 | 68 | 69 | 68 | 68 | 68 | 65 | 60 | 60 | 55 | 53 | 48 | 48 |
| | 80 | 79 | 79 | 82 | 85 | 85 | 87 | 84 | 82 | 84 | 82 | 75 | 71 | 73 | 70 | 65 | 61 |
| | 116 | 120 | 120 | 119 | 118 | 118 | 114 | 114 | 115 | 111 | 105 | 102 | 103 | 101 | 102 | 91 | 76 |
| 4.5U | 70 | 70 | 72 | 72 | 73 | 75 | 74 | 75 | 73 | 72 | 72 | 71 | 68 | 65 | 60 | 55 | 55 |
| | 84 | 86 | 84 | 90 | 89 | 91 | 93 | 94 | 95 | 94 | 90 | 86 | 82 | 80 | 77 | 67 | 68 |
| | 126 | 121 | 127 | 120 | 120 | 121 | 120 | 118 | 115 | 111 | 108 | 108 | 110 | 109 | 103 | 93 | 83 |
| 4U | 79 | 81 | 80 | 81 | 83 | 81 | 82 | 83 | 80 | 80 | 80 | 79 | 76 | 71 | 71 | 65 | 58 |
| | 96 | 98 | 101 | 102 | 103 | 105 | 103 | 104 | 105 | 104 | 101 | 104 | 101 | 93 | 83 | 78 | 78 |
| | 126 | 132 | 131 | 135 | 130 | 133 | 131 | 132 | 131 | 130 | 122 | 121 | 121 | 123 | 115 | 102 | 96 |
| 3.5U | 85 | 85 | 87 | 91 | 93 | 95 | 90 | 88 | 86 | 90 | 91 | 90 | 90 | 85 | 82 | 67 | 70 |
| | 105 | 110 | 106 | 113 | 110 | 115 | 115 | 119 | 118 | 116 | 113 | 119 | 120 | 105 | 96 | 96 | 83 |
| | 142 | 147 | 148 | 150 | 151 | 150 | 152 | 148 | 146 | 146 | 145 | 154 | 144 | 135 | 120 | 122 | 161 |
| 3U | 95 | 96 | 101 | 99 | 101 | 106 | 105 | 105 | 104 | 106 | 108 | 106 | 107 | 96 | 89 | 98 | 85 |
| | 120 | 127 | 123 | 128 | 133 | 133 | 131 | 131 | 133 | 132 | 143 | 151 | 138 | 116 | 117 | 118 | 120 |
| | 159 | 166 | 170 | 179 | 179 | 175 | 176 | 177 | 175 | 173 | 177 | 185 | 185 | 166 | 144 | 183 | 185 |
| 2.5U | 105 | 106 | 107 | 115 | 117 | 119 | 120 | 121 | 128 | 131 | 128 | 141 | 138 | 126 | 120 | 125 | 93 |
| | 136 | 136 | 142 | 146 | 153 | 152 | 153 | 153 | 153 | 156 | 160 | 186 | 166 | 150 | 138 | 221 | 137 |
| | 203 | 201 | 201 | 208 | 208 | 213 | 209 | 200 | 208 | 215 | 242 | 246 | 198 | 171 | 183 | 335 | 201 |
| 2U | 130 | 135 | 137 | 143 | 149 | 158 | 160 | 163 | 162 | 163 | 178 | 188 | 176 | 185 | 168 | 183 | 116 |
| | 164 | 180 | 183 | 183 | 184 | 187 | 187 | 193 | 196 | 198 | 213 | 220 | 212 | 218 | 236 | 309 | 158 |
| | 222 | 235 | 244 | 247 | 254 | 258 | 255 | 253 | 245 | 243 | 291 | 313 | 283 | 285 | 326 | 432 | 185 |
| 1.5U | 155 | 157 | 163 | 168 | 176 | 188 | 201 | 211 | 218 | 221 | 243 | 270 | 294 | 294 | 306 | 253 | 124 |
| | 202 | 206 | 221 | 222 | 225 | 228 | 238 | 236 | 263 | 262 | 284 | 315 | 355 | 470 | 590 | 314 | 151 |
| | 299 | 318 | 308 | 296 | 312 | 318 | 330 | 330 | 348 | 369 | 369 | 390 | 550 | 885 | 962 | 536 | 185 |
| 1U | 203 | 220 | 227 | 253 | 260 | 281 | 288 | 307 | 324 | 380 | 428 | 626 | 732 | 841 | 588 | 227 | 130 |
| | 258 | 264 | 281 | 286 | 301 | 334 | 341 | 365 | 390 | 440 | 589 | 875 | 1173 | 988 | 844 | 380 | 148 |
| | 354 | 363 | 386 | 395 | 396 | 401 | 409 | 455 | 479 | 535 | 1037 | 1906 | 1712 | 1450 | 1481 | 577 | 205 |
| 0.5U | 291 | 320 | 323 | 355 | 363 | 466 | 610 | 693 | 1002 | 1178 | 1925 | 2156 | 1650 | 1103 | 756 | 253 | 131 |
| | 365 | 396 | 413 | 447 | 495 | 578 | 712 | 1018 | 1400 | 2037 | 2750 | 2756 | 2318 | 1643 | 1168 | 341 | 171 |
| | 448 | 493 | 518 | 526 | 625 | 842 | 1212 | 1568 | 2456 | 3093 | 3562 | 3300 | 2625 | 2037 | 1693 | 551 | 219 |
| 0 | 616 | 718 | 940 | 1606 | 2087 | 2881 | 4118 | 4837 | 4331 | 3825 | 3393 | 2693 | 1800 | 1209 | 748 | 220 | 131 |
| | 676 | 825 | 1081 | 1937 | 3043 | 4837 | 5837 | 5456 | 5056 | 4800 | 4037 | 3168 | 2375 | 1775 | 1237 | 419 | 183 |
| | 850 | 1106 | 1600 | 3068 | 4950 | 6950 | 7675 | 7218 | 7175 | 7093 | 5581 | 4118 | 3075 | 2406 | 1837 | 596 | 240 |
| 0.5D | 3562 | 5468 | 8300 | 9450 | 8593 | 7562 | 6425 | 5718 | 5431 | 4837 | 3931 | 2975 | 2006 | 1431 | 987 | 245 | 131 |
| | 4206 | 6806 | 9206 | 10181 | 10681 | 10262 | 8837 | 7731 | 6668 | 6043 | 4600 | 3468 | 2650 | 1887 | 1337 | 448 | 200 |
| | 5475 | 7800 | 10293 | 11881 | 13000 | 12012 | 11431 | 10337 | 9500 | 8062 | 6287 | 4500 | 3312 | 2443 | 1875 | 607 | 256 |
| 1D | 11000 | 10937 | 11762 | 11731 | 10318 | 8718 | 7875 | 6650 | 5462 | 5312 | 3943 | 3250 | 2387 | 1756 | 1132 | 345 | 132 |
| | 13937 | 14000 | 13437 | 13250 | 12312 | 11250 | 9412 | 8375 | 7125 | 6250 | 5431 | 4212 | 3168 | 2243 | 1756 | 475 | 231 |
| | 15250 | 17687 | 17250 | 14625 | 14250 | 13312 | 11518 | 10437 | 9200 | 8318 | 6325 | 4743 | 3781 | 2850 | 2131 | 718 | 293 |
| 1.5D | 10325 | 10343 | 10356 | 10656 | 9612 | 8743 | 7762 | 7087 | 6400 | 5850 | 4731 | 3637 | 2856 | 2200 | 1806 | 436 | 171 |
| | 12312 | 12812 | 12287 | 11937 | 11900 | 9750 | 8881 | 7981 | 7312 | 5550 | 4543 | 3462 | 2587 | 2043 | 631 | 273 | 937 |
| | 16000 | 16312 | 16000 | 15000 | 14312 | 13625 | 12125 | 11068 | 10075 | 9056 | 7375 | 5506 | 4562 | 3431 | 2581 | 937 | 348 |
| 2D | 8056 | 8275 | 8700 | 9375 | 9531 | 8687 | 7750 | 6875 | 6312 | 5600 | 4993 | 4043 | 3293 | 2593 | 2156 | 556 | 197 |
| | 9300 | 10031 | 10218 | 10381 | 10706 | 10712 | 10462 | 9968 | 8925 | 8062 | 6481 | 4981 | 4087 | 3268 | 2368 | 767 | 359 |
| | 12212 | 12381 | 13062 | 12231 | 12143 | 11706 | 11750 | 11125 | 10437 | 9493 | 7862 | 6306 | 5131 | 4325 | 3187 | 1318 | 481 |
| 2.5D | 6925 | 7050 | 7462 | 7893 | 7743 | 7643 | 7250 | 6762 | 6237 | 5737 | 5087 | 4381 | 3500 | 2731 | 2281 | 700 | 271 |
| | 7937 | 8143 | 8462 | 8768 | 8850 | 9225 | 8412 | 8425 | 8556 | 7831 | 6506 | 5550 | 4406 | 3437 | 2837 | 1122 | 433 |
| | 10062 | 10668 | 10381 | 10425 | 10450 | 10168 | 10143 | 10031 | 9681 | 8793 | 7493 | 6437 | 5625 | 4712 | 3906 | 1506 | 598 |
| 3D | 5693 | 5787 | 6181 | 6643 | 6681 | 6356 | 5900 | 5675 | 5612 | 5687 | 4968 | 4656 | 3543 | 2943 | 2443 | 925 | 299 |
| | 7143 | 7500 | 7912 | 7893 | 7656 | 7668 | 7737 | 7381 | 7000 | 6643 | 6106 | 5493 | 4506 | 3612 | 2912 | 1300 | 444 |
| | 8962 | 9368 | 9506 | 9306 | 9331 | 9281 | 9075 | 9056 | 8725 | 8093 | 7231 | 6181 | 5362 | 4843 | 3893 | 1743 | 900 |
| 3.5D | 5050 | 5275 | 5537 | 5637 | 5306 | 4968 | 4862 | 4762 | 4693 | 4693 | 4506 | 4143 | 3606 | 2893 | 2462 | 1125 | 443 |
| | 6375 | 6481 | 6418 | 6506 | 6456 | 6406 | 6525 | 6500 | 6218 | 5868 | 5550 | 4881 | 4237 | 3768 | 3225 | 1475 | 608 |
| | 7818 | 8156 | 8462 | 8456 | 8306 | 8131 | 8193 | 8087 | 7900 | 7743 | 6987 | 6025 | 5331 | 4756 | 4256 | 1900 | 1021 |
| 4D | 4412 | 4400 | 4537 | 4625 | 4493 | 4275 | 4293 | 4325 | 4362 | 4368 | 4181 | 3825 | 3318 | 2875 | 2325 | 1181 | 491 |
| | 5500 | 5481 | 5562 | 5487 | 5437 | 5662 | 5543 | 5431 | 5406 | 5300 | 4868 | 4475 | 4068 | 3531 | 3043 | 1512 | 668 |
| | 7443 | 7500 | 7687 | 7818 | 7612 | 7262 | 7293 | 7168 | 7050 | 6806 | 6231 | 5456 | 4850 | 4343 | 4006 | 2118 | 1162 |
| 4.5D | 3737 | 3768 | 3887 | 3825 | 3831 | 3743 | 3625 | 3581 | 3712 | 3768 | 3756 | 3412 | 2918 | 2587 | 2356 | 1162 | 608 |
| | 4450 | 4650 | 4806 | 4750 | 4681 | 4631 | 4668 | 4675 | 4631 | 4468 | 4187 | 3950 | 3681 | 3262 | 2987 | 1400 | 912 |
| | 6650 | 6875 | 6987 | 7087 | 6931 | 6625 | 6262 | 6268 | 6175 | 6093 | 5806 | 5331 | 4481 | 4118 | 3906 | 2150 | 1143 |
| 5D | 3031 | 3062 | 3150 | 3100 | 3181 | 3287 | 3281 | 3368 | 3337 | 3318 | 3150 | 3050 | 2618 | 2387 | 2200 | 1186 | 632 |
| | 3912 | 3893 | 3956 | 4037 | 3987 | 3956 | 3906 | 3862 | 3818 | 3768 | 3675 | 3581 | 3262 | 2893 | 2681 | 1393 | 918 |
| | 5906 | 5968 | 6081 | 6106 | 6087 | 6037 | 5900 | 5481 | 5318 | 5150 | 4943 | 4606 | 3937 | 3612 | 3500 | 2050 | 1200 |

TABLE 5 Distributions of Luminous Intensities of Japanese SAE-J Lamps

| | 20L | 15L | 10L | 9L | 8L | 7L | 6L | 5L | 4.5L | 4L | 3.5L | 3L | 2.5L | 2L | 1.5L | 1L | 0.5L | 0 |
|-------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|----------|
| 5U | 43 | 54 | 81 | 89 | 99 | 107 | 116 | 117 | 123 | 126 | 132 | 136 | 137 | 145 | 147 | 148 | 152 | 158 |
| | 56 | 72 | 106 | 115 | 117 | 129 | 130 | 139 | 143 | 146 | 153 | 157 | 162 | 166 | 171 | 181 | 186 | 192 |
| | 73 | 104 | 142 | 144 | 155 | 170 | 180 | 200 | 206 | 205 | 214 | 219 | 224 | 226 | 228 | 244 | 251 | 250 |
| 4.5U | 40 | 56 | 80 | 86 | 96 | 107 | 121 | 121 | 130 | 131 | 135 | 142 | 146 | 148 | 152 | 158 | 162 | 161 |
| | 56 | 73 | 111 | 117 | 131 | 135 | 144 | 146 | 147 | 157 | 158 | 165 | 167 | 176 | 180 | 188 | 196 | 203 |
| | 71 | 107 | 153 | 159 | 168 | 180 | 194 | 208 | 217 | 224 | 230 | 241 | 246 | 257 | 251 | 262 | 264 | 275 |
| 4U | 44 | 64 | 94 | 106 | 114 | 120 | 132 | 142 | 148 | 153 | 157 | 163 | 168 | 172 | 175 | 179 | 180 | 184 |
| | 67 | 84 | 129 | 139 | 144 | 152 | 160 | 167 | 174 | 182 | 187 | 191 | 200 | 206 | 213 | 220 | 224 | 234 |
| | 77 | 120 | 172 | 187 | 200 | 222 | 238 | 258 | 265 | 274 | 282 | 285 | 288 | 294 | 300 | 312 | 321 | 330 |
| 3.5U | 41 | 63 | 104 | 107 | 121 | 130 | 138 | 152 | 161 | 165 | 165 | 173 | 177 | 183 | 192 | 194 | 203 | 215 |
| | 66 | 84 | 139 | 141 | 151 | 159 | 171 | 184 | 188 | 196 | 201 | 206 | 211 | 220 | 228 | 234 | 244 | 258 |
| | 74 | 123 | 175 | 189 | 202 | 214 | 240 | 263 | 266 | 280 | 289 | 300 | 316 | 326 | 336 | 349 | 358 | 368 |
| 3U | 49 | 76 | 120 | 136 | 154 | 159 | 178 | 188 | 187 | 194 | 193 | 198 | 205 | 212 | 228 | 245 | 265 | 282 |
| | 70 | 100 | 157 | 169 | 180 | 191 | 203 | 217 | 221 | 229 | 236 | 251 | 257 | 266 | 277 | 294 | 304 | 314 |
| | 87 | 144 | 200 | 211 | 227 | 254 | 275 | 302 | 314 | 334 | 349 | 365 | 387 | 407 | 427 | 437 | 452 | 460 |
| 2.5U | 49 | 81 | 127 | 141 | 159 | 171 | 182 | 201 | 209 | 217 | 218 | 223 | 228 | 231 | 244 | 252 | 275 | 289 |
| | 75 | 108 | 183 | 193 | 198 | 205 | 222 | 239 | 253 | 262 | 268 | 274 | 290 | 307 | 317 | 329 | 346 | 355 |
| | 88 | 143 | 205 | 220 | 238 | 265 | 289 | 316 | 326 | 348 | 362 | 390 | 414 | 439 | 466 | 502 | 526 | 536 |
| 2U | 56 | 94 | 162 | 178 | 201 | 202 | 222 | 239 | 237 | 251 | 256 | 257 | 266 | 279 | 295 | 319 | 349 | 372 |
| | 93 | 133 | 226 | 243 | 260 | 273 | 294 | 313 | 334 | 351 | 356 | 375 | 393 | 411 | 442 | 461 | 490 | 521 |
| | 105 | 169 | 263 | 280 | 314 | 344 | 373 | 410 | 434 | 453 | 458 | 511 | 545 | 584 | 615 | 644 | 661 | 678 |
| 1.5U | 57 | 106 | 167 | 194 | 210 | 225 | 246 | 268 | 267 | 274 | 281 | 288 | 296 | 302 | 320 | 344 | 371 | 392 |
| | 85 | 141 | 253 | 271 | 292 | 317 | 343 | 383 | 392 | 406 | 423 | 440 | 462 | 495 | 525 | 551 | 602 | 650 |
| | 111 | 169 | 286 | 317 | 349 | 385 | 404 | 433 | 455 | 482 | 515 | 543 | 576 | 627 | 673 | 709 | 747 | 800 |
| 1U | 75 | 144 | 222 | 256 | 267 | 295 | 302 | 328 | 299 | 339 | 326 | 345 | 390 | 419 | 455 | 509 | 559 | 596 |
| | 107 | 187 | 308 | 342 | 382 | 412 | 415 | 495 | 452 | 545 | 534 | 604 | 648 | 695 | 744 | 806 | 837 | 880 |
| | 134 | 204 | 361 | 407 | 449 | 480 | 508 | 580 | 619 | 664 | 705 | 738 | 770 | 840 | 914 | 950 | 1006 | 1105 |
| 0.5U | 77 | 175 | 282 | 302 | 323 | 359 | 418 | 435 | 440 | 452 | 470 | 497 | 521 | 550 | 573 | 596 | 687 | 760 |
| | 115 | 202 | 345 | 387 | 421 | 461 | 514 | 551 | 569 | 603 | 644 | 691 | 751 | 814 | 880 | 921 | 965 | 1054 |
| | 138 | 244 | 429 | 470 | 529 | 587 | 652 | 714 | 748 | 782 | 842 | 889 | 948 | 1048 | 1126 | 1223 | 1362 | 1459 |
| 0 | 112 | 250 | 389 | 402 | 524 | 475 | 605 | 580 | 653 | 683 | 704 | 720 | 769 | 853 | 939 | 1003 | 1109 | 1339 |
| | 152 | 313 | 537 | 542 | 578 | 607 | 684 | 791 | 850 | 931 | 1003 | 1081 | 1165 | 1300 | 1422 | 1634 | 1847 | 2003 |
| | 177 | 338 | 622 | 689 | 772 | 862 | 953 | 1040 | 1098 | 1173 | 1234 | 1322 | 1492 | 1666 | 1931 | 2148 | 2409 | 2725 |
| 0.5D | 110 | 310 | 587 | 647 | 720 | 789 | 902 | 964 | 1007 | 1040 | 1081 | 1125 | 1189 | 1203 | 1453 | 1625 | 1897 | 2420 |
| | 164 | 419 | 777 | 867 | 937 | 1035 | 1093 | 1208 | 1243 | 1319 | 1562 | 1659 | 1781 | 1950 | 2169 | 2528 | 3290 | 3959 |
| | 204 | 497 | 950 | 1075 | 1134 | 1202 | 1429 | 1605 | 1728 | 1914 | 2109 | 2349 | 2633 | 2934 | 3420 | 3882 | 4315 | 5059 |
| 1D | 190 | 318 | 1031 | 1140 | 1251 | 1342 | 1528 | 1676 | 1782 | 1880 | 1970 | 2067 | 2333 | 2620 | 3089 | 3781 | 4511 | 6031 |
| | 245 | 653 | 1316 | 1456 | 1509 | 1609 | 1728 | 1972 | 2078 | 2222 | 2447 | 2693 | 3012 | 3381 | 3940 | 4772 | 5478 | 7088 |
| | 325 | 790 | 1487 | 1647 | 1935 | 2165 | 2373 | 2823 | 3111 | 3505 | 3943 | 4390 | 5001 | 5562 | 6588 | 7338 | 8651 | 10703 |
| 1.5D | 203 | 814 | 1555 | 1701 | 1884 | 2003 | 2172 | 2339 | 2464 | 2596 | 2723 | 2955 | 3220 | 3583 | 4102 | 5009 | 6656 | 8621 |
| | 279 | 895 | 1750 | 2009 | 2209 | 2356 | 2591 | 2863 | 3022 | 3225 | 3503 | 3909 | 4425 | 5056 | 5784 | 6650 | 7800 | 9991 |
| | 428 | 1011 | 2289 | 2408 | 2658 | 3109 | 3705 | 4410 | 4806 | 5576 | 6801 | 7845 | 8455 | 9192 | 10389 | 11850 | 14125 | 16609 |
| 2D | 284 | 1121 | 2076 | 2231 | 2425 | 2609 | 2964 | 3411 | 3562 | 3733 | 3906 | 4337 | 4867 | 4944 | 5048 | 7062 | 8719 | 10891 |
| | 400 | 1303 | 2600 | 2969 | 3228 | 3588 | 3997 | 4394 | 4634 | 4866 | 4913 | 5913 | 6428 | 7500 | 8594 | 9719 | 11531 | 13250 |
| | 530 | 1417 | 2933 | 3094 | 3673 | 4363 | 4829 | 6968 | 7765 | 8812 | 9531 | 10140 | 11109 | 12031 | 14500 | 16281 | 18359 | 19687 |
| 2.5D | 360 | 1178 | 2305 | 2532 | 2789 | 3112 | 3507 | 3946 | 4071 | 4214 | 4374 | 4645 | 5076 | 5584 | 6498 | 7454 | 9415 | 10850 |
| | 479 | 1278 | 2950 | 3309 | 3831 | 4331 | 4737 | 5181 | 5409 | 5706 | 6381 | 7178 | 8106 | 9162 | 9906 | 10787 | 12375 | 14469 |
| | 597 | 1542 | 3270 | 3684 | 4070 | 4717 | 5714 | 7298 | 7909 | 8486 | 9000 | 9372 | 10382 | 11360 | 13719 | 17109 | 18469 | 20063 |
| 3D | 381 | 1362 | 2606 | 2726 | 3108 | 3205 | 3576 | 3955 | 4123 | 4322 | 4579 | 5081 | 5138 | 5655 | 6911 | 7750 | 9106 | 9643 |
| | 493 | 1490 | 2944 | 3484 | 3753 | 4247 | 4787 | 5178 | 5325 | 5956 | 6515 | 6938 | 7500 | 8084 | 8903 | 11062 | 12250 | 13219 |
| | 687 | 1868 | 3507 | 3898 | 4743 | 5158 | 6103 | 6967 | 7709 | 8164 | 8515 | 9063 | 9859 | 10531 | 11688 | 13484 | 15219 | 17047 |
| 3.5D | 421 | 1075 | 2049 | 2306 | 2498 | 2918 | 3382 | 3795 | 3984 | 4155 | 4409 | 4683 | 4830 | 4984 | 5139 | 6203 | 7439 | 7864 |
| | 533 | 1242 | 2750 | 3212 | 3619 | 3944 | 4172 | 4390 | 4619 | 4944 | 5319 | 5722 | 6259 | 6978 | 7878 | 8684 | 9716 | 10550 |
| | 702 | 1742 | 2980 | 3339 | 3744 | 4309 | 4831 | 5736 | 6208 | 6454 | 6695 | 7092 | 8225 | 9026 | 9706 | 10623 | 12331 | 13250 |
| 4D | 419 | 887 | 1818 | 2018 | 2206 | 2412 | 2650 | 2993 | 3159 | 3311 | 3489 | 3797 | 4105 | 4464 | 4759 | 4864 | 5948 | 6339 |
| | 477 | 1284 | 2250 | 2491 | 2781 | 3038 | 3281 | 3550 | 3709 | 4037 | 4265 | 4491 | 4794 | 5456 | 6094 | 6853 | 7334 | 7881 |
| | 795 | 1587 | 2786 | 3190 | 3584 | 4034 | 4590 | 5312 | 5158 | 5650 | 5818 | 5790 | 6922 | 7485 | 8148 | 8893 | 9433 | 10797 |
| 4.5D | 343 | 654 | 1312 | 1504 | 1611 | 1766 | 1967 | 2264 | 2367 | 2439 | 2553 | 2681 | 2831 | 2953 | 3181 | 3367 | 3629 | 3948 |
| | 397 | 971 | 1703 | 1884 | 2113 | 2341 | 2606 | 2809 | 2903 | 3019 | 3243 | 3547 | 3800 | 4078 | 4456 | 4853 | 5169 | 5500 |
| | 637 | 1228 | 2110 | 2515 | 2856 | 3275 | 3682 | 4026 | 4230 | 4418 | 4572 | 4698 | 5026 | 5610 | 5740 | 6393 | 6997 | 7500 |
| 5D | 279 | 508 | 998 | 1103 | 1289 | 1433 | 1611 | 1733 | 1806 | 1867 | 1919 | 1978 | 2034 | 2170 | 2317 | 2607 | 2822 | 3068 |
| | 393 | 794 | 1328 | 1412 | 1478 | 1653 | 1869 | 2053 | 2203 | 2372 | 2578 | 2859 | 3184 | 3418 | 3697 | 3940 | 4172 | 4259 |
| | 610 | 1117 | 1936 | 2155 | 2362 | 2643 | 2817 | 3003 | 3084 | 3226 | 3361 | 3504 | 3665 | 4037 | 4386 | 4811 | 5189 | 5530 |

NOTE: The three entries in each cell are (from top to bottom) the 25th percentile, the median (the 50th percentile), and the 75th percentile.

(continued on next page)

TABLE 5 (continued)

| | 0.5R | 1R | 1.5R | 2R | 2.5R | 3R | 3.5R | 4R | 4.5R | 5R | 6R | 7R | 8R | 9R | 10R | 15R | 20R |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|
| 5U | 158 | 158 | 163 | 160 | 164 | 165 | 161 | 156 | 156 | 156 | 151 | 138 | 131 | 124 | 111 | 70 | 45 |
| | 198 | 199 | 198 | 198 | 194 | 192 | 187 | 185 | 186 | 174 | 170 | 168 | 164 | 153 | 140 | 99 | 68 |
| | 247 | 250 | 251 | 252 | 258 | 257 | 249 | 245 | 245 | 241 | 228 | 215 | 196 | 188 | 171 | 130 | 89 |
| 4.5U | 169 | 170 | 171 | 171 | 174 | 177 | 175 | 177 | 175 | 171 | 170 | 162 | 155 | 138 | 125 | 78 | 50 |
| | 205 | 215 | 216 | 219 | 219 | 217 | 213 | 208 | 201 | 200 | 196 | 187 | 184 | 176 | 162 | 119 | 76 |
| | 285 | 284 | 281 | 286 | 291 | 287 | 278 | 278 | 274 | 270 | 266 | 253 | 228 | 211 | 197 | 143 | 99 |
| 4U | 197 | 201 | 204 | 207 | 209 | 209 | 205 | 202 | 195 | 187 | 180 | 166 | 155 | 141 | 129 | 75 | 47 |
| | 243 | 249 | 252 | 251 | 244 | 235 | 235 | 228 | 225 | 220 | 211 | 208 | 203 | 185 | 165 | 122 | 75 |
| | 332 | 333 | 333 | 322 | 314 | 311 | 313 | 319 | 310 | 296 | 281 | 256 | 247 | 228 | 218 | 143 | 99 |
| 3.5U | 225 | 236 | 247 | 256 | 254 | 246 | 237 | 235 | 232 | 226 | 202 | 186 | 174 | 165 | 147 | 86 | 54 |
| | 264 | 274 | 282 | 283 | 287 | 285 | 283 | 282 | 278 | 273 | 261 | 245 | 245 | 223 | 201 | 139 | 86 |
| | 380 | 384 | 386 | 380 | 372 | 361 | 356 | 356 | 363 | 358 | 333 | 310 | 288 | 267 | 250 | 162 | 114 |
| 3U | 294 | 302 | 306 | 300 | 283 | 274 | 267 | 257 | 240 | 227 | 213 | 197 | 181 | 171 | 153 | 86 | 54 |
| | 326 | 331 | 339 | 348 | 352 | 345 | 340 | 334 | 334 | 329 | 303 | 290 | 262 | 229 | 205 | 142 | 85 |
| | 463 | 466 | 462 | 450 | 452 | 442 | 424 | 409 | 408 | 395 | 360 | 337 | 319 | 285 | 264 | 158 | 122 |
| 2.5U | 309 | 337 | 359 | 366 | 363 | 361 | 330 | 310 | 289 | 277 | 258 | 257 | 229 | 205 | 185 | 106 | 63 |
| | 369 | 398 | 416 | 435 | 451 | 451 | 448 | 451 | 453 | 447 | 427 | 386 | 343 | 315 | 272 | 167 | 106 |
| | 552 | 572 | 579 | 597 | 599 | 586 | 563 | 539 | 499 | 478 | 460 | 422 | 394 | 362 | 326 | 197 | 132 |
| 2U | 409 | 431 | 438 | 438 | 411 | 369 | 351 | 344 | 327 | 314 | 302 | 282 | 253 | 236 | 203 | 109 | 67 |
| | 554 | 573 | 592 | 602 | 581 | 562 | 550 | 544 | 531 | 509 | 451 | 407 | 359 | 321 | 286 | 173 | 113 |
| | 697 | 732 | 694 | 667 | 648 | 632 | 599 | 598 | 578 | 549 | 517 | 453 | 407 | 371 | 331 | 215 | 132 |
| 1.5U | 425 | 431 | 471 | 505 | 523 | 520 | 505 | 488 | 470 | 443 | 402 | 366 | 302 | 296 | 252 | 135 | 84 |
| | 701 | 743 | 762 | 755 | 720 | 700 | 681 | 647 | 633 | 605 | 539 | 478 | 428 | 400 | 362 | 208 | 133 |
| | 816 | 858 | 904 | 920 | 899 | 867 | 842 | 816 | 786 | 758 | 684 | 594 | 515 | 473 | 415 | 252 | 152 |
| 1U | 650 | 732 | 754 | 711 | 665 | 637 | 616 | 607 | 579 | 546 | 510 | 435 | 357 | 310 | 279 | 146 | 84 |
| | 917 | 928 | 925 | 898 | 864 | 826 | 775 | 718 | 664 | 624 | 565 | 545 | 508 | 468 | 408 | 234 | 143 |
| | 1154 | 1082 | 1197 | 1154 | 1113 | 1074 | 1036 | 1002 | 939 | 862 | 731 | 680 | 632 | 558 | 513 | 252 | 161 |
| 0.5U | 828 | 908 | 950 | 1006 | 1024 | 907 | 877 | 846 | 825 | 807 | 752 | 698 | 626 | 523 | 416 | 206 | 129 |
| | 1146 | 1198 | 1312 | 1347 | 1265 | 1169 | 1118 | 1087 | 1053 | 1028 | 922 | 828 | 731 | 637 | 524 | 326 | 189 |
| | 1622 | 1581 | 1673 | 1744 | 1758 | 1703 | 1537 | 1463 | 1393 | 1314 | 1161 | 905 | 900 | 814 | 737 | 394 | 244 |
| 0 | 1582 | 1564 | 1495 | 1544 | 1642 | 1767 | 1545 | 1399 | 1236 | 1303 | 1159 | 969 | 829 | 710 | 583 | 278 | 134 |
| | 2231 | 2775 | 2740 | 2756 | 2622 | 2209 | 2166 | 2216 | 2212 | 1941 | 1612 | 1317 | 1168 | 945 | 761 | 405 | 231 |
| | 3033 | 3319 | 3534 | 3761 | 3628 | 3317 | 3051 | 2834 | 2677 | 2432 | 1970 | 1669 | 1353 | 1131 | 933 | 528 | 272 |
| 0.5D | 3089 | 3809 | 4087 | 4184 | 4222 | 3836 | 3718 | 3457 | 3565 | 3548 | 2664 | 2331 | 1884 | 1418 | 1058 | 346 | 206 |
| | 5066 | 5956 | 6828 | 7119 | 7072 | 6137 | 5897 | 5359 | 4822 | 4219 | 3316 | 2575 | 2112 | 1728 | 1309 | 607 | 342 |
| | 6475 | 7764 | 8623 | 9011 | 9010 | 8172 | 7345 | 6736 | 5990 | 5300 | 4078 | 3354 | 2672 | 1953 | 1730 | 822 | 435 |
| 1D | 7123 | 8455 | 9497 | 9686 | 9499 | 8492 | 7868 | 7342 | 6067 | 5815 | 4717 | 3498 | 2650 | 2029 | 1595 | 576 | 264 |
| | 8966 | 10256 | 11428 | 11588 | 11491 | 11262 | 10053 | 9131 | 8056 | 7169 | 5428 | 4134 | 3450 | 2747 | 2122 | 908 | 377 |
| | 13047 | 14781 | 15984 | 17078 | 15828 | 14609 | 12607 | 11087 | 9710 | 8345 | 6335 | 5312 | 4305 | 3242 | 2600 | 1154 | 456 |
| 1.5D | 10990 | 13500 | 14609 | 14843 | 14578 | 13656 | 12812 | 11563 | 10547 | 9500 | 6906 | 5237 | 4439 | 3361 | 2678 | 995 | 316 |
| | 13625 | 15188 | 16437 | 16656 | 16125 | 15906 | 14656 | 13125 | 12094 | 10687 | 8500 | 6469 | 5172 | 4297 | 3531 | 1318 | 505 |
| | 19031 | 19703 | 20906 | 20969 | 19688 | 19375 | 17813 | 15141 | 13422 | 11781 | 9156 | 7297 | 5520 | 4997 | 4072 | 1751 | 840 |
| 2D | 13562 | 16000 | 15984 | 16719 | 16797 | 15656 | 14328 | 13593 | 12201 | 10809 | 8498 | 6789 | 5754 | 4681 | 3425 | 1232 | 461 |
| | 15312 | 17813 | 18438 | 19094 | 18000 | 17344 | 16469 | 14812 | 13437 | 12015 | 10053 | 8066 | 6534 | 5291 | 4341 | 1728 | 654 |
| | 20359 | 20531 | 22812 | 23953 | 22672 | 20984 | 20047 | 18359 | 15953 | 14609 | 11395 | 8875 | 6959 | 5862 | 4739 | 2057 | 932 |
| 2.5D | 11648 | 13156 | 15281 | 16078 | 16188 | 15766 | 14500 | 12609 | 11812 | 10535 | 9016 | 7641 | 6938 | 5030 | 4289 | 1819 | 523 |
| | 16125 | 18469 | 19031 | 19375 | 17750 | 17125 | 15688 | 14563 | 13406 | 12344 | 10500 | 8813 | 7250 | 5391 | 5013 | 2181 | 912 |
| | 21313 | 21297 | 23109 | 23109 | 21250 | 20906 | 20141 | 19156 | 17547 | 15438 | 12406 | 10203 | 7734 | 6422 | 5417 | 2492 | 1240 |
| 3D | 10439 | 10978 | 11755 | 12609 | 13484 | 13391 | 12161 | 10762 | 10022 | 9337 | 7662 | 6800 | 5761 | 4759 | 3979 | 2048 | 758 |
| | 14438 | 15500 | 15969 | 16000 | 15812 | 14875 | 13750 | 13719 | 12869 | 11894 | 9900 | 8047 | 6806 | 5703 | 4519 | 2303 | 936 |
| | 18812 | 19422 | 20140 | 19968 | 18609 | 17765 | 16859 | 16172 | 15000 | 13594 | 11466 | 9522 | 7605 | 6398 | 5364 | 2467 | 1211 |
| 3.5D | 8281 | 8515 | 8859 | 9319 | 9709 | 9750 | 9592 | 9467 | 9101 | 8054 | 6792 | 5915 | 5064 | 4656 | 3823 | 2034 | 968 |
| | 11453 | 12441 | 12725 | 12803 | 12540 | 12325 | 11594 | 10600 | 10231 | 9828 | 8438 | 7125 | 5647 | 5084 | 4419 | 2416 | 1109 |
| | 13812 | 14484 | 15766 | 16234 | 15359 | 14750 | 14422 | 13890 | 12906 | 11656 | 9877 | 8812 | 7098 | 5720 | 5091 | 2787 | 1397 |
| 4D | 6636 | 7084 | 7233 | 7183 | 7233 | 6978 | 6980 | 6960 | 6941 | 6700 | 5814 | 4940 | 4322 | 3349 | 2671 | 1592 | 762 |
| | 8394 | 8622 | 9119 | 9487 | 9619 | 9497 | 9034 | 8416 | 7903 | 7559 | 6737 | 5534 | 4756 | 4278 | 3859 | 2190 | 1079 |
| | 11803 | 12390 | 12703 | 12434 | 11765 | 11617 | 11200 | 10273 | 9063 | 8131 | 7231 | 6628 | 5672 | 4706 | 4129 | 2592 | 1204 |
| 4.5D | 4323 | 4648 | 4929 | 5121 | 5234 | 5175 | 5189 | 5132 | 5033 | 4843 | 4333 | 3881 | 3416 | 2795 | 2356 | 1248 | 773 |
| | 5944 | 6328 | 6622 | 6843 | 6906 | 6741 | 6534 | 6403 | 6090 | 5788 | 5294 | 4703 | 3790 | 3397 | 2922 | 1816 | 981 |
| | 7985 | 8345 | 8464 | 8520 | 8532 | 8501 | 8136 | 7680 | 7078 | 6723 | 5992 | 5173 | 4693 | 4231 | 3773 | 2448 | 1175 |
| 5D | 3270 | 3465 | 3631 | 3742 | 3701 | 3645 | 3531 | 3455 | 3414 | 3294 | 2901 | 2557 | 2281 | 2002 | 1725 | 984 | 616 |
| | 4384 | 4584 | 4553 | 4556 | 4634 | 4531 | 4413 | 4340 | 4028 | 3834 | 3572 | 3309 | 2944 | 2515 | 2168 | 1199 | 801 |
| | 5820 | 6164 | 6501 | 6707 | 6687 | 6523 | 6369 | 6060 | 5773 | 5621 | 4840 | 4332 | 3806 | 3522 | 3143 | 1976 | 1031 |

TABLE 6 Distributions of Luminous Intensities of Japanese ECE-J Lamps

| | 20L | 15L | 10L | 9L | 8L | 7L | 6L | 5L | 4.5L | 4L | 3.5L | 3L | 2.5L | 2L | 1.5L | 1L | 0.5L | 0 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|
| 5U | 38 | 40 | 47 | 52 | 52 | 55 | 54 | 54 | 54 | 57 | 56 | 58 | 56 | 60 | 62 | 65 | 63 | 66 |
| | 47 | 55 | 63 | 65 | 68 | 68 | 69 | 70 | 68 | 72 | 76 | 76 | 78 | 80 | 80 | 81 | 83 | 83 |
| | 60 | 68 | 85 | 85 | 87 | 91 | 93 | 94 | 94 | 97 | 98 | 100 | 102 | 106 | 104 | 104 | 105 | 108 |
| 4.5U | 38 | 41 | 53 | 54 | 55 | 55 | 55 | 56 | 57 | 56 | 59 | 59 | 61 | 61 | 63 | 66 | 67 | 69 |
| | 46 | 54 | 65 | 66 | 68 | 69 | 72 | 74 | 75 | 76 | 77 | 79 | 80 | 82 | 84 | 88 | 88 | 87 |
| | 62 | 71 | 86 | 90 | 92 | 91 | 96 | 98 | 98 | 96 | 102 | 105 | 106 | 106 | 110 | 110 | 114 | 114 |
| 4U | 40 | 44 | 56 | 56 | 59 | 60 | 63 | 63 | 63 | 62 | 63 | 64 | 66 | 69 | 69 | 76 | 76 | 79 |
| | 47 | 60 | 72 | 73 | 75 | 77 | 81 | 82 | 82 | 85 | 85 | 88 | 92 | 95 | 92 | 97 | 97 | 100 |
| | 65 | 75 | 96 | 96 | 96 | 99 | 102 | 106 | 106 | 109 | 111 | 115 | 118 | 120 | 122 | 122 | 127 | 127 |
| 3.5U | 40 | 44 | 58 | 60 | 63 | 61 | 64 | 64 | 64 | 69 | 68 | 69 | 69 | 73 | 75 | 78 | 80 | 84 |
| | 46 | 59 | 72 | 75 | 76 | 81 | 86 | 88 | 88 | 91 | 92 | 95 | 99 | 99 | 103 | 106 | 106 | 104 |
| | 58 | 72 | 95 | 102 | 104 | 105 | 106 | 110 | 115 | 112 | 119 | 118 | 125 | 130 | 135 | 136 | 136 | 137 |
| 3U | 41 | 47 | 63 | 67 | 68 | 71 | 75 | 74 | 74 | 78 | 81 | 81 | 83 | 85 | 91 | 95 | 95 | 98 |
| | 48 | 65 | 83 | 87 | 89 | 94 | 98 | 103 | 101 | 104 | 110 | 108 | 110 | 118 | 116 | 115 | 115 | 123 |
| | 65 | 78 | 105 | 110 | 117 | 116 | 118 | 125 | 124 | 132 | 135 | 139 | 147 | 150 | 152 | 156 | 157 | 161 |
| 2.5U | 41 | 50 | 66 | 70 | 72 | 74 | 79 | 84 | 84 | 84 | 86 | 90 | 91 | 93 | 98 | 100 | 104 | 110 |
| | 50 | 64 | 90 | 93 | 99 | 100 | 109 | 113 | 114 | 115 | 120 | 127 | 133 | 136 | 134 | 139 | 140 | 141 |
| | 63 | 80 | 110 | 113 | 120 | 128 | 129 | 133 | 137 | 143 | 143 | 149 | 155 | 162 | 172 | 173 | 179 | 186 |
| 2U | 43 | 56 | 79 | 82 | 90 | 93 | 94 | 99 | 100 | 103 | 108 | 108 | 110 | 109 | 118 | 127 | 134 | 135 |
| | 55 | 76 | 104 | 116 | 127 | 122 | 127 | 138 | 142 | 152 | 156 | 160 | 161 | 167 | 173 | 172 | 173 | 180 |
| | 67 | 90 | 130 | 135 | 142 | 153 | 161 | 169 | 171 | 181 | 187 | 195 | 205 | 214 | 222 | 226 | 233 | |
| 1.5U | 44 | 61 | 88 | 96 | 99 | 105 | 112 | 119 | 120 | 129 | 130 | 131 | 132 | 133 | 138 | 140 | 151 | 154 |
| | 58 | 78 | 111 | 132 | 137 | 150 | 147 | 155 | 161 | 168 | 183 | 185 | 195 | 203 | 208 | 216 | 223 | 223 |
| | 65 | 88 | 144 | 153 | 164 | 179 | 189 | 203 | 209 | 218 | 224 | 233 | 245 | 253 | 270 | 276 | 289 | 298 |
| 1U | 50 | 73 | 116 | 129 | 135 | 141 | 155 | 159 | 164 | 170 | 167 | 171 | 176 | 188 | 196 | 208 | 223 | 232 |
| | 66 | 96 | 159 | 168 | 177 | 190 | 199 | 212 | 220 | 241 | 243 | 255 | 263 | 278 | 295 | 307 | 311 | 320 |
| | 76 | 115 | 198 | 214 | 229 | 241 | 261 | 277 | 285 | 295 | 307 | 321 | 332 | 347 | 360 | 378 | 396 | 410 |
| 0.5U | 51 | 79 | 138 | 157 | 170 | 187 | 204 | 216 | 225 | 240 | 245 | 262 | 270 | 282 | 294 | 294 | 310 | 337 |
| | 68 | 103 | 192 | 212 | 221 | 243 | 283 | 290 | 292 | 306 | 310 | 324 | 326 | 352 | 383 | 401 | 420 | 438 |
| | 82 | 132 | 246 | 282 | 307 | 315 | 331 | 355 | 372 | 382 | 399 | 426 | 443 | 457 | 488 | 510 | 514 | 537 |
| 0 | 65 | 104 | 213 | 261 | 296 | 316 | 335 | 359 | 386 | 353 | 443 | 449 | 409 | 473 | 444 | 458 | 524 | 618 |
| | 86 | 145 | 284 | 310 | 355 | 413 | 442 | 451 | 494 | 472 | 509 | 530 | 522 | 600 | 653 | 668 | 728 | 819 |
| | 112 | 205 | 401 | 437 | 496 | 533 | 562 | 562 | 630 | 673 | 700 | 720 | 745 | 784 | 818 | 870 | 911 | 1011 |
| 0.5D | 75 | 140 | 343 | 394 | 457 | 548 | 627 | 718 | 764 | 820 | 854 | 941 | 1049 | 1153 | 1177 | 1267 | 1498 | 1743 |
| | 109 | 203 | 475 | 564 | 625 | 761 | 898 | 1060 | 1119 | 1182 | 1221 | 1289 | 1422 | 1550 | 1637 | 1659 | 1875 | 2234 |
| | 147 | 352 | 707 | 757 | 926 | 1068 | 1187 | 1451 | 1594 | 1728 | 1837 | 1995 | 2167 | 2337 | 2484 | 2687 | 2926 | 3281 |
| 1D | 107 | 276 | 1078 | 1255 | 1579 | 2057 | 2382 | 2890 | 3278 | 3559 | 3641 | 3866 | 4065 | 4303 | 4589 | 4914 | 5305 | 6645 |
| | 214 | 499 | 1362 | 1668 | 1981 | 2491 | 3175 | 3894 | 4303 | 4753 | 5019 | 5359 | 5328 | 6231 | 6500 | 6913 | 7531 | 9347 |
| | 331 | 886 | 1759 | 2310 | 2814 | 3434 | 4305 | 4953 | 5328 | 5781 | 6240 | 6609 | 6765 | 7203 | 7828 | 8672 | 9813 | 11343 |
| 1.5D | 152 | 662 | 2048 | 2326 | 2650 | 3222 | 3705 | 4368 | 4718 | 4939 | 5222 | 5422 | 5678 | 5875 | 6207 | 6672 | 7356 | 8469 |
| | 279 | 956 | 2325 | 2765 | 3287 | 3844 | 4703 | 5328 | 5741 | 5893 | 6247 | 6575 | 7213 | 7518 | 7869 | 8509 | 9247 | 9947 |
| | 467 | 1252 | 3075 | 3392 | 3903 | 4626 | 5564 | 6645 | 6934 | 7401 | 7796 | 8187 | 8767 | 9028 | 10048 | 11193 | 12052 | 13468 |
| 2D | 334 | 1081 | 2703 | 3042 | 3481 | 3925 | 4317 | 4823 | 4982 | 5129 | 5199 | 5253 | 5432 | 5511 | 5659 | 5792 | 6159 | 6772 |
| | 464 | 1447 | 3115 | 3553 | 3997 | 4453 | 5037 | 5500 | 5669 | 5744 | 6356 | 6612 | 6803 | 7375 | 7684 | 7831 | 8053 | 8516 |
| | 764 | 1668 | 3848 | 4378 | 4672 | 5289 | 5933 | 6897 | 7272 | 7520 | 7787 | 7941 | 8056 | 8406 | 9468 | 10594 | 11328 | 11436 |
| 2.5D | 391 | 1181 | 2751 | 3086 | 3336 | 3553 | 3922 | 4293 | 4492 | 4537 | 4569 | 4658 | 4800 | 4923 | 4885 | 5034 | 5124 | 5192 |
| | 590 | 1691 | 3181 | 3559 | 4053 | 4531 | 4987 | 5212 | 5312 | 5468 | 5572 | 5697 | 5988 | 6409 | 6650 | 6772 | 6888 | 7197 |
| | 860 | 1914 | 3756 | 4348 | 4750 | 5305 | 5902 | 6434 | 6670 | 6965 | 7092 | 7094 | 7311 | 7437 | 7955 | 8365 | 8246 | 8435 |
| 3D | 460 | 1486 | 2682 | 2905 | 3025 | 3378 | 3638 | 3884 | 3953 | 4014 | 4051 | 4233 | 4343 | 4522 | 4589 | 4718 | 4791 | 4922 |
| | 756 | 1981 | 3316 | 3697 | 4184 | 4466 | 4622 | 4915 | 5097 | 5222 | 5384 | 5562 | 5684 | 5750 | 5978 | 6144 | 6250 | 6444 |
| | 1018 | 2197 | 3989 | 4228 | 4806 | 5345 | 5783 | 5927 | 6028 | 6172 | 6161 | 6231 | 6298 | 6533 | 6759 | 7098 | 7320 | 7583 |
| 3.5D | 548 | 1534 | 2484 | 2636 | 2953 | 3104 | 3165 | 3420 | 3476 | 3526 | 3671 | 3784 | 3913 | 3981 | 4089 | 4237 | 4272 | 4343 |
| | 760 | 1919 | 3015 | 3422 | 3703 | 3900 | 4190 | 4325 | 4428 | 4534 | 4644 | 4759 | 4872 | 4956 | 5078 | 5250 | 5434 | 5525 |
| | 1121 | 2200 | 3595 | 3912 | 4343 | 4733 | 4953 | 5246 | 5355 | 5466 | 5550 | 5735 | 5855 | 5935 | 6213 | 6353 | 6430 | 6501 |
| 4D | 648 | 1580 | 2369 | 2429 | 2597 | 2693 | 2897 | 3139 | 3169 | 3203 | 3387 | 3470 | 3511 | 3564 | 3702 | 3781 | 3817 | 3845 |
| | 938 | 1884 | 2909 | 3122 | 3313 | 3456 | 3681 | 3931 | 4050 | 4125 | 4175 | 4266 | 4322 | 4353 | 4419 | 4450 | 4547 | 4662 |
| | 1303 | 2221 | 3526 | 3733 | 4093 | 4280 | 4476 | 4670 | 4790 | 4906 | 4981 | 5065 | 5222 | 5287 | 5353 | 5439 | 5519 | 5661 |
| 4.5D | 634 | 1565 | 2067 | 2151 | 2214 | 2323 | 2539 | 2673 | 2723 | 2742 | 2798 | 2870 | 3042 | 3130 | 3200 | 3252 | 3305 | 3328 |
| | 885 | 1750 | 2628 | 2756 | 2868 | 3106 | 3281 | 3428 | 3475 | 3515 | 3550 | 3590 | 3625 | 3672 | 3744 | 3778 | 3878 | 3859 |
| | 1196 | 2064 | 3114 | 3348 | 3600 | 3751 | 3914 | 4088 | 4183 | 4274 | 4359 | 4422 | 4472 | 4664 | 4664 | 4752 | 4803 | 4816 |
| 5D | 684 | 1457 | 1912 | 1965 | 2006 | 2094 | 2162 | 2258 | 2301 | 2373 | 2437 | 2456 | 2520 | 2565 | 2637 | 2711 | 2832 | 2840 |
| | 1012 | 1687 | 2372 | 2484 | 2609 | 2797 | 2981 | 3075 | 3116 | 3147 | 3165 | 3172 | 3175 | 3172 | 3194 | 3231 | 3291 | 3337 |
| | 1356 | 1958 | 2800 | 3131 | 3259 | 3386 | 3514 | 3634 | 3709 | 3798 | 3876 | 3920 | 3956 | 4053 | 4049 | 4064 | 4206 | |

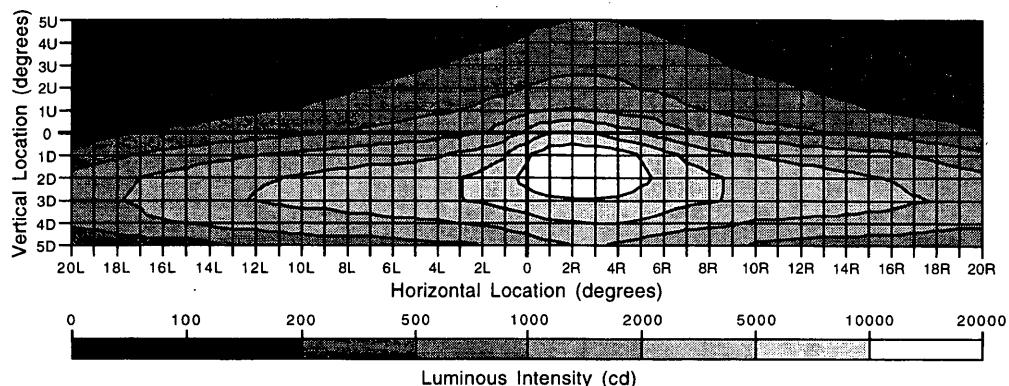
NOTE: The three entries in each cell are (from top to bottom) the 25th percentile, the median (the 50th percentile), and the 75th percentile.

(continued on next page)

TABLE 6 (continued)

| | 0.5R | 1R | 1.5R | 2R | 2.5R | 3R | 3.5R | 4R | 4.5R | 5R | 6R | 7R | 8R | 9R | 10R | 15R | 20R |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| 5U | 65 | 67 | 68 | 68 | 68 | 70 | 70 | 68 | 68 | 69 | 65 | 65 | 63 | 65 | 61 | 47 | 37 |
| | 86 | 90 | 89 | 92 | 93 | 93 | 90 | 88 | 86 | 86 | 82 | 81 | 76 | 74 | 74 | 60 | 51 |
| | 111 | 110 | 109 | 109 | 110 | 113 | 115 | 112 | 109 | 108 | 103 | 98 | 95 | 93 | 90 | 69 | 62 |
| 4.5U | 68 | 70 | 70 | 75 | 72 | 74 | 74 | 75 | 75 | 75 | 75 | 73 | 72 | 68 | 69 | 53 | 41 |
| | 90 | 92 | 94 | 95 | 100 | 101 | 101 | 99 | 97 | 97 | 93 | 87 | 89 | 82 | 80 | 67 | 56 |
| | 115 | 116 | 117 | 117 | 119 | 118 | 122 | 123 | 124 | 122 | 117 | 110 | 106 | 103 | 99 | 77 | 75 |
| 4U | 79 | 81 | 81 | 84 | 81 | 82 | 83 | 83 | 81 | 81 | 79 | 80 | 76 | 74 | 71 | 57 | 46 |
| | 102 | 107 | 106 | 108 | 111 | 110 | 108 | 104 | 101 | 100 | 97 | 94 | 94 | 88 | 86 | 71 | 61 |
| | 130 | 129 | 127 | 132 | 129 | 137 | 134 | 135 | 132 | 130 | 121 | 118 | 117 | 109 | 107 | 85 | 110 |
| 3.5U | 87 | 88 | 90 | 91 | 92 | 92 | 93 | 95 | 94 | 94 | 91 | 91 | 90 | 86 | 82 | 67 | 60 |
| | 108 | 109 | 112 | 117 | 121 | 127 | 123 | 120 | 119 | 115 | 112 | 107 | 106 | 103 | 100 | 80 | 76 |
| | 137 | 141 | 144 | 145 | 147 | 147 | 152 | 152 | 153 | 149 | 144 | 138 | 137 | 130 | 123 | 98 | 167 |
| 3U | 99 | 102 | 104 | 106 | 103 | 105 | 106 | 109 | 107 | 105 | 102 | 99 | 95 | 93 | 86 | 75 | 70 |
| | 129 | 131 | 134 | 141 | 142 | 136 | 134 | 134 | 134 | 132 | 132 | 131 | 121 | 116 | 110 | 103 | 115 |
| | 162 | 168 | 174 | 174 | 173 | 174 | 177 | 178 | 171 | 176 | 166 | 165 | 162 | 147 | 140 | 172 | 193 |
| 2.5U | 111 | 116 | 120 | 120 | 120 | 122 | 131 | 136 | 132 | 134 | 132 | 123 | 118 | 110 | 104 | 101 | 105 |
| | 140 | 146 | 154 | 161 | 159 | 161 | 163 | 163 | 162 | 164 | 159 | 155 | 153 | 144 | 143 | 160 | 159 |
| | 189 | 194 | 198 | 198 | 204 | 207 | 211 | 216 | 213 | 217 | 211 | 204 | 203 | 194 | 178 | 286 | 202 |
| 2U | 141 | 148 | 152 | 153 | 160 | 163 | 171 | 170 | 162 | 158 | 147 | 153 | 146 | 146 | 153 | 174 | 124 |
| | 185 | 194 | 192 | 194 | 200 | 203 | 209 | 205 | 205 | 204 | 205 | 209 | 198 | 195 | 198 | 278 | 164 |
| | 244 | 245 | 252 | 257 | 261 | 273 | 278 | 283 | 270 | 259 | 265 | 256 | 257 | 277 | 319 | 376 | 209 |
| 1.5U | 165 | 176 | 185 | 199 | 211 | 218 | 222 | 221 | 219 | 210 | 206 | 228 | 248 | 244 | 253 | 238 | 153 |
| | 227 | 231 | 251 | 253 | 253 | 259 | 268 | 270 | 274 | 272 | 290 | 312 | 302 | 353 | 426 | 389 | 188 |
| | 302 | 313 | 325 | 337 | 344 | 353 | 354 | 361 | 356 | 361 | 362 | 388 | 459 | 522 | 623 | 512 | 229 |
| 1U | 250 | 263 | 272 | 285 | 300 | 325 | 332 | 311 | 324 | 367 | 458 | 454 | 512 | 583 | 602 | 317 | 140 |
| | 341 | 346 | 356 | 369 | 372 | 383 | 409 | 412 | 427 | 454 | 609 | 759 | 921 | 887 | 837 | 401 | 166 |
| | 438 | 442 | 460 | 464 | 465 | 476 | 508 | 523 | 556 | 658 | 951 | 1145 | 1217 | 1271 | 1173 | 524 | 210 |
| 0.5U | 373 | 395 | 413 | 434 | 500 | 544 | 590 | 718 | 865 | 911 | 1178 | 1392 | 1269 | 1084 | 949 | 345 | 150 |
| | 455 | 488 | 540 | 567 | 585 | 674 | 780 | 913 | 1066 | 1262 | 1753 | 1909 | 1706 | 1503 | 1247 | 481 | 196 |
| | 556 | 604 | 682 | 710 | 736 | 816 | 997 | 1302 | 1873 | 2487 | 2714 | 2481 | 2031 | 1859 | 1609 | 714 | 278 |
| 0 | 709 | 845 | 1034 | 1275 | 1651 | 2078 | 2598 | 2814 | 2955 | 3083 | 2700 | 2176 | 1661 | 1259 | 1107 | 371 | 136 |
| | 943 | 1047 | 1184 | 1859 | 2609 | 3334 | 4444 | 4550 | 4328 | 4137 | 3256 | 2575 | 2147 | 1772 | 1472 | 556 | 187 |
| | 1153 | 1390 | 1833 | 2384 | 3656 | 5398 | 6284 | 6591 | 6098 | 5566 | 4237 | 3112 | 2570 | 2121 | 1864 | 735 | 304 |
| 0.5D | 2336 | 2882 | 4176 | 5692 | 5925 | 6757 | 7083 | 6782 | 5720 | 4987 | 3820 | 2934 | 2255 | 1851 | 1500 | 438 | 168 |
| | 2850 | 4147 | 5744 | 7300 | 8094 | 8438 | 8216 | 7800 | 7012 | 6343 | 4534 | 3375 | 2715 | 2266 | 1897 | 765 | 243 |
| | 4108 | 5055 | 6681 | 8514 | 10647 | 10825 | 10207 | 9888 | 8472 | 7420 | 5123 | 4100 | 3442 | 2817 | 2421 | 948 | 369 |
| 1D | 8000 | 9342 | 10176 | 10134 | 9798 | 8976 | 8074 | 7271 | 6423 | 5650 | 4164 | 3374 | 2728 | 2212 | 1750 | 517 | 160 |
| | 10788 | 12309 | 13188 | 13750 | 13750 | 11725 | 10609 | 9444 | 8234 | 7059 | 5309 | 4194 | 3362 | 2769 | 2353 | 804 | 267 |
| | 13093 | 15016 | 15688 | 15718 | 14891 | 14031 | 13187 | 11520 | 9812 | 8374 | 6476 | 5073 | 4252 | 3456 | 2929 | 1142 | 426 |
| 1.5D | 9051 | 9445 | 10564 | 10644 | 10439 | 10063 | 8953 | 7833 | 7006 | 6515 | 5218 | 4467 | 3630 | 2939 | 2305 | 765 | 226 |
| | 11444 | 12509 | 13500 | 13656 | 12938 | 12250 | 11406 | 10484 | 9406 | 8219 | 6688 | 5297 | 4494 | 3638 | 3091 | 1109 | 335 |
| | 15156 | 15859 | 16812 | 15984 | 15000 | 14203 | 12875 | 11922 | 10718 | 9750 | 7693 | 6001 | 5145 | 4465 | 3890 | 1519 | 481 |
| 2D | 7426 | 7545 | 7878 | 8003 | 8340 | 8525 | 8294 | 7445 | 6825 | 6479 | 5553 | 4525 | 3850 | 3183 | 2612 | 1011 | 249 |
| | 9219 | 9631 | 10059 | 10313 | 10297 | 10115 | 9866 | 9465 | 8625 | 7731 | 6375 | 5541 | 4653 | 3769 | 3331 | 1209 | 392 |
| | 12266 | 13141 | 13703 | 13766 | 13047 | 12656 | 11342 | 10298 | 9595 | 9059 | 7727 | 6406 | 5362 | 4692 | 4227 | 1806 | 634 |
| 2.5D | 5335 | 5609 | 6006 | 6712 | 7059 | 7061 | 6989 | 6837 | 6360 | 6189 | 5411 | 4631 | 4040 | 3501 | 2931 | 1332 | 344 |
| | 7400 | 7844 | 8025 | 8193 | 8237 | 8434 | 8406 | 8269 | 7887 | 7547 | 6434 | 5590 | 4900 | 4112 | 3528 | 1612 | 514 |
| | 9256 | 10140 | 9947 | 10162 | 9949 | 9721 | 9557 | 9536 | 8898 | 8311 | 7338 | 6536 | 5570 | 4811 | 4201 | 2060 | 781 |
| 3D | 4950 | 5170 | 5440 | 5787 | 5936 | 5990 | 5955 | 5923 | 5675 | 5298 | 4857 | 4497 | 3712 | 3297 | 2839 | 1306 | 383 |
| | 6712 | 6753 | 6872 | 6969 | 7097 | 7156 | 6878 | 6753 | 6650 | 6428 | 5894 | 5303 | 4588 | 3928 | 3466 | 1700 | 603 |
| | 7828 | 7933 | 7926 | 7890 | 7808 | 7755 | 7732 | 7601 | 7448 | 7255 | 6561 | 5926 | 5453 | 4697 | 4031 | 2061 | 934 |
| 3.5D | 4407 | 4493 | 4597 | 4742 | 4903 | 5054 | 5050 | 5065 | 4830 | 4603 | 4288 | 3892 | 3672 | 3293 | 2901 | 1493 | 367 |
| | 5631 | 5662 | 5712 | 5778 | 5869 | 5947 | 5834 | 5712 | 5618 | 5531 | 5293 | 4875 | 4472 | 3950 | 3469 | 1887 | 706 |
| | 6693 | 6806 | 6821 | 6802 | 6694 | 6672 | 6562 | 6585 | 6503 | 6434 | 6139 | 5528 | 5024 | 4571 | 4084 | 2283 | 1100 |
| 4D | 3912 | 4040 | 4162 | 4337 | 4385 | 4393 | 4376 | 4216 | 4122 | 4029 | 3781 | 3553 | 3217 | 2897 | 2582 | 1480 | 458 |
| | 4753 | 4822 | 4850 | 4840 | 4919 | 4943 | 4906 | 4819 | 4766 | 4631 | 4422 | 4193 | 3890 | 3553 | 3206 | 1868 | 691 |
| | 5797 | 5839 | 5775 | 5757 | 5687 | 5651 | 5614 | 5617 | 5674 | 5217 | 4938 | 4484 | 4119 | 3684 | 2278 | 1196 | |
| 4.5D | 3337 | 3359 | 3416 | 3506 | 3564 | 3617 | 3623 | 3515 | 3445 | 3400 | 3301 | 3151 | 2972 | 2732 | 2494 | 1432 | 493 |
| | 3965 | 3953 | 3972 | 3969 | 4031 | 4109 | 4156 | 4153 | 4100 | 4053 | 3869 | 3706 | 3490 | 3256 | 3044 | 1953 | 906 |
| | 4956 | 5049 | 5109 | 5097 | 5075 | 5025 | 4943 | 4895 | 4879 | 4857 | 4626 | 4465 | 4035 | 3812 | 3571 | 2326 | 1311 |
| 5D | 2823 | 2822 | 2928 | 3011 | 2992 | 2949 | 2905 | 2905 | 2902 | 2907 | 2776 | 2684 | 2581 | 2429 | 2185 | 1415 | 533 |
| | 3397 | 3422 | 3375 | 3397 | 3425 | 3487 | 3472 | 3531 | 3459 | 3419 | 3303 | 3137 | 2950 | 2812 | 2659 | 1781 | 844 |
| | 4311 | 4433 | 4489 | 4516 | 4481 | 4394 | 4333 | 4273 | 4198 | 4107 | 3945 | 3766 | 3589 | 3325 | 3119 | 2130 | 1187 |

U.S. Lamps



European Lamps

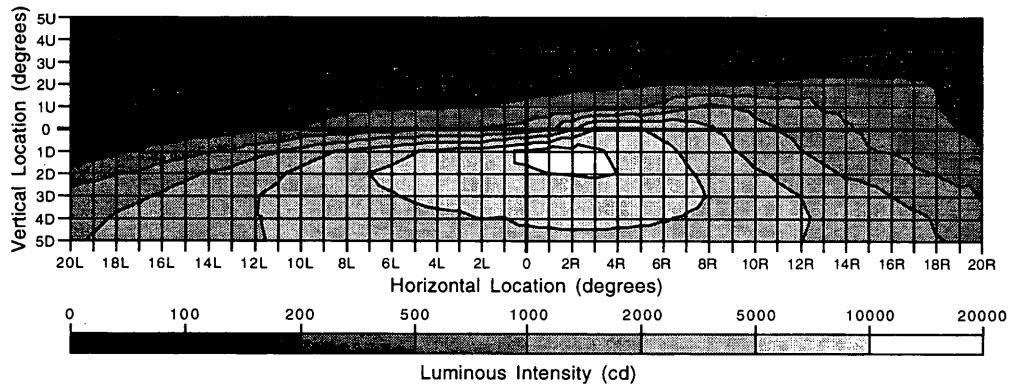


FIGURE 1 Isocandela diagrams of the median (50th percentile) luminous intensities for U.S. lamps, European lamps, Japanese SAE-J lamps, and Japanese ECE-J lamps. (The median intensities for U.S. lamps exceeded 20 000 cd at the following test points: 1.5D, 1.5R; 1.5D, 2R; 1.5D, 2.5R; and 2D, 2R. These four intensities ranged from 20 084 to 22 400 cd.) (*continued on next page*)

TABLE 7 Spatial Coordinates of Targets (m)

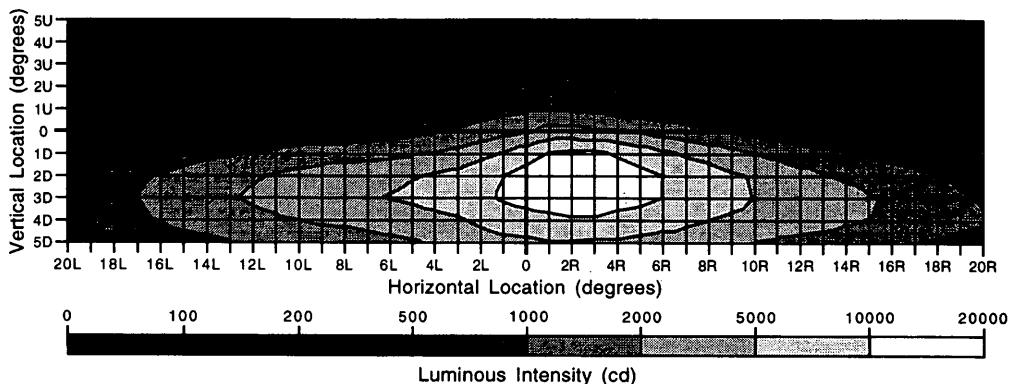
| Target | x (lateral) | y (height) | z (distance) |
|-----------------------------|----------------|---------------|-----------------|
| Left outside mirror | -0.87 | 0.98 | 20 |
| Center inside mirror | 0 | 1.24 | 20 |
| Right outside mirror | 0.87 | 0.98 | 20 |
| Left shoulder-mounted sign | -8.85 | 2.1 | 150 |
| Center overhead sign | 0 | 6.1 | 150 |
| Right shoulder-mounted sign | 6.15 | 2.1 | 150 |
| Left delineation | -5.55 | 0 | 50 |
| Right delineation | 1.85 | 0 | 50 |

NOTE: Origin corresponds to location of ground at front edge of vehicle in center of lane of travel.

TABLE 8 Visual Angles (degrees) of Targets with Respect to Headlamp Axes

| Target | Left lamp | | Right lamp | |
|-----------------------------|-----------|-------|------------|-------|
| | x | y | x | y |
| Left outside mirror | -0.86 | 1.09 | -4.12 | 1.09 |
| Center inside mirror | 1.63 | 1.83 | -1.63 | 1.83 |
| Right outside mirror | 4.12 | 1.09 | 0.86 | 1.09 |
| Left shoulder-mounted sign | 2.57 | 0.57 | 2.13 | 0.57 |
| Center overhead sign | 0.22 | 2.10 | -0.22 | 2.10 |
| Right shoulder-mounted sign | -3.16 | 0.57 | -3.59 | 0.57 |
| Left delineation | -5.69 | -0.69 | -6.98 | -0.69 |
| Right delineation | 2.77 | -0.69 | 1.47 | -0.69 |

Japanese SAE-J Lamps



Japanese ECE-J Lamps

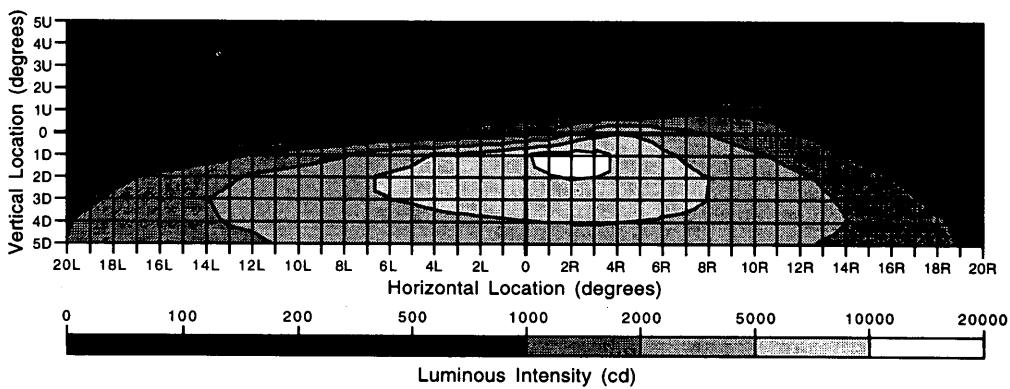


FIGURE 1 (continued).

TABLE 9 Median Luminous Intensity and Illumination from U.S. Low Beams

| Target | Luminous intensity (cd) | | | Illuminance (lx*) |
|-----------------------------|-------------------------|------------|------------|-------------------|
| | Left lamp | Right lamp | Both lamps | |
| Left outside mirror | 628 | 402 | 1030 | 2.57 |
| Center inside mirror | 657 | 387 | 1044 | 2.61 |
| Right outside mirror | 794 | 917 | 1711 | 4.26 |
| Left shoulder-mounted sign | 557 | 526 | 1083 | 0.05 |
| Center overhead sign | 479 | 446 | 925 | 0.04 |
| Right shoulder-mounted sign | 1628 | 1652 | 3280 | 0.15 |
| Left delineation | 1250 | 1162 | 2412 | 0.01 |
| Right delineation | 14460 | 14283 | 28743 | 0.14 |

*The illuminances for the mirrors and the signs are in vertical lx, while those for the delineations are in horizontal lx.