



# POWERBALL® HCI®

Technical Information

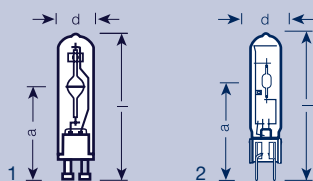
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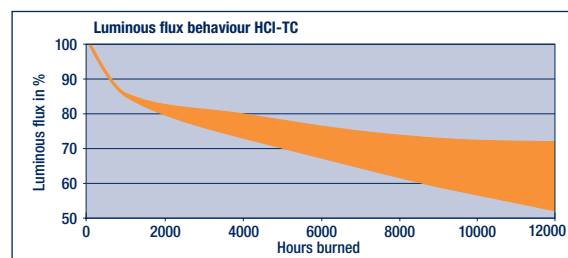
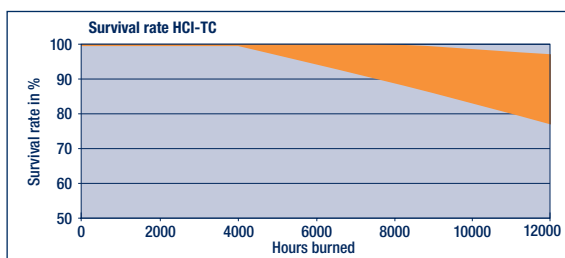
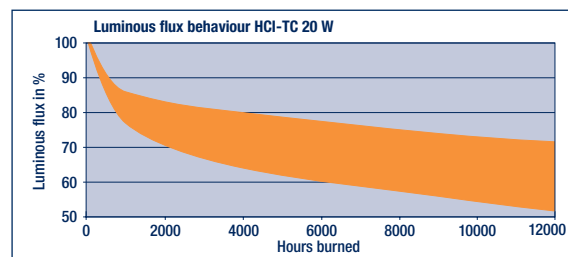
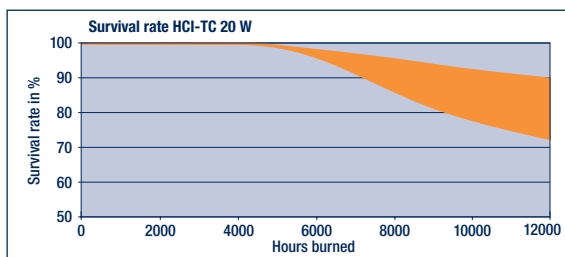
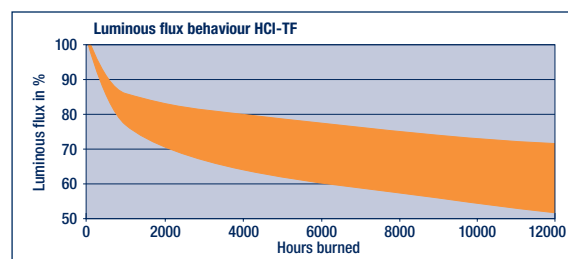
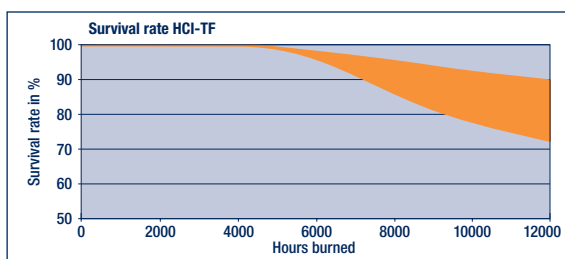
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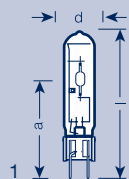


# POWERBALL® HCI®-TF, TC

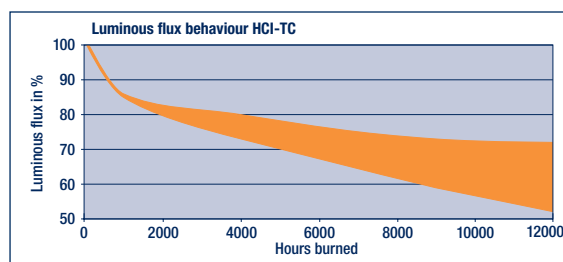
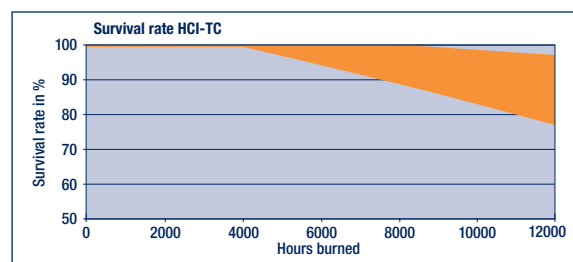


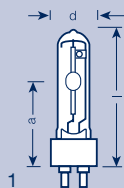
|                                |                             | <b>HCI-TF</b><br><b>20 W</b> <i>New</i><br><b>830 WDL PB</b> | <b>HCI-TC</b><br><b>20 W</b><br><b>830 WDL PB</b> | <b>HCI-TC</b><br><b>35 W</b><br><b>830 WDL PB</b> | <b>HCI-TC</b><br><b>35 W</b><br><b>942 ND L PB</b> |
|--------------------------------|-----------------------------|--------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------|----------------------------------------------------|
| <b>Type</b>                    |                             | <b>UVS, PB</b>                                               | <b>UVS, PB</b>                                    | <b>UVS, PB</b>                                    | <b>UVS, PB</b>                                     |
| <b>ILCOS</b>                   |                             | MT/UB-20/30/1B-H/E-GU6.5-13/57                               | MT/UB-20/30/1B-H/E-G8.5-15/81                     | MT/UB-35/30/1B-H-G8.5-15/81                       | MT/UB-35/42/1A-H-G8.5-15/81                        |
| Lamp wattage                   | W                           | 20                                                           | 20                                                | 37                                                | 37                                                 |
| Lamp voltage                   | V                           | 90                                                           | 100                                               | 90                                                | 90                                                 |
| Ignition voltage min./max.     | kVs                         | 3.6/5                                                        | 3.6/5                                             | 3.6/5                                             | 3.6/5                                              |
| Lamp current                   | A                           | 0.22                                                         | 0.22                                              | 0.5                                               | 0.5                                                |
| Nominal luminous flux          | lm                          | 1700                                                         | 1700                                              | 3400                                              | 3200                                               |
| Luminous efficacy              | lm/W                        | 85                                                           | 85                                                | 92                                                | 86                                                 |
| Light colour/Colour appearance |                             | 830 WDL                                                      | 830 WDL                                           | 830 WDL                                           | 942 ND L                                           |
| Colour temperature             | K                           | 3000                                                         | 3000                                              | 3000                                              | 4200                                               |
| Colour rendering index         | R <sub>a</sub>              | > 80                                                         | 82                                                | 82                                                | 90                                                 |
| NIOSH Skin                     | h                           | > 8                                                          | > 21                                              | > 21                                              | > 21                                               |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 2                                                          | < 0.4                                             | < 0.4                                             | < 0.4                                              |
| Base                           |                             | GU6.5                                                        | G8.5                                              | G8.5                                              | G8.5                                               |
| Diameter d                     | mm                          | 13                                                           | 15                                                | 15                                                | 15                                                 |
| Length max. l                  | mm                          | 57                                                           | 81                                                | 81                                                | 81                                                 |
| LCL a                          | mm                          | 31                                                           | 52                                                | 52                                                | 52                                                 |
| Burning position               |                             | universal                                                    | universal                                         | universal                                         | universal                                          |
| Average lamp life              | h                           | 12000                                                        | 12000                                             | 12000                                             | 12000                                              |
| Max. perm. outer bulb temp.    | °C                          | —                                                            | 400                                               | 450                                               | 450                                                |
| Max. perm. base edge temp.     | °C                          | —                                                            | 280                                               | 300                                               | 300                                                |
| PF corr. cap. at 50 Hz         | µF                          | ECG                                                          | ECG                                               | 6                                                 | 6                                                  |
| Lamp reference                 |                             | HCI-TF<br>20/830 WDL PB                                      | HCI-TC<br>20/830 WDL PB                           | HCI-TC<br>35/830 WDL PB                           | HCI-TC<br>35/942 ND L PB                           |
| EAN                            |                             | 4008321907615                                                | 4008321052216                                     | 4050300873763                                     | 4050300873725                                      |
| Standard pack                  | Qty                         | 12                                                           | 12                                                | 12                                                | 12                                                 |
| Figure                         | No.                         | 1                                                            | 2                                                 | 2                                                 | 2                                                  |
| Circuit (see page 26)          | Fig. no.                    | 2                                                            | 1/2                                               | 1/2                                               | 1/2                                                |



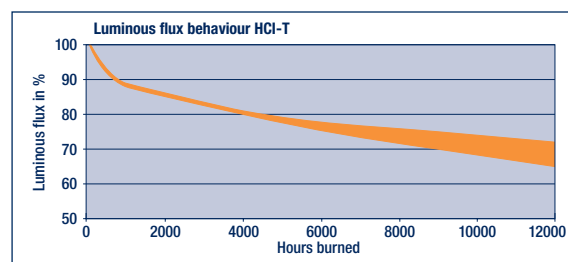
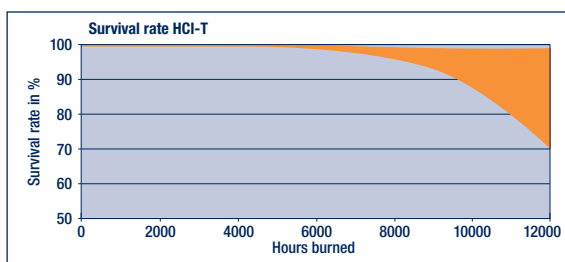


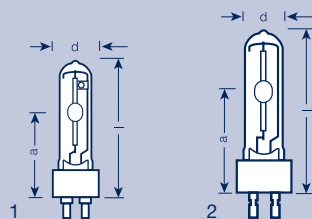
|                                |                 | HCI-TC<br>70 W                  | HCI-TC<br>70 W <b>New</b> | HCI-TC<br>70 W                  | HCI-TC<br>70 W                  |
|--------------------------------|-----------------|---------------------------------|---------------------------|---------------------------------|---------------------------------|
|                                |                 | 830 WDL PB                      | 942 NDL PB                | 830 WDL                         | 942 NDL                         |
| Type                           |                 | UVS, PB                         | UVS, PB                   | UVS                             | UVS                             |
| ILCOS                          |                 | MT/UB-70/30/1B-<br>H-G8.5-15/81 | in development            | MT/UB-70/30/1B-<br>H-G8.5-15/81 | MT/UB-70/42/1A-<br>H-G8.5-15/81 |
| Lamp wattage                   | W               | 72                              | 72                        | 72                              | 72                              |
| Lamp voltage                   | V               | 90                              | 91                        | 90                              | 91                              |
| Ignition voltage min./max.     | kVs             | 3.6/5                           | 3.6/5                     | 3.6/4.5                         | 3.6/5                           |
| Lamp current                   | A               | 0.96                            | 0.96                      | 0.96                            | 0.96                            |
| Nominal luminous flux          | lm              | 6900                            | 6600                      | 6600                            | 6300                            |
| Luminous efficacy              | lm/W            | 96                              | 92                        | 92                              | 88                              |
| Light colour/Colour appearance |                 | 830 WDL                         | 942 NDL                   | 830 WDL                         | 942 NDL                         |
| Colour temperature             | K               | 3000                            | 4200                      | 3000                            | 4200                            |
| Colour rendering index         | Ra              | 88                              | 94                        | 81                              | ≥ 90                            |
| NIOSH Skin                     | h               | > 21                            | > 8                       | > 24                            | > 22                            |
| ACGIH UV output                | mW/m² · 1000 lx | < 0.4                           | < 2                       | < 0.35                          | < 0.37                          |
| Base                           |                 | G8.5                            | G8.5                      | G8.5                            | G8.5                            |
| Diameter d                     | mm              | 15                              | 15                        | 15                              | 15                              |
| Length max. l                  | mm              | 81                              | 81                        | 81                              | 81                              |
| LCL a                          | mm              | 52                              | 52                        | 52                              | 52                              |
| Burning position               |                 | universal                       | universal                 | universal                       | universal                       |
| Average lamp life              | h               | 12000                           | 12000                     | 12000                           | 12000                           |
| Max. perm. outer bulb temp.    | °C              | 550                             | 550                       | 550                             | 550                             |
| Max. perm. base edge temp.     | °C              | 300                             | 300                       | 300                             | 300                             |
| PF corr. cap. at 50 Hz         | µF              | 12                              | 12                        | 12                              | 12                              |
| Lamp reference                 |                 | HCI-TC<br>70/830 WDL PB         | HCI-TC<br>70/942 NDL PB   | HCI-TC<br>70/830 WDL            | HCI-TC<br>70/942 NDL            |
| EAN                            |                 | 4008321907639                   | 4008321907646             | 4050300873831                   | 4050300873794                   |
| Standard pack                  | Qty             | 12                              | 12                        | 12                              | 12                              |
| Figure                         | No.             | 1                               | 1                         | 1                               | 1                               |
| Circuit (see page 26)          | Fig. no.        | 1/2                             | 1/2                       | 1/2                             | 1/2                             |



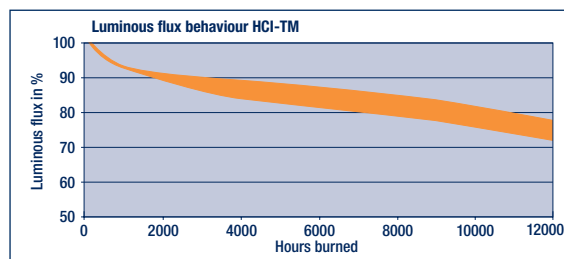
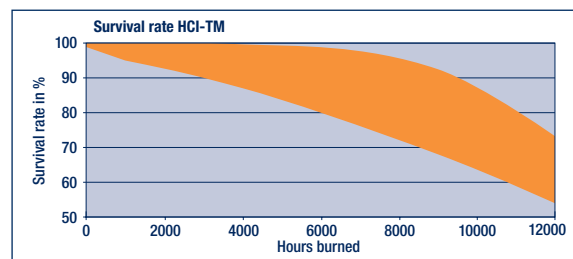
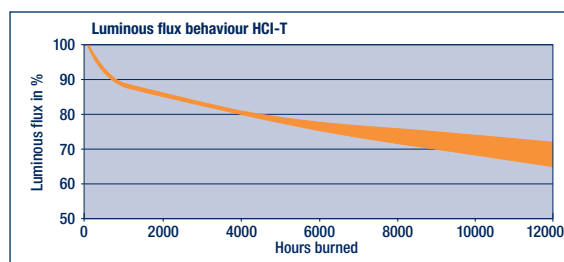
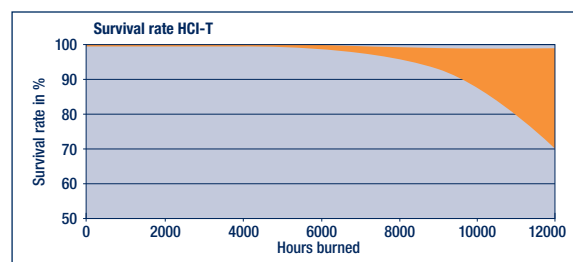


|                                |                             | HCI-T                       | HCI-T                       | HCI-T                       | HCI-T <b>New</b>            | HCI-T <b>New</b>             |
|--------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|
|                                |                             | 35 W                        | 35 W                        | 70 W                        | 70 W                        | 100 W                        |
|                                |                             | 830 WDL PB                  | 942 NDL PB                  | 830 WDL PB                  | 942 NDL PB                  | 830 WDL PB                   |
| Type                           |                             | UVS, PB                     | UVS, PB                     | UVS, PB                     | UVS, PB                     | UVS, PB                      |
| ILCOS                          |                             | MT/UB-35/30/1B-H-G12-19/100 | MT/UB-35/42/1A-H-G12-19/100 | MT/UB-70/30/1B-H-G12-19/100 | MT/UB-70/42/1A-H-G12-19/100 | MT/UB-100/30/1B-H-G12-19/100 |
| Lamp wattage                   | W                           | 37                          | 37                          | 72                          | 72                          | 100                          |
| Lamp voltage                   | V                           | 90                          | 90                          | 100                         | 90                          | 100                          |
| Ignition voltage min./max.     | kVs                         | 3.6/5                       | 3.6/5                       | 3.6/5                       | 3.6/5                       | 3.6/5                        |
| Lamp current                   | A                           | 0.5                         | 0.5                         | 0.96                        | 0.96                        | 1.2                          |
| Nominal luminous flux          | lm                          | 3400                        | 3300                        | 7000                        | 6700                        | 9500                         |
| Luminous efficacy              | lm/W                        | 92                          | 89                          | 97                          | 93                          | 95                           |
| Light colour/Colour appearance |                             | 830 WDL                     | 942 NDL                     | 830 WDL                     | 942 NDL                     | 830 WDL                      |
| Colour temperature             | K                           | 3000                        | 4200                        | 3000                        | 4200                        | 3000                         |
| Colour rendering index         | R <sub>a</sub>              | 84                          | 90                          | 87                          | 93                          | 86                           |
| NIOSH Skin                     | h                           | > 21                        | > 21                        | > 47                        | > 27                        | > 8                          |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.4                       | < 0.4                       | < 0.18                      | < 0.32                      | < 2                          |
| Base                           |                             | G12                         | G12                         | G12                         | G12                         | G12                          |
| Diameter d                     | mm                          | 19                          | 19                          | 19                          | 19                          | 19                           |
| Length max. l                  | mm                          | 100                         | 100                         | 100                         | 100                         | 100                          |
| LCL a                          | mm                          | 56                          | 56                          | 56                          | 56                          | 56                           |
| Burning position               |                             | universal                   | universal                   | universal                   | universal                   | universal                    |
| Average lamp life              | h                           | 12000                       | 12000                       | 12000                       | 12000                       | 12000                        |
| Max. perm. outer bulb temp.    | °C                          | 450                         | 450                         | 500                         | 500                         | 500                          |
| Max. perm. base edge temp.     | °C                          | 280                         | 280                         | 280                         | 280                         | 280                          |
| PF corr. cap. at 50 Hz         | µF                          | 6                           | 6                           | 12                          | 12                          | 16                           |
| Lamp reference                 |                             | HCI-T<br>35/830 WDL PB      | HCI-T<br>35/942 NDL PB      | HCI-T<br>70/830 WDL PB      | HCI-T<br>70/942 NDL PB      | HCI-T<br>100/830 WDL PB      |
| EAN                            |                             | 4008321005625               | 4050300873480               | 4050300873664               | 4050300873626               | 4008321907660                |
| Standard pack                  | Qty                         | 12                          | 12                          | 12                          | 12                          | 12                           |
| Figure                         | No.                         | 1                           | 1                           | 1                           | 1                           | 1                            |
| Circuit (see page 26)          | Fig. no.                    | 1/2                         | 1/2                         | 1/2                         | 1/2                         | 1/2                          |

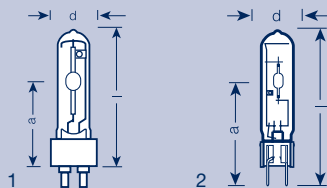




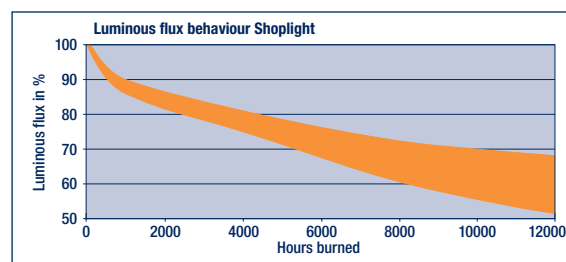
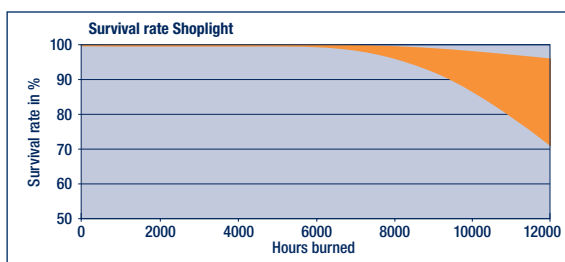
|                                |                             | HCI-T<br>100 W <b>New</b><br>942 NDL PB  | HCI-T<br>150 W<br>830 WDL PB             | HCI-T<br>150 W<br>942 NDL PB             | HCI-TM<br>250 W <b>New</b><br>830 WDL PB  | HCI-TM<br>250 W <b>New</b><br>942 NDL PB  |
|--------------------------------|-----------------------------|------------------------------------------|------------------------------------------|------------------------------------------|-------------------------------------------|-------------------------------------------|
| Type                           |                             | UVS, PB                                  | UVS, PB                                  | UVS, PB                                  | UVS, PB                                   | UVS, PB                                   |
| ILCOS                          |                             | MT/UB-100/42/1A-H-G12-19/100             | MT/UB-150/30/1B-H-G12-25/105             | MT/UB-150/42/1A-H-G12-25/105             | MT/UB-250/30/1B-H-G22-34/175              | MT/UB-250/42/1A-H-G22-34/175              |
| Lamp wattage                   | W                           | 100                                      | 145                                      | 145                                      | 248                                       | 249                                       |
| Lamp voltage                   | V                           | 100                                      | 100                                      | 92                                       | 101                                       | 98                                        |
| Ignition voltage min./max.     | kVs                         | 3.6/5                                    | 3.6/5                                    | 3.6/5                                    | 3.6/5                                     | 3.6/5                                     |
| Lamp current                   | A                           | 1.2                                      | 1.8                                      | 1.8                                      | 2.9                                       | 3.0                                       |
| Nominal luminous flux          | lm                          | 9300                                     | 15500                                    | 14500                                    | 26000                                     | 25000                                     |
| Luminous efficacy              | lm/W                        | 93                                       | 107                                      | 100                                      | 107                                       | 100                                       |
| Light colour/Colour appearance |                             | 942 NDL                                  | 830 WDL                                  | 942 NDL                                  | 830 WDL                                   | 942 NDL                                   |
| Colour temperature             | K                           | 4200                                     | 3000                                     | 4200                                     | 3000                                      | 4200                                      |
| Colour rendering index         | R <sub>a</sub>              | > 90                                     | 86                                       | 96                                       | 92                                        | 98                                        |
| NIOSH Skin                     | h                           | > 8                                      | > 50                                     | > 50                                     | > 300                                     | > 8                                       |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 2                                      | < 0.06                                   | < 0.12                                   | < 0.028                                   | < 2                                       |
| Base                           |                             | G12                                      | G12                                      | G12                                      | G22                                       | G22                                       |
| Diameter d                     | mm                          | 19                                       | 25                                       | 25                                       | 28                                        | 28                                        |
| Length max. l                  | mm                          | 100                                      | 105                                      | 105                                      | 175                                       | 175                                       |
| LCL a                          | mm                          | 56                                       | 56                                       | 56                                       | 90                                        | 90                                        |
| Burning position               |                             | universal                                | universal                                | universal                                | universal                                 | universal                                 |
| Average lamp life              | h                           | 12000                                    | 12000                                    | 12000                                    | 12000                                     | 12000                                     |
| Max. perm. outer bulb temp.    | °C                          | 500                                      | 550                                      | 550                                      | 580                                       | 580                                       |
| Max. perm. base edge temp.     | °C                          | 280                                      | 280                                      | 280                                      | 280                                       | 280                                       |
| PF corr. cap. at 50 Hz         | µF                          | 16                                       | 20                                       | 20                                       | 32                                        | 32                                        |
| Lamp reference                 |                             | HCI-T<br>100/942 NDL PB<br>4008321907677 | HCI-T<br>150/830 WDL PB<br>4050300873435 | HCI-T<br>150/942 NDL PB<br>4050300873336 | HCI-TM<br>250/830 WDL PB<br>4050300977263 | HCI-TM<br>250/942 NDL PB<br>4008321907684 |
| EAN                            |                             |                                          |                                          |                                          |                                           |                                           |
| Standard pack                  | Qty                         | 12                                       | 12                                       | 12                                       | 10                                        | 10                                        |
| Figure                         | No.                         | 1                                        | 1                                        | 1                                        | 2                                         | 2                                         |
| Circuit (see page 26)          | Fig. no.                    | 1/2                                      | 1/2                                      | 1/2                                      | 1                                         | 1                                         |



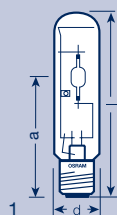
# POWERBALL® HCI®-T, TC, Shoplight



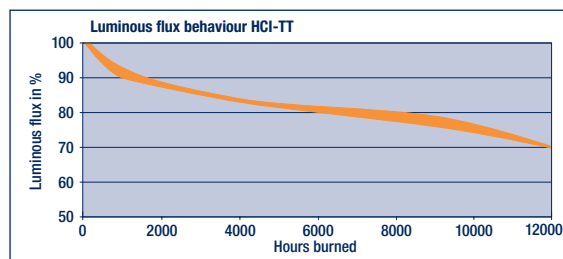
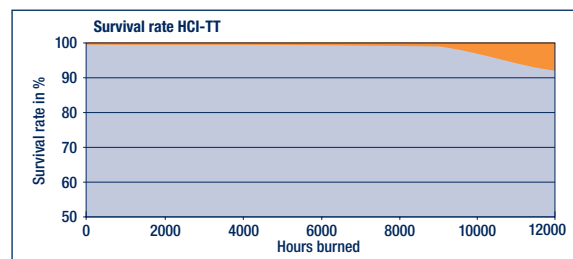
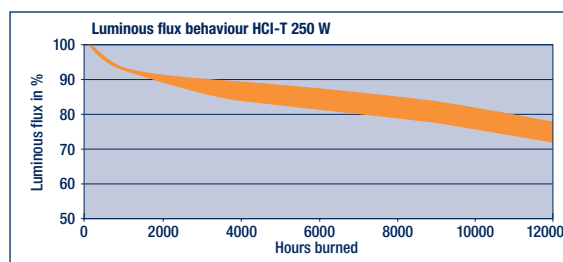
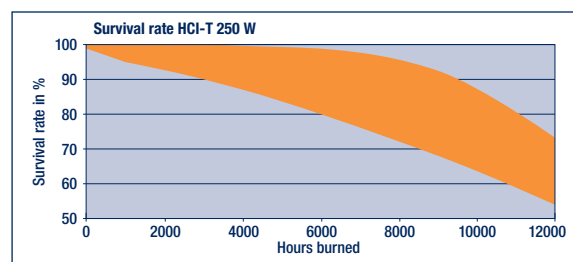
|                                |                             | HCI-T<br>35 W <b>New</b><br>930 WDL PB | HCI-T<br>70 W<br>930 WDL PB | HCI-TC<br>35 W <b>New</b><br>930 WDL PB | HCI-TC<br>70 W<br>930 WDL PB |
|--------------------------------|-----------------------------|----------------------------------------|-----------------------------|-----------------------------------------|------------------------------|
| <b>Type</b>                    |                             | <b>UVS, PB, Shoplight</b>              | <b>UVS, PB, Shoplight</b>   | <b>UVS, PB, Shoplight</b>               | <b>UVS, PB, Shoplight</b>    |
| <b>ILCOS</b>                   |                             | MT/UB-35/30/1A-H-G12-19/100            | MT/UB-70/30/1A-H-G12-19/100 | MT/UB-35/30/1A-H-G8.5-15/81             | MT/UB-70/30/1A-H-G8.5-15/81  |
| Lamp wattage                   | W                           | 39                                     | 73                          | 37                                      | 73                           |
| Lamp voltage                   | V                           | 92                                     | 90                          | 92                                      | 95                           |
| Ignition voltage min./max.     | kVs                         | 3.6/5                                  | 3.6/5                       | 3.6/5                                   | 3.6/5                        |
| Lamp current                   | A                           | 0.5                                    | 0.96                        | 0.5                                     | 0.96                         |
| Nominal luminous flux          | lm                          | 2800                                   | 6400                        | 2800                                    | 6300                         |
| Luminous efficacy              | lm/W                        | 79                                     | 88                          | 79                                      | 86                           |
| Light colour/Colour appearance |                             | 930 WDL                                | 930 WDL                     | 930 WDL                                 | 930 WDL                      |
| Colour temperature             | K                           | 3000                                   | 3000                        | 3000                                    | 3000                         |
| Colour rendering index         | R <sub>a</sub>              | 92                                     | 94                          | 92                                      | 95                           |
| NIOSH Skin                     | h                           | > 8                                    | > 21                        | > 8                                     | > 24                         |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 2                                    | < 0.4                       | < 2                                     | < 0.35                       |
| Base                           |                             | G12                                    | G12                         | G8.5                                    | G8.5                         |
| Diameter d                     | mm                          | 19                                     | 19                          | 15                                      | 15                           |
| Length max. l                  | mm                          | 100                                    | 100                         | 81                                      | 81                           |
| LCL a                          | mm                          | 56                                     | 56                          | 52                                      | 52                           |
| Burning position               |                             | universal                              | universal                   | universal                               | universal                    |
| Average lamp life              | h                           | 12000                                  | 12000                       | 12000                                   | 12000                        |
| Max. perm. outer bulb temp.    | °C                          | 450                                    | 550                         | 450                                     | 550                          |
| Max. perm. base edge temp.     | °C                          | 300                                    | 300                         | 300                                     | 300                          |
| PF corr. cap. at 50 Hz         | µF                          | 6                                      | 12                          | 6                                       | 12                           |
| Lamp reference                 |                             | HCI-T<br>35/930 WDL PB Shop            | HCI-T<br>70/930 WDL PB Shop | HCI-TC<br>35/930 WDL PB Shop            | HCI-TC<br>70/930 WDL PB Shop |
| EAN                            |                             | 4008321108166                          | 4050300983134               | 4008321108142                           | 4050300983110                |
| Standard pack                  | Qty                         | 12                                     | 12                          | 12                                      | 12                           |
| Figure                         | No.                         | 1                                      | 1                           | 2                                       | 2                            |
| Circuit (see page 26)          | Fig. no.                    | 1/2                                    | 1/2                         | 1/2                                     | 1/2                          |

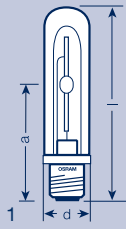


# POWERBALL® HCI®-T, TT

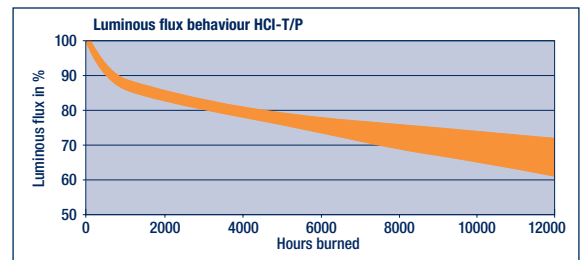
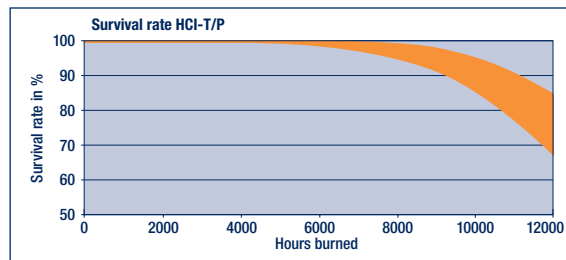


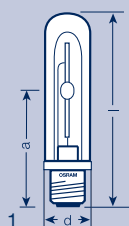
|                                |                             | HCI-T<br>250 W               | HCI-T<br>250 W <b>New</b>    | HCI-TT<br>70 W              | HCI-TT<br>150 W              |
|--------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|
|                                |                             | 830 WDL PB                   | 942 NDL PB                   | 830 WDL PB                  | 830 WDL PB                   |
| Type                           |                             | UVS, PB                      | UVS, PB                      | UVS, PB                     | UVS, PB                      |
| ILCOS                          |                             | MT/UB-250/30/1B-H-E40-46/226 | MT/UB-250/42/1A-H-E40-46/226 | MT/UB-70/30/1B-H-E27-30/150 | MT/UB-150/30/1B-H-E40-46/204 |
| Lamp wattage                   | W                           | 245                          | 250                          | 74                          | 148                          |
| Lamp voltage                   | V                           | 105                          | 100                          | 90                          | 95                           |
| Ignition voltage min./max.     | kVs                         | 3.6/5                        | 3.6/5                        | 1.8/5                       | 2.75/5                       |
| Lamp current                   | A                           | 2.8                          | 2.8                          | 0.92                        | 1.8                          |
| Nominal luminous flux          | lm                          | 25800                        | 25000                        | 7000                        | 14500                        |
| Luminous efficacy              | lm/W                        | 105                          | 100                          | 95                          | 98                           |
| Light colour/Colour appearance |                             | 830 WDL                      | 942 NDL                      | 830 WDL                     | 830 WDL                      |
| Colour temperature             | K                           | 3000                         | 4200                         | 3000                        | 3000                         |
| Colour rendering index         | R <sub>a</sub>              | 87                           | 96                           | 86                          | 83                           |
| NIOSH Skin                     | h                           | > 50                         | > 8                          | > 47                        | > 50                         |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.04                       | < 2                          | < 0.18                      | < 0.04                       |
| Base                           |                             | E40                          | E40                          | E27                         | E40                          |
| Diameter d                     | mm                          | 46                           | 46                           | 30                          | 46                           |
| Length max. l                  | mm                          | 226                          | 226                          | 150                         | 204                          |
| LCL a                          | mm                          | 150                          | 150                          | 102                         | 132                          |
| Burning position               |                             | universal                    | universal                    | universal                   | universal                    |
| Average lamp life              | h                           | 12000                        | 12000                        | 15000                       | 15000                        |
| Max. perm. outer bulb temp.    | °C                          | 500                          | 500                          | 350                         | 400                          |
| Max. perm. base edge temp.     | °C                          | 250                          | 250                          | 210                         | 210                          |
| PF corr. cap. at 50 Hz         | µF                          | 32                           | 32                           | 12                          | 20                           |
| Lamp reference                 |                             | HCI-T<br>250/830 WDL PB      | HCI-T<br>250/942 NDL PB      | HCI-TT<br>70/830 WDL PB     | HCI-TT<br>150/830 WDL PB     |
| EAN                            |                             | 4050300636849                | 4008321908308                | 4050300784120               | 4050300784144                |
| Standard pack                  | Qty                         | 12                           | 12                           | 12                          | 12                           |
| Figure                         | No.                         | 1                            | 1                            | 1                           | 1                            |
| Circuit (see page 26)          | Fig. no.                    | 1                            | 1                            | 1                           | 1                            |



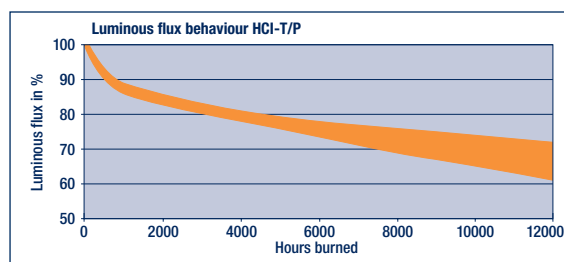
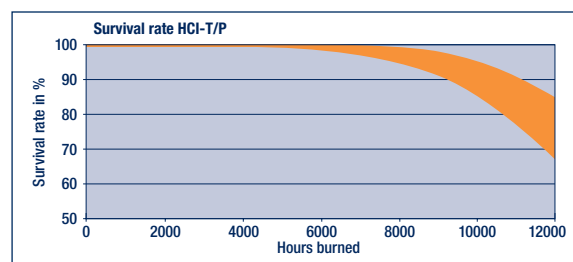


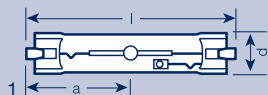
|                                |                             | <b>New</b>                           |                                             |                                      |                                             |                                       |                                              |
|--------------------------------|-----------------------------|--------------------------------------|---------------------------------------------|--------------------------------------|---------------------------------------------|---------------------------------------|----------------------------------------------|
|                                |                             | <b>HCI-T/P</b>                       | <b>HCI-T/P</b>                              | <b>HCI-T/P</b>                       | <b>HCI-T/P</b>                              | <b>HCI-T/P</b>                        | <b>HCI-T/P</b>                               |
|                                |                             | <b>70 W</b>                          | <b>70 W</b>                                 | <b>70 W</b>                          | <b>70 W</b>                                 | <b>100 W</b>                          | <b>100 W</b>                                 |
|                                |                             | <b>830 WDL PB</b>                    | <b>830 WDL PB</b>                           | <b>942 NDL PB</b>                    | <b>942 NDL PB</b>                           | <b>830 WDL PB</b>                     | <b>830 WDL PB</b>                            |
|                                |                             | <b>clear</b>                         | <b>coated</b>                               | <b>clear</b>                         | <b>coated</b>                               | <b>clear</b>                          | <b>coated</b>                                |
| Type                           |                             | <b>UVS, PB</b>                       | <b>UVS, PB</b>                              | <b>UVS, PB</b>                       | <b>UVS, PB</b>                              | <b>UVS, PB</b>                        | <b>UVS, PB</b>                               |
| ILCOS                          |                             | MTS/UB-70/30/<br>1B-H-E27-32/<br>125 | MTS coated/<br>UB-70/30/1B-<br>H-E27-32/125 | MTS/UB-70/42/<br>1A-H-E27-32/<br>125 | MTS coated/<br>UB-70/42/1A-<br>H-E27-32/125 | MTS/UB-100/30/<br>1B-H-E27-40/<br>140 | MTS coated/<br>UB-100/30/1B-<br>H-E27-40/140 |
| Lamp wattage                   | W                           | 73                                   | 73                                          | 73                                   | 73                                          | 100                                   | 100                                          |
| Lamp voltage                   | V                           | 90                                   | 90                                          | 90                                   | 90                                          | 95                                    | 95                                           |
| Ignition voltage min./max.     | kVs                         | 3.6/5                                | 3.6/5                                       | 3.6/5                                | 3.6/5                                       | 3.6/5                                 | 3.6/5                                        |
| Lamp current                   | A                           | 0.98                                 | 0.98                                        | 0.98                                 | 0.98                                        | 1.2                                   | 1.2                                          |
| Nominal luminous flux          | lm                          | 6500                                 | 6400                                        | 6100                                 | 6000                                        | 9000                                  | 8500                                         |
| Luminous efficacy              | lm/W                        | 89                                   | 88                                          | 84                                   | 82                                          | 90                                    | 85                                           |
| Light colour/Colour appearance |                             | 830 WDL                              | 830 WDL                                     | 942 NDL                              | 942 NDL                                     | 830 WDL                               | 830 WDL                                      |
| Colour temperature             | K                           | 3000                                 | 3000                                        | 4200                                 | 4200                                        | 3000                                  | 3000                                         |
| Colour rendering index         | R <sub>a</sub>              | > 80                                 | > 80                                        | > 90                                 | > 90                                        | > 80                                  | > 80                                         |
| NIOSH Skin                     | h                           | > 47                                 | > 47                                        | > 8                                  | > 8                                         | > 8                                   | > 8                                          |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.18                               | < 0.18                                      | < 2                                  | < 2                                         | < 2                                   | < 2                                          |
| Base                           |                             | E27                                  | E27                                         | E27                                  | E27                                         | E27                                   | E27                                          |
| Diameter d                     | mm                          | 32                                   | 32                                          | 32                                   | 32                                          | 40                                    | 40                                           |
| Length max. l                  | mm                          | 125                                  | 125                                         | 125                                  | 125                                         | 140                                   | 140                                          |
| LCL a                          | mm                          | 89                                   | 89                                          | 89                                   | 89                                          | 89                                    | 89                                           |
| Burning position               |                             | universal                            | universal                                   | universal                            | universal                                   | universal                             | universal                                    |
| Average lamp life              | h                           | 12000                                | 12000                                       | 12000                                | 12000                                       | 12000                                 | 12000                                        |
| Max. perm. outer bulb temp.    | °C                          | 330                                  | 330                                         | 330                                  | 330                                         | 330                                   | 330                                          |
| Max. perm. base edge temp.     | °C                          | 190                                  | 190                                         | 190                                  | 190                                         | 190                                   | 190                                          |
| PF corr. cap. at 50 Hz         | µF                          | 12                                   | 12                                          | 12                                   | 12                                          | 16                                    | 16                                           |
| Lamp reference                 |                             | HCI-T/P<br>70/830 WDL PB<br>clear    | HCI-T/P<br>70/830 WDL PB<br>coated          | HCI-T/P<br>70/942 NDL PB<br>clear    | HCI-T/P<br>70/942 NDL PB<br>coated          | HCI-T/P<br>100/830 WDL PB<br>clear    | HCI-T/P<br>100/830 WDL PB<br>coated          |
| EAN                            |                             | 4008321907714                        | 4008321907721                               | 4008321907738                        | 4008321907745                               | 4008321907752                         | 4008321907769                                |
| Standard pack                  | Qty                         | 12                                   | 12                                          | 12                                   | 12                                          | 12                                    | 12                                           |
| Figure                         | No.                         | 1                                    | 1                                           | 1                                    | 1                                           | 1                                     | 1                                            |
| Circuit (see page 26)          | Fig. no.                    | 1/2                                  | 1/2                                         | 1/2                                  | 1/2                                         | 1/2                                   | 1/2                                          |



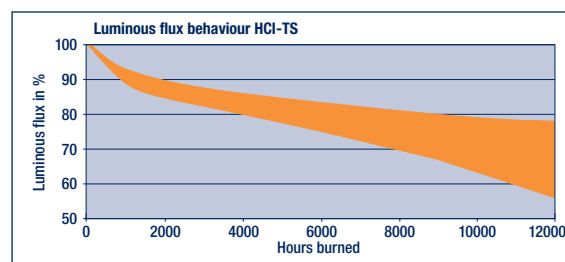
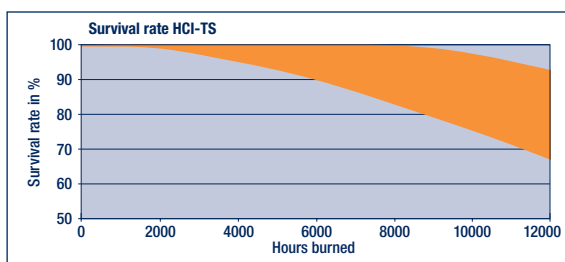


|                                |                             |                               |  |                                      |                               |                                      |                               |                                      |                                      |
|--------------------------------|-----------------------------|-------------------------------|--|--------------------------------------|-------------------------------|--------------------------------------|-------------------------------|--------------------------------------|--------------------------------------|
|                                |                             | <b>New</b>                    |  | <b>HCI-T/P</b>                       | <b>HCI-T/P</b>                | <b>HCI-T/P</b>                       | <b>HCI-T/P</b>                | <b>HCI-T/P</b>                       | <b>HCI-T/P</b>                       |
|                                |                             |                               |  | <b>100 W</b>                         | <b>100 W</b>                  | <b>150 W</b>                         | <b>150 W</b>                  | <b>150 W</b>                         | <b>150 W</b>                         |
|                                |                             |                               |  | <b>942 NDL PB</b>                    | <b>942 NDL PB</b>             | <b>830 WDL PB</b>                    | <b>830 WDL PB</b>             | <b>942 NDL PB</b>                    | <b>942 NDL PB</b>                    |
|                                |                             |                               |  | <b>clear</b>                         | <b>coated</b>                 | <b>clear</b>                         | <b>coated</b>                 | <b>clear</b>                         | <b>coated</b>                        |
| <b>Type</b>                    |                             | <b>UVS, PB</b>                |  | <b>UVS, PB</b>                       | <b>UVS, PB</b>                | <b>UVS, PB</b>                       | <b>UVS, PB</b>                | <b>UVS, PB</b>                       | <b>UVS, PB</b>                       |
| ILCOS                          |                             | MTS/UB-100/42/1A-H-E27-40/140 |  | MTS coated/UB-100/42/1A-H-E27-40/140 | MTS/UB-150/30/1B-H-E27-40/140 | MTS coated/UB-150/30/1B-H-E27-40/140 | MTS/UB-150/42/1A-H-E27-40/140 | MTS coated/UB-150/42/1A-H-E27-40/140 | MTS coated/UB-150/42/1A-H-E27-40/140 |
| Lamp wattage                   | W                           | 100                           |  | 100                                  | 145                           | 145                                  | 145                           | 145                                  | 145                                  |
| Lamp voltage                   | V                           | 95                            |  | 95                                   | 95                            | 95                                   | 95                            | 95                                   | 95                                   |
| Ignition voltage min./max.     | kVs                         | 3.6/5                         |  | 3.6/5                                | 3.6/5                         | 3.6/5                                | 3.6/5                         | 3.6/5                                | 3.6/5                                |
| Lamp current                   | A                           | 1.2                           |  | 1.2                                  | 1.8                           | 1.8                                  | 1.8                           | 1.8                                  | 1.8                                  |
| Nominal luminous flux          | lm                          | 8800                          |  | 8300                                 | 14200                         | 14000                                | 14000                         | 13300                                | 13300                                |
| Luminous efficacy              | lm/W                        | 88                            |  | 83                                   | 98                            | 97                                   | 97                            | 92                                   | 92                                   |
| Light colour/Colour appearance |                             | 942 NDL                       |  | 942 NDL                              | 830 WDL                       | 830 WDL                              | 942 NDL                       | 942 NDL                              | 942 NDL                              |
| Colour temperature             | K                           | 4200                          |  | 4200                                 | 3000                          | 3000                                 | 4200                          | 4200                                 | 4200                                 |
| Colour rendering index         | R <sub>a</sub>              | > 90                          |  | > 90                                 | > 80                          | > 80                                 | > 90                          | > 90                                 | > 90                                 |
| NIOSH Skin                     | h                           | > 8                           |  | > 8                                  | > 50                          | > 50                                 | > 50                          | > 50                                 | > 50                                 |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 2                           |  | < 2                                  | < 0.06                        | < 0.06                               | < 0.12                        | < 0.12                               | < 0.12                               |
| Base                           |                             | E27                           |  | E27                                  | E27                           | E27                                  | E27                           | E27                                  | E27                                  |
| Diameter d                     | mm                          | 40                            |  | 40                                   | 40                            | 40                                   | 40                            | 40                                   | 40                                   |
| Length max. l                  | mm                          | 140                           |  | 140                                  | 140                           | 140                                  | 140                           | 140                                  | 140                                  |
| LCL a                          | mm                          | 89                            |  | 89                                   | 89                            | 89                                   | 89                            | 89                                   | 89                                   |
| Burning position               |                             | universal                     |  | universal                            | universal                     | universal                            | universal                     | universal                            | universal                            |
| Average lamp life              | h                           | 12000                         |  | 12000                                | 12000                         | 12000                                | 12000                         | 12000                                | 12000                                |
| Max. perm. outer bulb temp.    | °C                          | 330                           |  | 330                                  | 330                           | 330                                  | 330                           | 330                                  | 330                                  |
| Max. perm. base edge temp.     | °C                          | 190                           |  | 190                                  | 190                           | 190                                  | 190                           | 190                                  | 190                                  |
| PF corr. cap. at 50 Hz         | µF                          | 16                            |  | 16                                   | 20                            | 20                                   | 20                            | 20                                   | 20                                   |
| Lamp reference                 |                             | HCI-T/P                       |  | HCI-T/P                              | HCI-T/P                       | HCI-T/P                              | HCI-T/P                       | HCI-T/P                              | HCI-T/P                              |
|                                |                             | 100/942 NDL PB                |  | 100/942 NDL PB                       | 150/830 WDL PB                | 150/830 WDL PB                       | 150/942 NDL PB                | 150/942 NDL PB                       | 150/942 NDL PB                       |
|                                |                             | clear                         |  | coated                               | clear                         | coated                               | clear                         | coated                               | coated                               |
| EAN                            |                             | 4008321907776                 |  | 4008321907783                        | 4008321907790                 | 4008321907806                        | 4008321907813                 | 4008321907820                        | 4008321907820                        |
| Standard pack                  | Qty                         | 12                            |  | 12                                   | 12                            | 12                                   | 12                            | 12                                   | 12                                   |
| Figure                         | No.                         | 1                             |  | 1                                    | 1                             | 1                                    | 1                             | 1                                    | 1                                    |
| Circuit (see page 26)          | Fig. no.                    | 1/2                           |  | 1/2                                  | 1/2                           | 1/2                                  | 1/2                           | 1/2                                  | 1/2                                  |

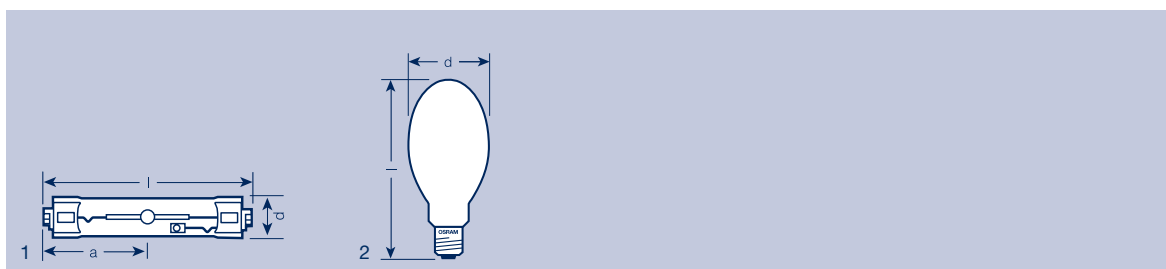




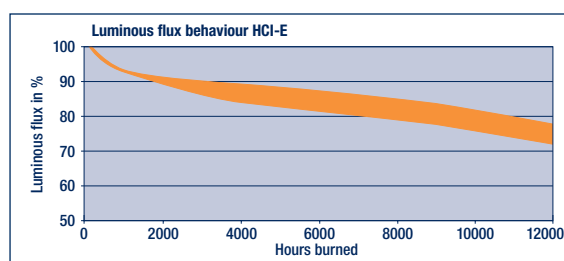
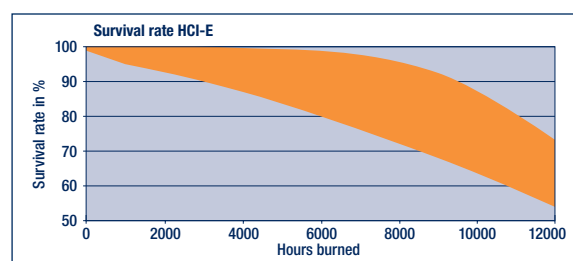
|                                |                             | HCI-TS<br>70 W                     | HCI-TS<br>70 W                     | HCI-TS<br>150 W                     | HCI-TS<br>150 W                     |
|--------------------------------|-----------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
|                                |                             | 830 WDL PB                         | 942 NDL PB                         | 830 WDL PB                          | 942 NDL PB                          |
| Type                           |                             | UVS, PB                            | UVS, PB                            | UVS, PB                             | UVS, PB                             |
| ILCOS                          |                             | MD/UB-70/30/1B-H-RX7s-21/114.2/P45 | MD/UB-70/42/1A-H-RX7s-21/114.2/P45 | MD/UB-150/30/1B-H-RX7s24-24/132/P45 | MD/UB-150/42/1A-H-RX7s24-24/132/P45 |
| Lamp wattage                   | W                           | 72                                 | 74                                 | 144                                 | 144                                 |
| Lamp voltage                   | V                           | 95                                 | 94                                 | 100                                 | 96                                  |
| Ignition voltage min./max.     | kVs                         | 3.6/4.5                            | 3.6/5                              | 3.6/5                               | 3.6/5                               |
| Lamp current                   | A                           | 0.95                               | 0.98                               | 1.8                                 | 1.8                                 |
| Nominal luminous flux          | lm                          | 6900                               | 6700                               | 14800                               | 14200                               |
| Luminous efficacy              | lm/W                        | 96                                 | 91                                 | 103                                 | 99                                  |
| Light colour/Colour appearance |                             | 830 WDL                            | 942 NDL                            | 830 WDL                             | 942 NDL                             |
| Colour temperature             | K                           | 3000                               | 4200                               | 3000                                | 4200                                |
| Colour rendering index         | Ra                          | 88                                 | 95                                 | 90                                  | 97                                  |
| NIOSH Skin                     | h                           | > 18                               | > 29.7                             | > 50                                | > 26                                |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.45                             | < 0.28                             | < 0.4                               | < 0.32                              |
| Base                           |                             | RX7s                               | RX7s                               | RX7s-24                             | RX7s-24                             |
| Diameter d                     | mm                          | 21                                 | 21                                 | 24                                  | 24                                  |
| Length max. l                  | mm                          | 114.2                              | 114.2                              | 132                                 | 132                                 |
| LCL a                          | mm                          | 57                                 | 57                                 | 66                                  | 66                                  |
| Burning position               |                             | p 45                               | p 45                               | p 45                                | p 45                                |
| Average lamp life              | h                           | 12000                              | 12000                              | 12000                               | 12000                               |
| Max. perm. outer bulb temp.    | °C                          | 500                                | 500                                | 650                                 | 650                                 |
| Max. perm. base edge temp.     | °C                          | 280                                | 280                                | 280                                 | 280                                 |
| PF corr. cap. at 50 Hz         | µF                          | 12                                 | 12                                 | 20                                  | 20                                  |
| Lamp reference                 |                             | HCI-TS<br>70/830 WDL PB            | HCI-TS<br>70/942 NDL PB            | HCI-TS<br>150/830 WDL PB            | HCI-TS<br>150/942 NDL PB            |
| EAN                            |                             | 4050300784069                      | 4050300784106                      | 4050300783987                       | 4050300784007                       |
| Standard pack                  | Qty                         | 12                                 | 12                                 | 12                                  | 12                                  |
| Figure                         | No.                         | 1                                  | 1                                  | 1                                   | 1                                   |
| Circuit (see page 26)          | Fig. no.                    | 1/2                                | 1/2                                | 1/2                                 | 1/2                                 |

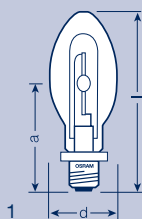


# POWERBALL® HCI®-TS, E

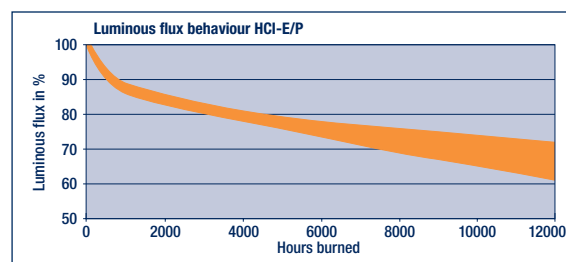
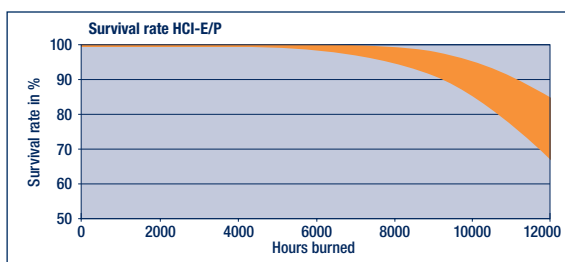


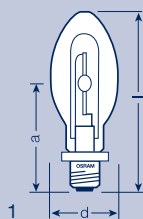
|                                |                             | HCI-TS<br>250 W<br>830 WDL PB    | HCI-TS <b>New</b><br>250 W<br>942 NDL PB | HCI-E<br>250 W<br>830 WDL PB<br>coated | HCI-E <b>New</b><br>250 W<br>942 NDL PB<br>coated |
|--------------------------------|-----------------------------|----------------------------------|------------------------------------------|----------------------------------------|---------------------------------------------------|
| <b>Type</b>                    |                             | UVS, PB                          | UVS, PB                                  | UVS, PB                                | UVS, PB                                           |
| ILCOS                          |                             | MD/UB-250/30/1B-H-Fc2-25/163/P45 | MD/UB-250/42/1A-H-Fc2-25/163/P45         | ME/UB-250/30/1B-H-E40-90/226           | ME/UB-250/42/1A-H-E40-90/226                      |
| Lamp wattage                   | W                           | 245                              | 245                                      | 245                                    | 258                                               |
| Lamp voltage                   | V                           | 100                              | 100                                      | 95                                     | 105                                               |
| Ignition voltage min./max.     | kVs                         | 3.6/5                            | 3.6/5                                    | 3.6/5                                  | 3.6/5                                             |
| Lamp current                   | A                           | 3.0                              | 3.0                                      | 2.9                                    | 2.9                                               |
| Nominal luminous flux          | lm                          | 25000                            | 23000                                    | 24500                                  | 24500                                             |
| Luminous efficacy              | lm/W                        | 102                              | 94                                       | 100                                    | 100                                               |
| Light colour/Colour appearance |                             | 830 WDL                          | 942 NDL                                  | 830 WDL                                | 942 NDL                                           |
| Colour temperature             | K                           | 3000                             | 4200                                     | 3000                                   | 4200                                              |
| Colour rendering index         | Ra                          | 90                               | > 90                                     | 91                                     | > 90                                              |
| NIOSH Skin                     | h                           | > 50                             | > 8                                      | > 50                                   | > 8                                               |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.15                           | < 2                                      | < 0.1                                  | < 2                                               |
| Base                           |                             | Fc2                              | Fc2                                      | E40                                    | E40                                               |
| Diameter d                     | mm                          | 25                               | 25                                       | 90                                     | 90                                                |
| Length max. l                  | mm                          | 163                              | 163                                      | 226                                    | 226                                               |
| LCL a                          | mm                          | 81.5                             | 81.5                                     | –                                      | –                                                 |
| Burning position               |                             | p 45                             | p 45                                     | universal                              | universal                                         |
| Average lamp life              | h                           | 12000                            | 12000                                    | 12000                                  | 12000                                             |
| Max. perm. outer bulb temp.    | °C                          | 650                              | 650                                      | 400                                    | 400                                               |
| Max. perm. base edge temp.     | °C                          | 280                              | 280                                      | 250                                    | 250                                               |
| PF corr. cap. at 50 Hz         | µF                          | 32                               | 32                                       | 32                                     | 32                                                |
| Lamp reference                 |                             | HCI-TS<br>250/830 WDL PB         | HCI-TS<br>250/942 NDL PB                 | HCI-E<br>250/830 WDL PB                | HCI-E<br>250/942 NDL PB                           |
| EAN                            |                             | 4050300637730                    | 4008321907707                            | 4050300636825                          | 4008321908315                                     |
| Standard pack                  | Qty                         | 12                               | 12                                       | 12                                     | 12                                                |
| Figure                         | No.                         | 1                                | 1                                        | 2                                      | 2                                                 |
| Circuit (see page 26)          | Fig. no.                    | 1                                | 1                                        | 1                                      | 1                                                 |



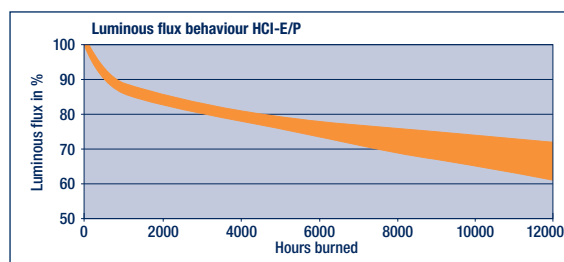
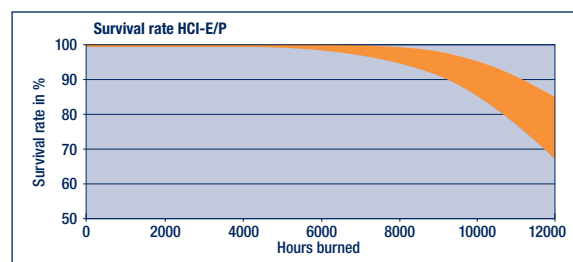


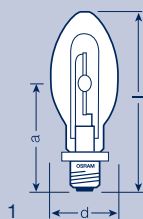
|                                |                             | <b>New</b>                   |                              |                              |                              |
|--------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|                                |                             | HCI-E/P                      | HCI-E/P                      | HCI-E/P                      | HCI-E/P                      |
|                                |                             | 35 W                         | 35 W                         | 35 W                         | 35 W                         |
|                                |                             | 830 WDL PB                   | 830 WDL PB                   | 942 NDL PB                   | 942 NDL PB                   |
|                                |                             | clear                        | coated                       | clear                        | coated                       |
| Type                           |                             | UVS, PB                      | UVS, PB                      | UVS, PB                      | UVS, PB                      |
| ILCOS                          |                             | MCS/UB-35/30/1B-H-E27-54/138 | MES/UB-35/30/1B-H-E27-54/138 | MCS/UB-35/42/1A-H-E27-54/138 | MES/UB-35/42/1A-H-E27-54/138 |
| Lamp wattage                   | W                           | 39                           | 39                           | 39                           | 39                           |
| Lamp voltage                   | V                           | 90                           | 90                           | 90                           | 90                           |
| Ignition voltage min./max.     | kVs                         | 3.6/5                        | 3.6/5                        | 3.6/5                        | 3.6/5                        |
| Lamp current                   | A                           | 0.5                          | 0.5                          | 0.5                          | 0.5                          |
| Nominal luminous flux          | lm                          | 3000                         | 2850                         | 3000                         | 2850                         |
| Luminous efficacy              | lm/W                        | 77                           | 73                           | 77                           | 73                           |
| Light colour/Colour appearance |                             | 830 WDL                      | 830 WDL                      | 942 NDL                      | 942 NDL                      |
| Colour temperature             | K                           | 3000                         | 3000                         | 4200                         | 4200                         |
| Colour rendering index         | Ra                          | > 80                         | > 80                         | > 90                         | > 90                         |
| NIOSH Skin                     | h                           | > 21                         | > 21                         | > 21                         | > 21                         |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.4                        | < 0.4                        | < 0.4                        | < 0.4                        |
| Base                           |                             | E27                          | E27                          | E27                          | E27                          |
| Diameter d                     | mm                          | 54                           | 54                           | 54                           | 54                           |
| Length max. l                  | mm                          | 138                          | 138                          | 138                          | 138                          |
| LCL a                          | mm                          | 86                           | –                            | 86                           | –                            |
| Burning position               |                             | universal                    | universal                    | universal                    | universal                    |
| Average lamp life              | h                           | 12000                        | 12000                        | 12000                        | 12000                        |
| Max. perm. outer bulb temp.    | °C                          | 330                          | 330                          | 330                          | 330                          |
| Max. perm. base edge temp.     | °C                          | 190                          | 190                          | 190                          | 190                          |
| PF corr. cap. at 50 Hz         | µF                          | 6                            | 6                            | 6                            | 6                            |
| Lamp reference                 |                             | HCI-E/P                      | HCI-E/P                      | HCI-E/P                      | HCI-E/P                      |
|                                |                             | 35/830 WDL PB clear          | 35/830 WDL PB coated         | 35/942 NDL PB clear          | 35/942 NDL PB coated         |
| EAN                            |                             | 4008321907837                | 4008321907844                | 4008321907851                | 4008321907868                |
| Standard pack                  | Qty                         | 12                           | 12                           | 12                           | 12                           |
| Figure                         | No.                         | 1                            | 1                            | 1                            | 1                            |
| Circuit (see page 26)          | Fig. no.                    | 1/2                          | 1/2                          | 1/2                          | 1/2                          |



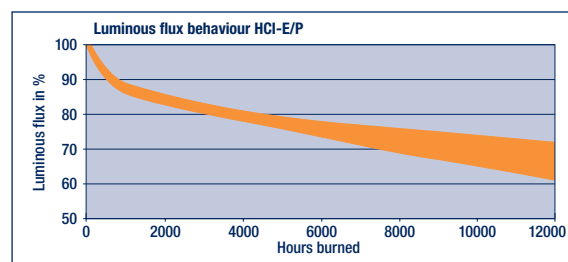
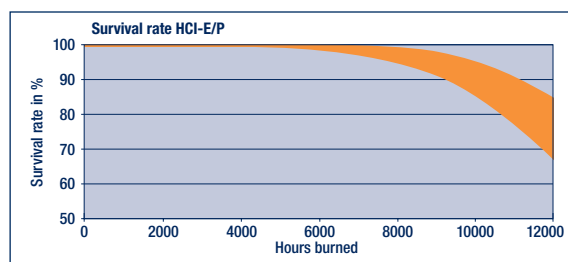


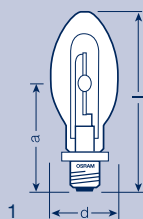
|                                |                             | HCI-E/P                        | HCI-E/P                         | HCI-E/P                        | HCI-E/P                         |
|--------------------------------|-----------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|
|                                |                             | 70 W                           | 70 W                            | 70 W                           | 70 W                            |
|                                |                             | 830 WDL PB                     | 830 WDL PB                      | 942 NDL PB                     | 942 NDL PB                      |
|                                |                             | clear                          | coated                          | clear                          | coated                          |
| Type                           |                             | UVS, PB                        | UVS, PB                         | UVS, PB                        | UVS, PB                         |
| ILCOS                          |                             | MCS/UB-70/30/1B-H-E27-54/138   | MES/UB-70/30/1B-H-E27-54/138    | MCS/UB-70/42/1A-H-E27-54/138   | MES/UB-70/42/1A-H-E27-54/138    |
| Lamp wattage                   | W                           | 73                             | 73                              | 73                             | 73                              |
| Lamp voltage                   | V                           | 90                             | 90                              | 100                            | 100                             |
| Ignition voltage min./max.     | kVs                         | 3.6/5                          | 3.6/5                           | 3.6/5                          | 3.6/5                           |
| Lamp current                   | A                           | 0.98                           | 0.98                            | 0.98                           | 0.98                            |
| Nominal luminous flux          | lm                          | 6500                           | 6400                            | 6100                           | 6000                            |
| Luminous efficacy              | lm/W                        | 89                             | 88                              | 84                             | 82                              |
| Light colour/Colour appearance |                             | 830 WDL                        | 830 WDL                         | 942 NDL                        | 942 NDL                         |
| Colour temperature             | K                           | 3000                           | 3000                            | 4200                           | 4200                            |
| Colour rendering index         | Ra                          | 87                             | 87                              | > 90                           | > 90                            |
| NIOSH Skin                     | h                           | > 47                           | > 47                            | > 26                           | > 26                            |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.18                         | < 0.18                          | < 0.32                         | < 0.32                          |
| Base                           |                             | E27                            | E27                             | E27                            | E27                             |
| Diameter d                     | mm                          | 54                             | 54                              | 54                             | 54                              |
| Length max. l                  | mm                          | 138                            | 138                             | 138                            | 138                             |
| LCL a                          | mm                          | 86                             | –                               | 86                             | –                               |
| Burning position               |                             | universal                      | universal                       | universal                      | universal                       |
| Average lamp life              | h                           | 12000                          | 12000                           | 12000                          | 12000                           |
| Max. perm. outer bulb temp.    | °C                          | 330                            | 330                             | 330                            | 330                             |
| Max. perm. base edge temp.     | °C                          | 190                            | 190                             | 190                            | 190                             |
| PF corr. cap. at 50 Hz         | µF                          | 12                             | 12                              | 12                             | 12                              |
| Lamp reference                 |                             | HCI-E/P<br>70/830 WDL PB clear | HCI-E/P<br>70/830 WDL PB coated | HCI-E/P<br>70/942 NDL PB clear | HCI-E/P<br>70/942 NDL PB coated |
| EAN                            |                             | 4008321907875                  | 4008321907882                   | 4008321907899                  | 4008321907905                   |
| Standard pack                  | Qty                         | 12                             | 12                              | 12                             | 12                              |
| Figure                         | No.                         | 1                              | 1                               | 1                              | 1                               |
| Circuit (see page 26)          | Fig. no.                    | 1/2                            | 1/2                             | 1/2                            | 1/2                             |



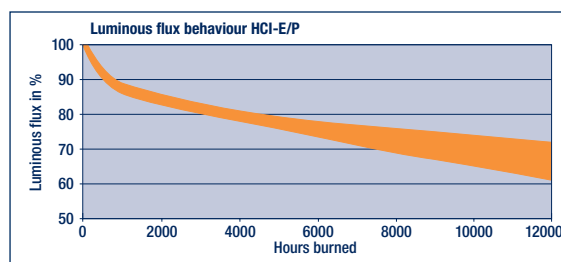
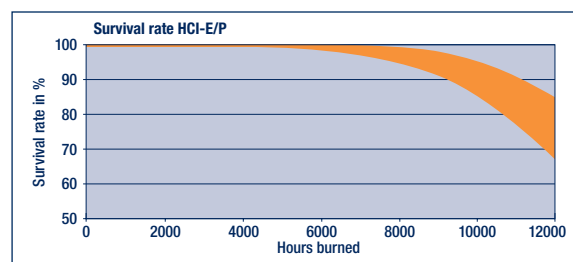


|                                |                             | <b>New</b>                      |                                  |                                 |                                  |
|--------------------------------|-----------------------------|---------------------------------|----------------------------------|---------------------------------|----------------------------------|
|                                |                             | <b>HCI-E/P</b>                  | <b>HCI-E/P</b>                   | <b>HCI-E/P</b>                  | <b>HCI-E/P</b>                   |
|                                |                             | <b>100 W</b>                    | <b>100 W</b>                     | <b>100 W</b>                    | <b>100 W</b>                     |
|                                |                             | <b>830 WDL PB</b>               | <b>830 WDL PB</b>                | <b>942 NDL PB</b>               | <b>942 NDL PB</b>                |
|                                |                             | <b>clear</b>                    | <b>coated</b>                    | <b>clear</b>                    | <b>coated</b>                    |
| Type                           |                             | <b>UVS, PB</b>                  | <b>UVS, PB</b>                   | <b>UVS, PB</b>                  | <b>UVS, PB</b>                   |
| ILCOS                          |                             | MCS/UB-100/30/1B-H-E27-54/138   | MES/UB-100/30/1B-H-E27-54/138    | MCS/UB-100/42/1A-H-E27-54/138   | MES/UB-100/42/1A-H-E27-54/138    |
| Lamp wattage                   | W                           | 100                             | 100                              | 100                             | 100                              |
| Lamp voltage                   | V                           | 100                             | 100                              | 100                             | 100                              |
| Ignition voltage min./max.     | kVs                         | 3.6/5                           | 3.6/5                            | 3.6/5                           | 3.6/5                            |
| Lamp current                   | A                           | 1.2                             | 1.2                              | 1.2                             | 1.2                              |
| Nominal luminous flux          | lm                          | 9000                            | 8500                             | 8800                            | 8300                             |
| Luminous efficacy              | lm/W                        | 90                              | 85                               | 88                              | 83                               |
| Light colour/Colour appearance |                             | 830 WDL                         | 830 WDL                          | 942 NDL                         | 942 NDL                          |
| Colour temperature             | K                           | 3000                            | 3000                             | 4200                            | 4200                             |
| Colour rendering index         | Ra                          | > 80                            | > 80                             | > 90                            | > 90                             |
| NIOSH Skin                     | h                           | > 50                            | > 50                             | > 8                             | > 8                              |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.02                          | < 0.02                           | < 2                             | < 2                              |
| Base                           |                             | E27                             | E27                              | E27                             | E27                              |
| Diameter d                     | mm                          | 54                              | 54                               | 54                              | 54                               |
| Length max. l                  | mm                          | 138                             | 138                              | 138                             | 138                              |
| LCL a                          | mm                          | 86                              | –                                | 86                              | –                                |
| Burning position               |                             | universal                       | universal                        | universal                       | universal                        |
| Average lamp life              | h                           | 12000                           | 12000                            | 12000                           | 12000                            |
| Max. perm. outer bulb temp.    | °C                          | 330                             | 330                              | 330                             | 330                              |
| Max. perm. base edge temp.     | °C                          | 190                             | 190                              | 190                             | 190                              |
| PF corr. cap. at 50 Hz         | µF                          | 16                              | 16                               | 16                              | 16                               |
| Lamp reference                 |                             | HCI-E/P<br>100/830 WDL PB clear | HCI-E/P<br>100/830 WDL PB coated | HCI-E/P<br>100/942 NDL PB clear | HCI-E/P<br>100/942 NDL PB coated |
| EAN                            |                             | 4008321907912                   | 4008321907929                    | 4008321907936                   | 4008321907943                    |
| Standard pack                  | Qty                         | 12                              | 12                               | 12                              | 12                               |
| Figure                         | No.                         | 1                               | 1                                | 1                               | 1                                |
| Circuit (see page 26)          | Fig. no.                    | 1/2                             | 1/2                              | 1/2                             | 1/2                              |

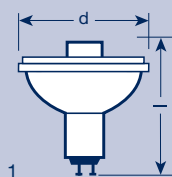




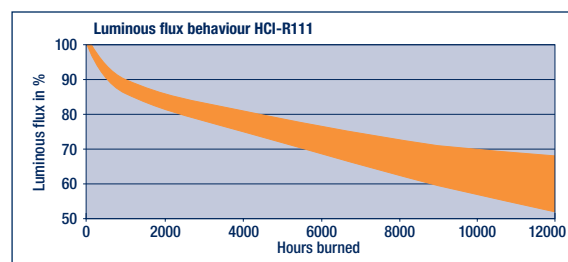
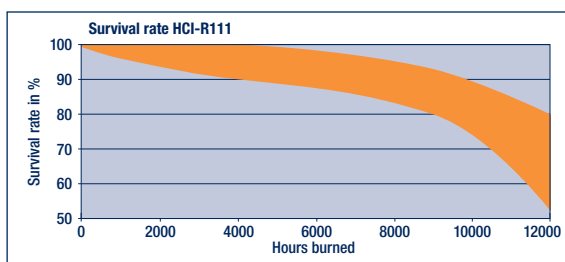
|                                |                             | HCI-E/P                         | HCI-E/P                          | HCI-E/P                         | HCI-E/P                          |
|--------------------------------|-----------------------------|---------------------------------|----------------------------------|---------------------------------|----------------------------------|
|                                |                             | 150 W                           | 150 W                            | 150 W                           | 150 W                            |
|                                |                             | 830 WDL PB                      | 830 WDL PB                       | 942 NDL PB                      | 942 NDL PB                       |
|                                |                             | clear                           | coated                           | clear                           | coated                           |
| Type                           |                             | UVS, PB                         | UVS, PB                          | UVS, PB                         | UVS, PB                          |
| ILCOS                          |                             | MCS/UB-150/30/1B-H-E27-54/138   | MES/UB-150/30/1B-H-E27-54/138    | MCS/UB-150/42/1A-H-E27-54/138   | MES/UB-150/42/1A-H-E27-54/138    |
| Lamp wattage                   | W                           | 150                             | 150                              | 150                             | 150                              |
| Lamp voltage                   | V                           | 95                              | 95                               | 91                              | 91                               |
| Ignition voltage min./max.     | kVs                         | 3.6/5                           | 3.6/5                            | 3.6/5                           | 3.6/5                            |
| Lamp current                   | A                           | 1.8                             | 1.8                              | 1.8                             | 1.8                              |
| Nominal luminous flux          | lm                          | 14000                           | 13300                            | 14000                           | 13300                            |
| Luminous efficacy              | lm/W                        | 93                              | 89                               | 93                              | 89                               |
| Light colour/Colour appearance |                             | 830 WDL                         | 830 WDL                          | 942 NDL                         | 942 NDL                          |
| Colour temperature             | K                           | 3000                            | 3000                             | 4200                            | 4200                             |
| Colour rendering index         | Ra                          | 90                              | 90                               | > 95                            | > 95                             |
| NIOSH Skin                     | h                           | > 50                            | > 50                             | > 50                            | > 50                             |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.12                          | < 0.12                           | < 0.17                          | < 0.17                           |
| Base                           |                             | E27                             | E27                              | E27                             | E27                              |
| Diameter d                     | mm                          | 54                              | 54                               | 54                              | 54                               |
| Length max. l                  | mm                          | 138                             | 138                              | 138                             | 138                              |
| LCL a                          | mm                          | 86                              | –                                | 86                              | –                                |
| Burning position               |                             | universal                       | universal                        | universal                       | universal                        |
| Average lamp life              | h                           | 12000                           | 12000                            | 12000                           | 12000                            |
| Max. perm. outer bulb temp.    | °C                          | 330                             | 330                              | 330                             | 330                              |
| Max. perm. base edge temp.     | °C                          | 190                             | 190                              | 190                             | 190                              |
| PF corr. cap. at 50 Hz         | µF                          | 20                              | 20                               | 20                              | 20                               |
| Lamp reference                 |                             | HCI-E/P<br>150/830 WDL PB clear | HCI-E/P<br>150/830 WDL PB coated | HCI-E/P<br>150/942 NDL PB clear | HCI-E/P<br>150/942 NDL PB coated |
| EAN                            |                             | 4008321907950                   | 4008321907967                    | 4008321907974                   | 4008321907981                    |
| Standard pack                  | Qty                         | 12                              | 12                               | 12                              | 12                               |
| Figure                         | No.                         | 1                               | 1                                | 1                               | 1                                |
| Circuit (see page 26)          | Fig. no.                    | 1/2                             | 1/2                              | 1/2                             | 1/2                              |

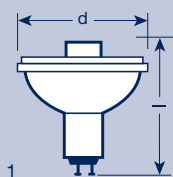


# POWERBALL® HCI®-R111

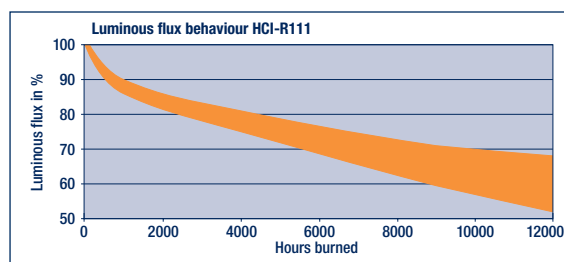
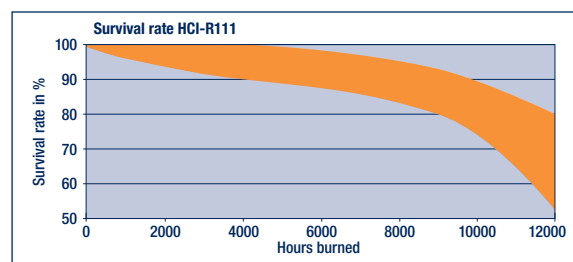


|                                |                             | <b>New</b>                                |                                           |                                           |                                           |                                           |                                           |
|--------------------------------|-----------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
|                                |                             | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           |
|                                |                             | <b>20 W</b>                               | <b>20 W</b>                               | <b>20 W</b>                               | <b>35 W</b>                               | <b>35 W</b>                               | <b>35 W</b>                               |
|                                |                             | <b>830 WDL PB</b>                         | <b>830 WDL PB</b>                         | <b>830 WDL PB</b>                         | <b>830 WDL PB</b>                         | <b>830 WDL PB</b>                         | <b>830 WDL PB</b>                         |
|                                |                             | <b>10D</b>                                | <b>24D</b>                                | <b>40D</b>                                | <b>10D</b>                                | <b>24D</b>                                | <b>40D</b>                                |
| Type                           |                             | UVS, PB                                   | UVS, PB                                   | UVS, PB                                   | UVS, PB                                   | UVS, PB                                   | UVS, PB                                   |
| ILCOS                          |                             | MRS/UB-20/30/<br>1B-H-GX8.5-<br>111/95/10 | MRS/UB-20/30/<br>1B-H-GX8.5-<br>111/95/24 | MRS/UB-20/30/<br>1B-H-GX8.5-<br>111/95/40 | MRS/UB-35/30/<br>1B-H-GX8.5-<br>111/95/10 | MRS/UB-35/30/<br>1B-H-GX8.5-<br>111/95/24 | MRS/UB-35/30/<br>1B-H-GX8.5-<br>111/95/40 |
| Lamp wattage                   | W                           | 20                                        | 20                                        | 20                                        | 39                                        | 39                                        | 39                                        |
| Lamp voltage                   | V                           | 100                                       | 100                                       | 100                                       | 90                                        | 90                                        | 90                                        |
| Ignition voltage min./max.     | kVs                         | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     |
| Lamp current                   | A                           | 0.22                                      | 0.22                                      | 0.22                                      | 0.5                                       | 0.5                                       | 0.5                                       |
| Axial luminous intensity       | cd                          | 17000                                     | 4200                                      | 2000                                      | 35000                                     | 8500                                      | 4000                                      |
| Beam angle                     | °                           | 10                                        | 24                                        | 40                                        | 10                                        | 24                                        | 40                                        |
| Light colour/Colour appearance |                             | 830 WDL                                   | 830 WDL                                   | 830 WDL                                   | 830 WDL                                   | 830 WDL                                   | 830 WDL                                   |
| Colour temperature             | K                           | 3000                                      | 3000                                      | 3000                                      | 3000                                      | 3000                                      | 3000                                      |
| Colour rendering index         | R <sub>a</sub>              | > 80                                      | > 80                                      | > 80                                      | > 80                                      | > 80                                      | > 80                                      |
| NIOSH Skin                     | h                           | > 8                                       | > 8                                       | > 8                                       | > 8                                       | > 8                                       | > 8                                       |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 2                                       | < 2                                       | < 2                                       | < 2                                       | < 2                                       | < 2                                       |
| Base                           |                             | GX8.5                                     | GX8.5                                     | GX8.5                                     | GX8.5                                     | GX8.5                                     | GX8.5                                     |
| Diameter d                     | mm                          | 111                                       | 111                                       | 111                                       | 111                                       | 111                                       | 111                                       |
| Length max. l                  | mm                          | 95                                        | 95                                        | 95                                        | 95                                        | 95                                        | 95                                        |
| Burning position               |                             | universal                                 | universal                                 | universal                                 | universal                                 | universal                                 | universal                                 |
| Average lamp life              | h                           | 12000                                     | 12000                                     | 12000                                     | 12000                                     | 12000                                     | 12000                                     |
| PF corr. cap. at 50 Hz         | µF                          | ECG                                       | ECG                                       | ECG                                       | 6                                         | 6                                         | 6                                         |
| Lamp reference                 |                             | HCI-R111<br>20/830 WDL<br>PB 10D          | HCI-R111<br>20/830 WDL<br>PB 24D          | HCI-R111<br>20/830 WDL<br>PB 40D          | HCI-R111<br>35/830 WDL<br>PB 10D          | HCI-R111<br>35/830 WDL<br>PB 24D          | HCI-R111<br>35/830 WDL<br>PB 40D          |
| EAN                            |                             | 4008321907998                             | 4008321908001                             | 4008321908018                             | 4008321908025                             | 4008321908032                             | 4008321908049                             |
| Standard pack                  | Qty                         | 6                                         | 6                                         | 6                                         | 6                                         | 6                                         | 6                                         |
| Figure                         | No.                         | 1                                         | 1                                         | 1                                         | 1                                         | 1                                         | 1                                         |
| Circuit (see page 26)          | Fig. no.                    | 2                                         | 2                                         | 2                                         | 1/2                                       | 1/2                                       | 1/2                                       |

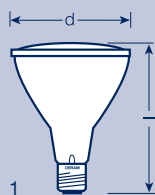




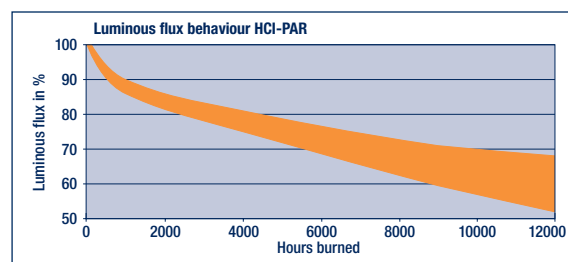
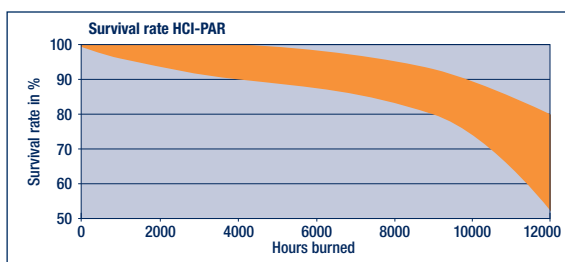
|                                |                             |                                           |                                           |                                           |                                           |                                           |                                           |
|--------------------------------|-----------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
|                                |                             | <b>New</b>                                |                                           |                                           |                                           |                                           |                                           |
|                                |                             | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           | <b>HCI-R111</b>                           |
|                                |                             | <b>35 W</b>                               | <b>35 W</b>                               | <b>35 W</b>                               | <b>70 W</b>                               | <b>70 W</b>                               | <b>70 W</b>                               |
|                                |                             | <b>942 NDL PB</b>                         | <b>942 NDL PB</b>                         | <b>942 NDL PB</b>                         | <b>830 WDL PB</b>                         | <b>830 WDL PB</b>                         | <b>830 WDL PB</b>                         |
|                                |                             | <b>10D</b>                                | <b>24D</b>                                | <b>40D</b>                                | <b>10D</b>                                | <b>24D</b>                                | <b>40D</b>                                |
| <b>Type</b>                    |                             | <b>UVS, PB</b>                            | <b>UVS, PB</b>                            | <b>UVS, PB</b>                            | <b>UVS, PB</b>                            | <b>UVS, PB</b>                            | <b>UVS, PB</b>                            |
| <b>ILCOS</b>                   |                             | MRS/UB-35/42/<br>1A-H-GX8.5-<br>111/95/10 | MRS/UB-35/42/<br>1A-H-GX8.5-<br>111/95/24 | MRS/UB-35/42/<br>1A-H-GX8.5-<br>111/95/40 | MRS/UB-70/30/<br>1B-H-GX8.5-<br>111/95/10 | MRS/UB-70/30/<br>1B-H-GX8.5-<br>111/95/24 | MRS/UB-70/30/<br>1B-H-GX8.5-<br>111/95/40 |
| Lamp wattage                   | W                           | 39                                        | 39                                        | 39                                        | 72                                        | 72                                        | 72                                        |
| Lamp voltage                   | V                           | 90                                        | 90                                        | 90                                        | 90                                        | 90                                        | 90                                        |
| Ignition voltage min./max.     | kVs                         | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     | 3.6/5                                     |
| Lamp current                   | A                           | 0.5                                       | 0.5                                       | 0.5                                       | 0.98                                      | 0.98                                      | 0.98                                      |
| Axial luminous intensity       | cd                          | 35000                                     | 8500                                      | 4000                                      | 55000                                     | 15000                                     | 9000                                      |
| Beam angle                     | °                           | 10                                        | 24                                        | 40                                        | 10                                        | 24                                        | 40                                        |
| Light colour/Colour appearance |                             | 942 NDL                                   | 942 NDL                                   | 942 NDL                                   | 830 WDL                                   | 830 WDL                                   | 830 WDL                                   |
| Colour temperature             | K                           | 4200                                      | 4200                                      | 4200                                      | 3000                                      | 3000                                      | 3000                                      |
| Colour rendering index         | R <sub>a</sub>              | > 90                                      | > 90                                      | > 90                                      | > 80                                      | > 80                                      | > 80                                      |
| NIOSH Skin                     | h                           | > 8                                       | > 8                                       | > 8                                       | > 8                                       | > 8                                       | > 8                                       |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 2                                       | < 2                                       | < 2                                       | < 2                                       | < 2                                       | < 2                                       |
| Base                           |                             | GX8.5                                     | GX8.5                                     | GX8.5                                     | GX8.5                                     | GX8.5                                     | GX8.5                                     |
| Diameter d                     | mm                          | 111                                       | 111                                       | 111                                       | 111                                       | 111                                       | 111                                       |
| Length max. l                  | mm                          | 95                                        | 95                                        | 95                                        | 95                                        | 95                                        | 95                                        |
| Burning position               |                             | universal                                 | universal                                 | universal                                 | universal                                 | universal                                 | universal                                 |
| Average lamp life              | h                           | 12000                                     | 12000                                     | 12000                                     | 12000                                     | 12000                                     | 12000                                     |
| PF corr. cap. at 50 Hz         | µF                          | 6                                         | 6                                         | 6                                         | 12                                        | 12                                        | 12                                        |
| Lamp reference                 |                             | HCI-R111<br>35/942 NDL<br>PB 10D          | HCI-R111<br>35/942 NDL<br>PB 24D          | HCI-R111<br>35/942 NDL<br>PB 40D          | HCI-R111<br>70/830 WDL<br>PB 10D          | HCI-R111<br>70/830 WDL<br>PB 24D          | HCI-R111<br>70/830 WDL<br>PB 40D          |
| EAN                            |                             | 4008321908056                             | 4008321908063                             | 4008321908070                             | 4008321908087                             | 4008321908094                             | 4008321908100                             |
| Standard pack                  | Qty                         | 6                                         | 6                                         | 6                                         | 6                                         | 6                                         | 6                                         |
| Figure                         | No.                         | 1                                         | 1                                         | 1                                         | 1                                         | 1                                         | 1                                         |
| Circuit (see page 26)          | Fig. no.                    | 1/2                                       | 1/2                                       | 1/2                                       | 1/2                                       | 1/2                                       | 1/2                                       |

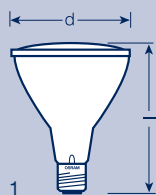


# POWERBALL® HCI®-PAR 20, 30

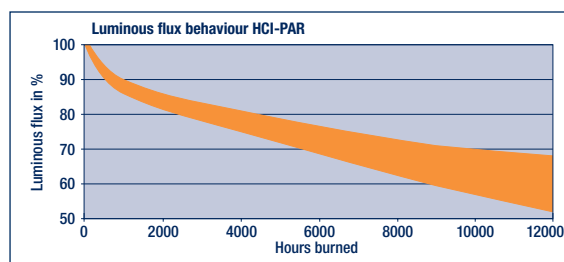
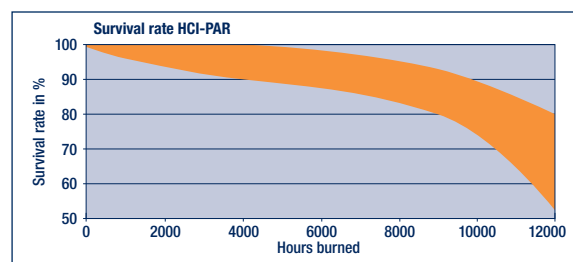


|                                |                             | <b>New</b>                     |                                |                                 |                                 |
|--------------------------------|-----------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------------|
|                                |                             | <b>HCI-PAR 20</b>              | <b>HCI-PAR 20</b>              | <b>HCI-PAR 30</b>               | <b>HCI-PAR 30</b>               |
|                                |                             | <b>35 W</b>                    | <b>35 W</b>                    | <b>20 W</b>                     | <b>20 W</b>                     |
|                                |                             | <b>830 WDL PB SP</b>           | <b>830 WDL PB FL</b>           | <b>830 WDL PB SP</b>            | <b>830 WDL PB FL</b>            |
| Type                           |                             | <b>UVS, PB</b>                 | <b>UVS, PB</b>                 | <b>UVS, PB</b>                  | <b>UVS, PB</b>                  |
| ILCOS                          |                             | MRS/UB-35/30/1B-H-E27-65/95/10 | MRS/UB-35/30/1B-H-E27-65/95/30 | MRS/UB-20/30/1B-H-E27-97/125/10 | MRS/UB-20/30/1B-H-E27-97/125/30 |
| Lamp wattage                   | W                           | 39                             | 39                             | 20                              | 20                              |
| Lamp voltage                   | V                           | 90                             | 90                             | 90                              | 90                              |
| Ignition voltage min./max.     | kVs                         | 3.6/4.5                        | 3.6/4.5                        | 3.6/4.5                         | 3.6/4.5                         |
| Lamp current                   | A                           | 0.5                            | 0.5                            | 0.22                            | 0.22                            |
| Axial luminous intensity       | cd                          | 24000                          | 5500                           | 24000                           | 4000                            |
| Beam angle                     | °                           | 10                             | 30                             | 10                              | 30                              |
| Light colour/Colour appearance |                             | 830 WDL                        | 830 WDL                        | 830 WDL                         | 830 WDL                         |
| Colour temperature             | K                           | 3000                           | 3000                           | 3000                            | 3000                            |
| Colour rendering index         | R <sub>a</sub>              | > 80                           | > 80                           | > 80                            | > 80                            |
| NIOSH Skin                     | h                           | > 22                           | > 22                           | > 22                            | > 22                            |
| ACGIH UV output                | mW/m <sup>2</sup> · 1000 lx | < 0.37                         | < 0.37                         | < 0.37                          | < 0.37                          |
| Base                           |                             | E27                            | E27                            | E27                             | E27                             |
| Diameter d                     | mm                          | 65                             | 65                             | 97                              | 97                              |
| Length max. l                  | mm                          | 95                             | 95                             | 125                             | 125                             |
| Burning position               |                             | universal                      | universal                      | universal                       | universal                       |
| Average lamp life              | h                           | 12000                          | 12000                          | 12000                           | 12000                           |
| Max. perm. outer bulb temp.    | °C                          | 300                            | 300                            | 300                             | 300                             |
| Max. perm. base edge temp.     | °C                          | 210                            | 210                            | 210                             | 210                             |
| PF corr. cap. at 50 Hz         | µF                          | 6                              | 6                              | ECG                             | ECG                             |
| Lamp reference                 |                             | HCI-PAR 20<br>35/830 WDL PB SP | HCI-PAR 20<br>35/830 WDL PB FL | HCI-PAR 30<br>20/830 WDL PB SP  | HCI-PAR 30<br>20/830 WDL PB FL  |
| EAN                            |                             | 4008321908162                  | 4008321908179                  | 4008321908148                   | 4008321908155                   |
| Standard pack                  | Qty                         | 12                             | 12                             | 6                               | 6                               |
| Figure                         | No.                         | 1                              | 1                              | 1                               | 1                               |
| Circuit (see page 26)          | Fig. no.                    | 1/2                            | 1/2                            | 2                               | 2                               |

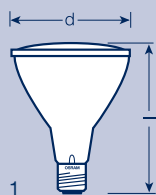




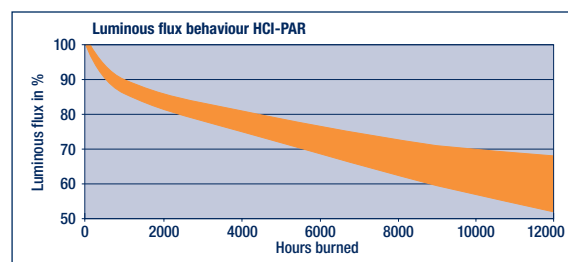
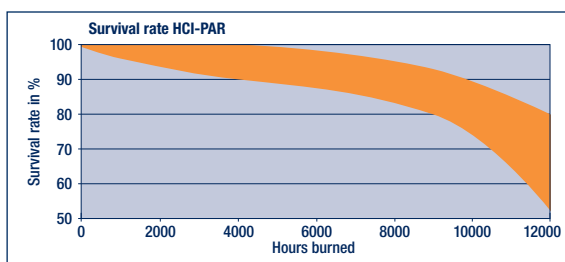
|                                |                 | <b>New</b>                              |                                         |                                         |                                         |
|--------------------------------|-----------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|
|                                |                 | <b>HCI-PAR 30</b>                       | <b>HCI-PAR 30</b>                       | <b>HCI-PAR 30</b>                       | <b>HCI-PAR 30</b>                       |
|                                |                 | <b>35 W</b>                             | <b>35 W</b>                             | <b>70 W</b>                             | <b>70 W</b>                             |
|                                |                 | <b>830 WDL PB SP</b>                    | <b>830 WDL PB FL</b>                    | <b>830 WDL PB SP</b>                    | <b>830 WDL PB FL</b>                    |
|                                |                 | <b>UVS, PB</b>                          | <b>UVS, PB</b>                          | <b>UVS, PB</b>                          | <b>UVS, PB</b>                          |
| <b>Type</b>                    |                 | MRS/UB-35/30/<br>1B-H-E27-<br>97/125/10 | MRS/UB-35/30/<br>1B-H-E27-<br>97/125/30 | MRS/UB-70/30/<br>1B-H-E27-<br>97/125/10 | MRS/UB-70/30/<br>1B-H-E27-<br>97/125/30 |
| <b>ILCOS</b>                   |                 | MRS/UB-70/30/<br>1B-H-E27-<br>97/125/40 | MRS/UB-70/30/<br>1B-H-E27-<br>97/125/40 | MRS/UB-70/30/<br>1B-H-E27-<br>97/125/40 | MRS/UB-70/30/<br>1B-H-E27-<br>97/125/40 |
| Lamp wattage                   | W               | 39                                      | 39                                      | 73                                      | 73                                      |
| Lamp voltage                   | V               | 90                                      | 90                                      | 90                                      | 90                                      |
| Ignition voltage min./max.     | kVs             | 3.6/4.5                                 | 3.6/4.5                                 | 3.6/4.5                                 | 3.6/4.5                                 |
| Lamp current                   | A               | 0.5                                     | 0.5                                     | 0.98                                    | 0.98                                    |
| Axial luminous intensity       | cd              | 46000                                   | 8500                                    | 70000                                   | 14000                                   |
| Beam angle                     | °               | 10                                      | 30                                      | 10                                      | 30                                      |
| Light colour/Colour appearance |                 | 830 WDL                                 | 830 WDL                                 | 830 WDL                                 | 830 WDL                                 |
| Colour temperature             | K               | 3000                                    | 3000                                    | 3000                                    | 3000                                    |
| Colour rendering index         | Ra              | > 80                                    | > 80                                    | > 80                                    | > 80                                    |
| NIOSH Skin                     | h               | > 22                                    | > 22                                    | > 22                                    | > 22                                    |
| ACGIH UV output                | mW/m² · 1000 lx | < 0.37                                  | < 0.37                                  | < 0.37                                  | < 0.37                                  |
| Base                           |                 | E27                                     | E27                                     | E27                                     | E27                                     |
| Diameter d                     | mm              | 97                                      | 97                                      | 97                                      | 97                                      |
| Length max. l                  | mm              | 125                                     | 125                                     | 125                                     | 125                                     |
| Burning position               |                 | universal                               | universal                               | universal                               | universal                               |
| Average lamp life              | h               | 12000                                   | 12000                                   | 12000                                   | 12000                                   |
| Max. perm. outer bulb temp.    | °C              | 300                                     | 300                                     | 300                                     | 300                                     |
| Max. perm. base edge temp.     | °C              | 210                                     | 210                                     | 210                                     | 210                                     |
| PF corr. cap. at 50 Hz         | µF              | 6                                       | 6                                       | 12                                      | 12                                      |
| Lamp reference                 |                 | HCI-PAR 30<br>35/830 WDL PB SP          | HCI-PAR 30<br>35/830 WDL PB FL          | HCI-PAR 30<br>70/830 WDL PB SP          | HCI-PAR 30<br>70/830 WDL PB FL          |
| EAN                            |                 | 4008321908209                           | 4008321908216                           | 4008321908247                           | 4008321908254                           |
| Standard pack                  | Qty             | 6                                       | 6                                       | 6                                       | 6                                       |
| Figure                         | No.             | 1                                       | 1                                       | 1                                       | 1                                       |
| Circuit (see page 26)          | Fig. no.        | 1/2                                     | 1/2                                     | 1/2                                     | 1/2                                     |



# POWERSTAR® HCI®-PAR 20, 30



|                                |                 | HCI-PAR 20                             | HCI-PAR 20                             | HCI-PAR 30                              | HCI-PAR 30                              | HCI-PAR 30                              | HCI-PAR 30                              |
|--------------------------------|-----------------|----------------------------------------|----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|
|                                |                 | 35 W                                   | 35 W                                   | 35 W                                    | 35 W                                    | 70 W                                    | 70 W                                    |
|                                |                 | 830 WDL SP                             | 830 WDL FL                             | 830 WDL SP                              | 830 WDL FL                              | 830 WDL SP                              | 830 WDL FL                              |
| Type                           |                 | Spot 10°, UVS                          | Flood 30°, UVS                         | Spot 10°, UVS                           | Flood 30°, UVS                          | Spot 10°, UVS                           | Flood 30°, UVS                          |
| ILCOS                          |                 | MRS/UB-35/30/<br>1B-H-E27-65/<br>95/10 | MRS/UB-35/30/<br>1B-H-E27-65/<br>95/30 | MRS/UB-35/30/<br>1B-H-E27-97/<br>125/10 | MRS/UB-35/30/<br>1B-H-E27-97/<br>125/30 | MRS/UB-70/30/<br>1B-H-E27-97/<br>125/10 | MRS/UB-70/30/<br>1B-H-E27-97/<br>125/30 |
| Lamp wattage                   | W               | 38                                     | 38                                     | 38                                      | 38                                      | 73                                      | 73                                      |
| Lamp voltage                   | V               | 90                                     | 90                                     | 90                                      | 90                                      | 90                                      | 90                                      |
| Ignition voltage min./max.     | kVs             | 3.6/4.5                                | 3.6/4.5                                | 3.6/4.5                                 | 3.6/4.5                                 | 3.6/4.5                                 | 3.6/4.5                                 |
| Lamp current                   | A               | 0.5                                    | 0.5                                    | 0.5                                     | 0.5                                     | 0.97                                    | 0.97                                    |
| Axial luminous intensity       | cd              | 22000                                  | 5000                                   | 37000                                   | 7000                                    | 55000                                   | 10000                                   |
| Beam angle                     | °               | 10                                     | 30                                     | 10                                      | 30                                      | 10                                      | 30                                      |
| Light colour/Colour appearance |                 | 830 WDL                                | 830 WDL                                | 830 WDL                                 | 830 WDL                                 | 830 WDL                                 | 830 WDL                                 |
| Colour temperature             | K               | 3000                                   | 3000                                   | 3000                                    | 3000                                    | 3000                                    | 3000                                    |
| Colour rendering index         | Ra              | > 80                                   | > 80                                   | > 80                                    | > 80                                    | > 80                                    | > 80                                    |
| NIOSH Skin                     | h               | > 22                                   | > 22                                   | > 22                                    | > 22                                    | > 22                                    | > 22                                    |
| ACGIH UV output                | mW/m² · 1000 lx | < 0.37                                 | < 0.37                                 | < 0.37                                  | < 0.37                                  | < 0.37                                  | < 0.37                                  |
| Base                           |                 | E27                                    | E27                                    | E27                                     | E27                                     | E27                                     | E27                                     |
| Diameter d                     | mm              | 65                                     | 65                                     | 97                                      | 97                                      | 97                                      | 97                                      |
| Length max. l                  | mm              | 95                                     | 95                                     | 125                                     | 125                                     | 125                                     | 125                                     |
| Burning position               |                 | universal                              | universal                              | universal                               | universal                               | universal                               | universal                               |
| Average lamp life              | h               | 9000                                   | 9000                                   | 9000                                    | 9000                                    | 9000                                    | 9000                                    |
| Max. perm. outer bulb temp.    | °C              | 300                                    | 300                                    | 300                                     | 300                                     | 300                                     | 300                                     |
| Max. perm. base edge temp.     | °C              | 210                                    | 210                                    | 210                                     | 210                                     | 210                                     | 210                                     |
| PF corr. cap. at 50 Hz         | µF              | 6                                      | 6                                      | 6                                       | 6                                       | 12                                      | 12                                      |
| Lamp reference                 |                 | HCI-PAR 20<br>35/830 WDL SP            | HCI-PAR 20<br>35/830 WDL FL            | HCI-PAR 30<br>35/830 WDL SP             | HCI-PAR 30<br>35/830 WDL FL             | HCI-PAR 30<br>70/830 WDL SP             | HCI-PAR 30<br>70/830 WDL FL             |
| EAN                            |                 | 4050300941936                          | 4050300941950                          | 4050300941974                           | 4050300941998                           | 4050300942018                           | 4050300942032                           |
| Standard pack                  | Qty             | 12                                     | 12                                     | 6                                       | 6                                       | 6                                       | 6                                       |
| Figure                         | No.             | 1                                      | 1                                      | 1                                       | 1                                       | 1                                       | 1                                       |
| Circuit (see page 26)          | Fig. no.        | 1/2                                    | 1/2                                    | 1/2                                     | 1/2                                     | 1/2                                     | 1/2                                     |



## Please note:

The values and curves published in this document are for guidance only. The basic data was determined under controlled laboratory conditions for a switching cycle of 11 h on/1 h off.

There may be considerable differences in actual practice. The highlighted areas around the curves represent a 90% confidence range based on our test conditions.

### NIOSH threshold and ACGIH UV output:

The radiated energy of a lamp is indicated by the defined NIOSH curve.

The NIOSH effective radiated output calculated from this is converted into permitted exposure times with defined limit values.

The ACGIH UV output value correlates directly with the NIOSH value and represents the current required value for UV exposure.

### PF correction capacitor:

The pf correction capacitors are designed so that  $\cos \varphi \geq 0.9$  is achieved at rated voltage.

# Operating instructions

## Supply voltage:

The lamps must be connected via suitable control gear. A 240 V / 50 Hz ac supply is generally required. If a different supply voltage is used (e.g. 400 V / 50 Hz) control gear with appropriate taps must be used.

## Permitted mains voltage deviation: $\pm 3\%$

Sudden fluctuations in mains voltage of more than 10% may cause the lamps to go out. If the deviation from rated supply voltage (230 V or 400 V) is permanent, high-pressure discharge lamps may exhibit changes in colour or luminous flux. Lamp life may also be reduced.

## Control gear:

Conventional control gear: Choke, igniter and pf correction capacitor.

The right igniter for the particular lamp type must be used to ensure reliable and safe ignition. Igniters must always be installed close to the lamp. The choke may be installed any distance from the lamp, provided the permissible voltage drop is not exceeded.

For power supplies with a neutral conductor the choke should be connected to the live conductor. In the case of luminaires in which there are no lamps installed, the ignition equipment (igniter, ignition pulser) must be disabled when voltage is applied otherwise the igniters may produce radio interference.

The chokes and pf correction capacitors generally needed for operating discharge lamps may, under certain conditions, create oscillating circuits. These circuits may then produce excessive currents and voltages, which in turn can destroy the lamps, ballasts and capacitors. Such resonance phenomena must be avoided by appropriate circuits and fuses.

When high-pressure discharge lamps come to the end of their lives a rectifier effect may occur (see IEC 62035). This is not manufacturer-specific. Because of the excessive dc current components the ballasts and igniters may become overheated. High-pressure discharge lamps should therefore only be operated with control gear with thermal protection. This applies also to control gear with the option of power reduction.

Suitable igniters and control gear for POWERBALL® HCI® are available from the electrical industry.

## Operating temperatures:

Only high-pressure discharge lamps with external igniters are suitable for low-temperature applications down to  $-50\text{ }^{\circ}\text{C}$ . Such applications call for special (heatable) igniters such as MZN 400 SU-LT from BAG Turgi (for lamps from 100 to 400 W).

## Power factor:

**CCG:** Because of the series connected choke this is around 0.5 to 0.7 (without compensation)

**ECG:** If **POWERTRONIC®** is used the power factor is greater than 0.96. Compensation is therefore not needed here.

## Switching on:

Full luminous flux is reached only a few minutes after the lamp is switched on. The start-up current may be up to twice the operating current depending on the control gear. (See also the graphs on p. 25)

## Fusing:

HCI® lamps must be protected by slow acting fuses. If fuse wire is used it is sufficient for it to be rated at twice the rated current of the lamp. If automatic cutouts are used they should have characteristic "C". If adjusted to the upper limit value of 10 x rated current there will be no triggering if fuse protection is at twice the rated lamp current.

## Restarting:

The lamps will restart only after they have cooled down for 2 to 15 minutes.

## Lampholders:

Because of the high voltages involved in ignition the lampholders must be designed for these high voltages. Lampholders that meet these requirements are available from appropriate manufacturers.

## Dimming:

In principle, dimming of HCI® POWERBALL® is technically feasible, but **OSRAM does not recommend it** for the lamps currently available on the market, because the typical characteristics of HCI® POWERBALL® change when dimmed.

The higher thermal load capacity of the round ceramic burner offers better dimming behavior in terms of luminous efficacy and color rendering compared to metal halide lamps with quartz burners or standard cylindrical ceramic burners.

As before, however, dimming does lead to a change in the chromaticity coordinates. Lamps operated at dimmed settings suffer a greater loss of luminous flux and a greater color shift over their lifetime.

Because there are many different methods of dimming and the effects on the physics of the lamps are highly complex there is as yet no statistically sound information on the performance of the lamps over their lifetime.

In addition, there is still no standardized dimming cycle by which the lamps can be reliably tested.

**The warranted product characteristics cannot therefore be guaranteed for lamps operated at dimmed settings.**

The operation of OSRAM HCI® POWERBALL® lamps at dimmed settings is not permitted as this results in significant color shifts, bad lumen maintenance and shorter lifetime.

#### End of life:

To protect the control gear and to avoid radio interference, high-pressure discharge lamps must be replaced as soon as they come to the end of their life.

These lamps reach their end of life when

- the light colour of the lamp changes dramatically
- there is a significant loss of brightness
- the lamp no longer ignites
- the lamp starts to cycle (periodically goes out and ignites again).

As a lamp reaches the end of its life the risk of bursting increases. This phenomenon is caused by effects not connected with the manufacturer, such as the rectifying effect mentioned earlier. Because of this we strongly recommend changing the lamp no later than when it reaches its average life or if one of the above effects occurs.

#### Notes on disposal:

All metal halide lamps contain small quantities of mercury. If they break, poisonous mercury vapour may be released. The lamps must be treated as waste requiring special supervision with EEC code **20 01 21** for waste or residue containing mercury and should be passed to a relevant collection or recycling company.

#### Guarantee:

A guarantee can only be made if suitable control gear is used and the defined operating conditions are met.

#### Safety:

OSRAM high-pressure lamps meet the safety requirements defined in IEC 62035.

All HCI® lamps are of UV-reduced design.

Because of their high operating pressure the following lamps may only be used in fully enclosed luminaires designed to take them:

- All HCI®-TS
- All HCI®-T, all HCI®-TT
- All HCI®-TC
- All HCI®-E ≥ 250 W
- All HCI®-TF
- All HCI®-TM

As we cannot completely rule out the possibility of the bulb bursting, luminaires for the lamps mentioned above must be equipped with sealed shatter-proof shields that can withstand wide fluctuations in temperature.

Operating lamps with a damaged outer bulb is dangerous and therefore not permitted.

#### Lamp operation:

Operating high-pressure lamps for short periods in combination with frequent on/off switching will shorten their life. This applies to both cold starting and hot restarts.

The following lamps are suitable for open luminaires:

- All HCI®-T/P
- All HCI®-E/P
- All HCI®-R111
- All HCI®-PAR

The use of shields should be considered for safety reasons in each case.

HCI® lamps for outdoor applications and damp locations may only be operated in luminaires approved for the purpose.

#### Luminaire design:

Luminaire design (thermal design and fuse protection) should be based on the EN 60598-1 standard.

#### Photometric and electrical data:

All lamp-specific electrical and photometric data is measured after 100 hours of operation under laboratory conditions on reference equipment.

The measurement switching cycle is 11 hours on/ 1 hour off. Unless otherwise indicated, the data relates to the horizontal burning position for TS types and to the base up burning position for other types.

The graphs for survival rates and luminous flux behaviour are average values for all wattages and light colours of lamps identical in construction.

The spread of the average values has not been taken into account. For detailed information on particular lamp types please contact OSRAM.

The luminous flux is virtually unaffected by the ambient temperature outside the luminaire. At low ambient temperatures down to around – 50 C° special igniters are needed.

Detailed information on heat accumulation tubes (luminaire simulators) for determining lamp data for HCI®-TS is given in IEC 61167, clause 1.7.

Colour deviations:

With all metal halide lamps there may be differences in colour from one lamp to the next due to external factors such as mains voltage, type of control gear used, burning position and luminaire design.

# Lamp life

There are a confusing number of definitions for lamp life, and these differ from one region to the next and from one application to the next. The basic definitions for the most common types are given below.

This document refers explicitly only to the **average life**.

## Average life:

Average number of hours burned over several groups in which in the group in question half the lamps have failed as the result of a defect (corresponds to 50% failure).

## Survival rate:

Quantity of working lamps of a group of lamps after a defined number of burning hours.  
Average value of some groups.

## Minimum life:

Minimum period of time in which a lamp remains in operation under laboratory conditions.

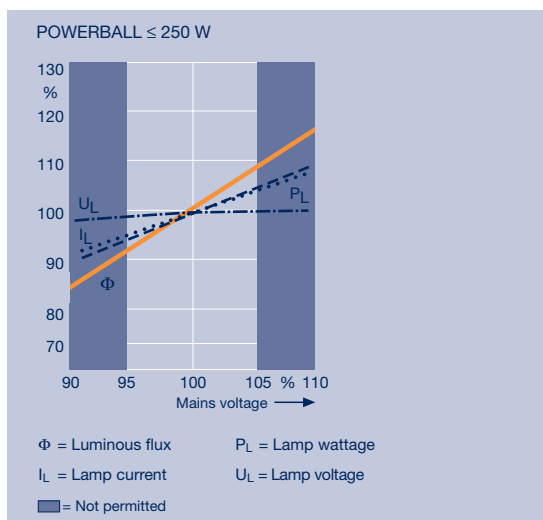
## Economical life:

Period of time between group relamping of an installation under the condition that operating costs are minimised and the installation luminous flux does not fall below a particular value. This will vary according to the application.

## Service life:

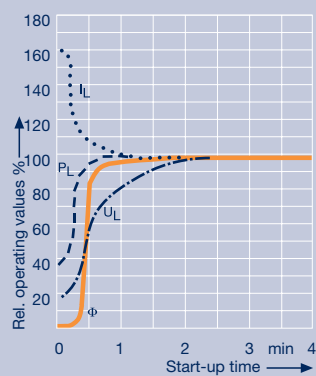
Simplified practical view of the economical life. This is the operating time after which the installation luminous flux (the product of the relative luminous flux and the lamps still in operation) is still around 70% (sometimes 80%).

## Operating characteristics in relation to the supply voltage

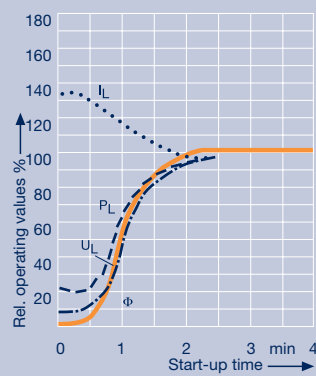


## Start-up behaviour (average value)

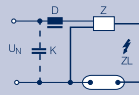
POWERBALL HCI-T  $\leq 250$  W with PTU



POWERBALL HCI-T  $\leq 250$  W with CCG



## Circuit diagrams



1



2

D = Choke  
K = PF correction capacitor  
LP = Lamp  
U<sub>N</sub> = 230 V ac mains voltage (for 2000 W = 400 V ac)

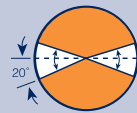
Z = Igniter to be installed near the lamp  
ZL = HF igniter lead to contact plate of lamp

For power supplies with a neutral conductor the choke should be connected to the live conductor.

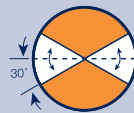
The right igniter for the particular lamp type must be used to ensure reliable and safe ignition.

Chokes, holder, capacitors and igniters are available from electrical suppliers.

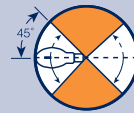
## Burning positions



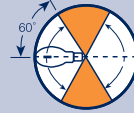
p 20



p 30



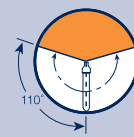
p 45



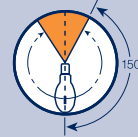
p 60



h 45



h 110



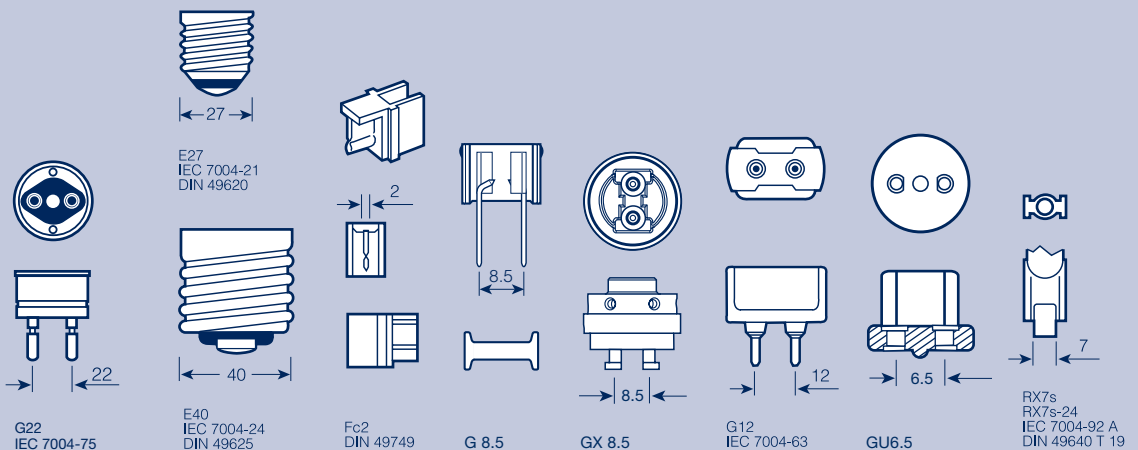
h 150



s 5

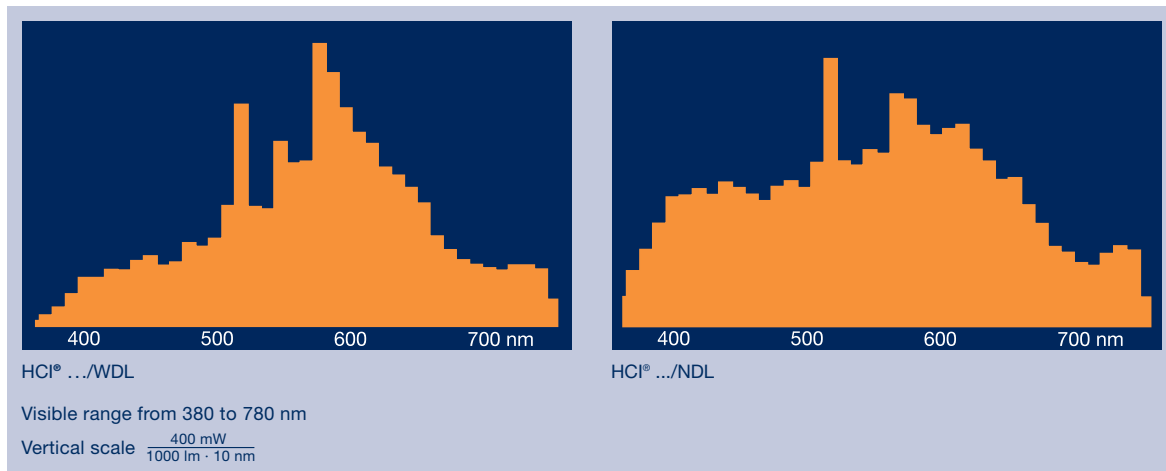
□ Permitted    ■ Not permitted

## Base

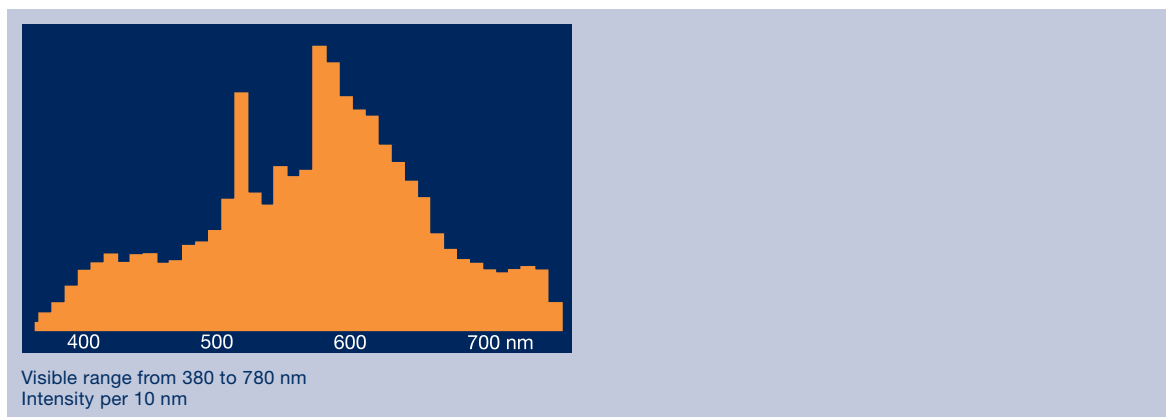


# Spectral power distribution of discharge lamps

## POWERBALL®



## POWERBALL® SHOPLIGHT



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OSRAM supplies customers in around 150 countries.

- 65 companies and sales offices for 100 countries
- 48 countries served by local agents or OSRAM GmbH, Munich

### OSRAM associated companies and support centres.

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| Australia          | Kenya                |
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| Denmark            | Singapore            |
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