

SUMMARY OF TECHNICAL DATA¹

Optical Performances (film):

- ON State: Haze < 7% - Total Light Transmittance = 75% (+/- 2%)
- OFF State: Haze > 90% - Total Light Transmittance = 55% (+/- 5%)

Electrical Power:

- Voltage ²: 60 or 80Vac (50 ~ 60 Hz – sine wave)
- Power Consumption: < 7 W/sqm

Standard Dimensions³:

- Maximum Width: 1800mm
- Maximum Length: 3000mm
- Thickness: 0,4mm

Storage and Durability:

- Temperature (Storage): -30 ~ 60 °C
- Temperature (Operation): -10 ~ 50 °C
- Highly durable to long term electrical Switching ⁴
- Highly durable to long term electrical Switching ⁵

Note:

1 = Ref: LPF CI-Grade Specs – updated: June 2011

2 = 60 or 80Vac according to sheet size and bus bar position

3 = Wider and longer film can be available on request

4, 5 = Please refer to Durability test Report for more details

DURABILITY TESTS

1. **Switching:** 5.000.000 cycles - 4s ON – 4s OFF - Result: no performance variation
2. **Continue ON-State:** 30.000 hours . - Result: no performance variation
3. **Thermal and Humidity tests on glass laminated sample with EVA and Innoptec film**

Glass size: 7.8x10.5 cm - Film size: LPF: 7.4x10.1 cm
Thermal test (Oven at 80°C)

| Test times (h) | Impedence 20Vac 50 Hz sine wave Z (kΩ) | Optical prop. / Off-State (ASTM 1003) | | | Optical prop. / On-State (60 Vac – 50Hz – sin wave) | | | Edge clearing min/max (mm) | ITO Crack |
|----------------|--|--|-------------|-------------------------------|--|------------|------------|----------------------------------|--------------|
| | | % Toff Dir. | % Toff Tot. | Color indeces L* / a* / b* | % Haze | % Ton dir. | % Ton Tot. | | |
| 0 | 76,3 | 0,3 | 30,2 | 11,7 / -0,97 / 0,82 | 5,9 | 65,7 | 71,1 | No | No |
| 280 | 70,9 | 0,3 | 29,1 | 11,1 / -1,09 / 0,78 | 5,6 | 66,5 | 71,8 | No | No |
| 566 | 66,5 | 0,4 | 34,1 | 11,0 / -0,67 / 1,50 | 4,7 | 67,9 | 72,5 | No | No |
| 853 | 60,2 | 0,3 | 33,3 | 12,4 / -0,61 / 0,57 | 5,5 | 67,6 | 72,9 | No | No |
| 1000 | 55,2 | 0,5 | 31,4 | 11,9 / -0,8 / 0,70 | 5,2 | 67,9 | 73,0 | 0 - 1 | No |

Humidity test (95% HR – 55°C)

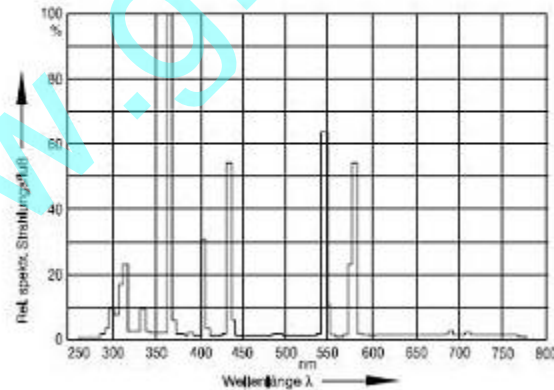
| Test times (h) | Impedence 20Vac 50 Hz sine wave Z (kΩ) | Optical prop. / Off-State (ASTM 1003) | | | Optical prop. / On-State (60 Vac – 50Hz – sin wave) | | | Edge clearing min/max (mm) | ITO Crack |
|----------------|--|--|-------------|-------------------------------|--|------------|------------|----------------------------------|--------------|
| | | % Toff Dir. | % Toff Tot. | Color indeces L* / a* / b* | % Haze | % Ton dir. | % Ton Tot. | | |
| 0 | 89.7 | 0.3 | 38.6 | 12,6 / -0.25 / 1,77 | 5.3 | 70.0 | 75.4 | 0.5 | No |
| 250 | 81.3 | 0.4 | 37.3 | 12,5 / -0.24 / 1.78 | 6.2 | 71.8 | 74.2 | 0.5 | No |
| 500 | 75.2 | 0.3 | 39.3 | 12,3 / 0,22 / 2,65 | 5.8 | 72.1 | 74.7 | 0.5 | No |
| 750 | 71.4 | 0.3 | 39.8 | 11,9 / -0,15 / 1,58 | 6.4 | 72.5 | 74.8 | 0.5 | No |
| 1000 | 68.5 | 0.3 | 39.8 | 12,8 / -0,24 / 1,65 | 6.0 | 71.1 | 74.6 | 0.5 - 1 | No |

4. Solar test on glass laminated sample with EVA and Innoptec film.

Glass size: 7.8x10.5 cm - Film size: LPF: 7.0x9,7 cm
Solar test (Ultravitalux 350W Lamps - 70°C)

| Test times (h) | Impedence 20Vac 50 Hz sine wave Z (kΩ) | Optical prop. / Off-State (ASTM 1003) | | | Optical prop. / On-State (60 Vac - 50Hz - sin wave) | | | Edge clearing min/max (mm) | ITO Crack |
|----------------|---|---------------------------------------|-------------|----------------------------|---|------------|------------|----------------------------|-----------|
| | | % Toff Dir. | % Toff Tot. | Color indeces L* / a* / b* | % Haze | % Ton dir. | % Ton Tot. | | |
| 0 | 75,9 | 0,4 | 36,8 | 13,9 / -0,01 / 1,87 | 5,9 | 70,5 | 74,7 | NO | No |
| 280 | 84,1 | 0,3 | 34,6 | 14,6 / -0,24 / 1,78 | 5,9 | 67,9 | 73,5 | NO | No |
| 566 | 80,8 | 0,3 | 38,2 | 14,3 / 0,55 / 2,62 | 5,1 | 70,1 | 75,2 | 0 - 0,2 | No |
| 853 | 73,9 | 0,3 | 39,1 | 12,2 / -0,01 / 1,52 | 5,1 | 69,7 | 74,7 | 0 - 0,2 | No |
| 1000 | 66,5 | 0,4 | 35,7 | 12,8 / -0,06 / 1,70 | 5,5 | 70,3 | 75,7 | 0 - 0,2 | No |

Spektrale Strahlungsverteilung / spectral radiation distribution



5. UV test on glass laminated sample with EVA and Innoptec film

Glass size: 7.8x10.5 cm - Film size: LPF: 7.0x9,7 cm

ATLAS UV Test - (fluorescent lamps: 340nm 40W -120cm)

| Test times (h) | Impedence 20Vac 50 Hz sine wave | Optical prop. / Off-State (ASTM 1003) | | | Optical prop. / On-State (60 Vac – 50Hz – sin wave) | | | Edge clearing min/max (mm) | ITO Crack |
|----------------|------------------------------------|--|-------------|-------------------------------|--|------------|------------|----------------------------------|--------------|
| | Z (kΩ) | % Toff Dir. | % Toff Tot. | Color indeces L* / a* / b* | % Haze | % Ton dir. | % Ton Tot. | | |
| 0 | 89.0 | 0.3 | 39.1 | 12,9 / -0.30 / 1,80 | 5.6 | 72.9 | 75.8 | 0.5 | No |
| 541 | 104.5 | 0.3 | 39.4 | 13,6 / -0.27 / 1.75 | 6.2 | 73.5 | 75.1 | 0.5 | No |
| 1073 | 98.4 | 0.3 | 39.3 | 13,4 / 0,45 / 1,68 | 6.0 | 71.7 | 73.9 | 0.5 | No |
| 1506 | 94.4 | 0.3 | 39.2 | 11,2 / -0,32 / 1,48 | 6.5 | 70.3 | 76.0 | 0.5 | No |
| 2000 | 98.7 | 0.3 | 39.3 | 12,6 / -0,15 / 1,71 | 6.7 | 71.9 | 74.9 | 0.5 | No |

