INSTALLATION
The UV-protective foil Y520E212 can be cut like to paper. You can use double-sided adhesive tape for mounting it on windows, privacy screens, room dividers, lamps and front openings.

We recommend, however, for large windows applications, to use our self-adhesive UV protection film YSA520E212. The yellow foil YSA520E212 can be glued with our mounting fluid DXYMF301 easily and bubble-free on any smooth and solid surfaces. Detailed information is available in our assembly instructions for self-adhesive UV protection yellow foil YSA520E212. For filtering fluorescent tubes, we recommend our specially designed polycarbonate sleeves. Here, our UV protective yellow film Y520E212 is already incorporated, so you can cost-effectively "upgrade" standard white fluorescent tubes for your yellow light application.

SALES UNITS AND DIMENSIONS OF THE LITHOPROTECT® PRODUCTS

<table>
<thead>
<tr>
<th align="left">Lithoprotect® UV-filter yellow foil:</th>
<th>width: 1,08 m</th>
<th>length: 1, 5, 10, 20, 50 m</th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">UV-filter yellow foil Y520E212</td>
<td>1,08 m</td>
<td>1, 5, 10, 15, 20 m</td>
</tr>
<tr>
<td align="left">UV-filter yellow foil YSA520E212</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lithoprotect® UV-filter sleeve:

- UV-filter tubes Y520E212 for T5 lamp (5/8" = Ø 16 mm)
- UV-filter tubes Y520E212 for T8 lamp (8/8" = Ø 26 mm)

Lithoprotect® accessories:

- seam tape YST520E212
- squeegee DXRA100
- assembly fluid DXYMF301

Partners:

Please note, that the Lithoprotect® UV-protection filter tubes Y520E212 T5/T8 are not approved for HO High Output lamps. Due to the higher performance and higher heat development, the Lithoprotect® UV-protection filter tube can be damaged, depending on the type of lamp housing. If you want to use our Lithoprotect® UV-protection filter tube Y520E212 T5/T8 for HO lamps, you have to carry out extensive tests with your lamp type and lamp housing, especially to check for overheating.

Please find all products and further information on our website: www.lithoprotect.com

PARTNER PROGRAM

Lithoprotect® is a trademark of duxitreme GmbH for yellow light products. Companies producing lamps, windowpanes, insulation glass, microscopes or other devices relevant in combination with our yellow light foil and the related spectrum can apply for a free license of using the trademark Lithoprotect®. We will grant the free license to companies using our foils in their devices which indicates, that the spectrum is suitable for lithography and can be promoted with the Lithoprotect® logo accordingly. If you are interested in a free license for using Lithoprotect® trademark, please contact us.
The spectral sensitivity of common g-, h-, and i-line broadband photo resists ranges from the near UV to the short wave visible part of the spectrum in the range of 320 ... 470 nm. The g-line absorption maximum at 435 nm wavelength is centered in the blue part of the spectrum and drops towards longer wavelengths without sharp absorption edge. Only i-line resists at small resist film thicknesses show a negligibly small sensitivity beyond approx. 400 nm wavelengths.

### SPECTRAL SENSITIVITY OF PHOTO RESISTS

Incident sunlight or daylight has also a high intensity in the spectral range absorbed by photo resists, which is not significantly blocked by common windows panes. Without suited yellow filters, artificial light as well as daylight will expose substrates coated with photo resist within seconds or minutes with a dose of several mJ/cm² making reproducible litho-processes impossible. Thus, a yellow filter needs to block wavelengths below 500 nm almost completely in order to allow the storage of photo resist coated substrates over hours and days in the clean room.

### LONG WAVELENGTH TRANSMISSION REQUIREMENTS

From 520 nm towards higher wavelengths, which corresponds to the maximum sensitivity of the human eye (555 nm) as well as an emission maximum of Hg fluorescent tubes (546 nm), the yellow filter should transmit as much light as possible. This allows to illuminate the clean room with reasonable energy input as well as to perform reproducible litho-processes.

### MAXIMUM PERMISSIBLE TRANSMISSION AT SHORT WAVELENGTHS

White (Hg-) fluorescent tubes have a strong emission near 405 and 435 nm wavelength, which corresponds to the absorption maxima of common photo resists. Incident sunlight or daylight has also a high intensity in the spectral range absorbed by photo resists, which is not significantly blocked by common windows panes. Without suited yellow filters, artificial light as well as daylight will expose substrates coated with photo resist within seconds or minutes with a dose of several mJ/cm² making reproducible litho-processes impossible. Thus, a yellow filter with a transmission of 1 % below 500 nm wavelengths is not suitable to allow the storage of coated substrates for several hours at exposed places in the clean room near windows or fluorescent tubes. Under these conditions, positive resists will show an increased dark erosion rate in the developer, which deteriorates the desired resolution and resist profile. Negative resists may form a cross linked surface which can be not or only time-delayed penetrated by the developer. Therefore, a yellow filter needs to block wavelengths below 500 nm almost completely in order to allow the storage of photo resist coated substrates over hours and days in the clean room.

### RAPID TEST FOR SUFFICIENT YELLOW LIGHT CONDITIONS

The absorption bands of DNQ-based photoresists responsible for the photoreaction lie in the range of the 320-450 nm wavelength and thus already clearly lower sensitivity - green spectral range. Even with solely i-line (365 nm) resist, there is a residual sensitivity to blue light, which can be critical in the case of cross-linking negative resists or chemically amplified, correspondingly highly sensitive positive resists. Therefore, not only the UV fraction of solar or blue sky light but also white artificial light from, for example, white fluorescent tubes can expose photoresist unintentionally if no suitable shielding is applied by means of suited filters with a sufficiently strong absorption for wavelengths below ≈ 520 nm.

We created a simple test if your yellow light conditions are sufficient or not. Please take this test card with you into your yellow light room and check if both indicator colors look similar. If you still see a difference, there may be a problem with your yellow light and you should consider to exchange your yellow light filters. We send you for a second test our Lithoprotect® yellow light filter foil. With this sample, you can cover a simple desktop lamp and switch it on in a dark room. Now you can compare the visible result of the photo reaction lie in the range of the 320-450 nm wavelength and thus already clearly lower sensitivity - green spectral range. Even with solely i-line (365 nm) resist, there is a residual sensitivity to blue light, which can be critical in the case of cross-linking negative resists or chemically amplified, correspondingly highly sensitive positive resists. Therefore, not only the UV fraction of solar or blue sky light but also white artificial light from, for example, white fluorescent tubes can expose photoresist unintentionally if no suitable shielding is applied by means of suited filters with a sufficiently strong absorption for wavelengths below ≈ 520 nm.

We would be pleased to provide you our yellow light indicator and a free sample of our Lithoprotect® yellow filter foil YS202E12 for this rapid test!

Your request: info@lithoprotect.com
www.lithoprotect.com

### PROBLEM

Many common yellow foils have a short wavelength transmission (< 500 nm) of approx. 1 % or higher, which is not low enough for reproducible litho processes. If unsuited polymers are used for the yellow foil, thermal stress from neighbored light sources can form small cracks in the foil over the years which transmit short wavelength light. UV-radiation from aged and damaged Hg fluorescent tubes deteriorates unsuited dyes in the yellow foil which hereby, over the years, becomes more and more transparent for short wavelength light.

### POSSIBLE REASONS FOR INSUFFICIENT YELLOW LIGHT

- Thermal stress from neighbored light sources can form small cracks in the foil over the years which transmit short wavelength light.
- UV-radiation from aged and damaged Hg fluorescent tubes deteriorates unsuited dyes in the yellow foil, which becomes more and more transparent for short wavelength light.

### RAPID TEST

1. Do you see a difference in the indicator film's colors?
2. If yes, please exchange your yellow light filters.
3. If no, please use our Lithoprotect® yellow light filter foil YS202E12 for a second test.

Your request: info@lithoprotect.com
www.lithoprotect.com

### OUR RANGE

The optical transmission properties of the Yellow UV-protection foil YS202E12 were specially designed for the high quality standards in the field of yellow rooms (photolithography in microelectronics manufacturing). The graph is semi-logarithmic. At 435 nm wavelength, the transmission is approximately 0.0001%, thus dropped to a fraction of one millihundredths of the incident light.

### OPTICAL TRANSMISSION

This transmission spectrum is not to be seen as specification, but as exemplaric measurement of a certain lot of our yellow foil.

### REQUIREMENTS ON YELLOW FILTERS

To be not or only time-delayed penetrated by the developer. Therefore, a yellow filter needs to block wavelengths below 500 nm almost completely in order to allow the storage of photo resist coated substrates over hours and days in the clean room.