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# Black EVA Encapsulant Film for Photovoltaic Modules

This catalog presents a black EVA encapsulant film from CNCGLASS, compounded from ethylene-vinyl acetate copolymer with the additives needed for photovoltaic module assembly. In the finished module the film seats the cells, holds them in position, and stands between the cells and the weather so that electrical output is not lost to environmental attack.

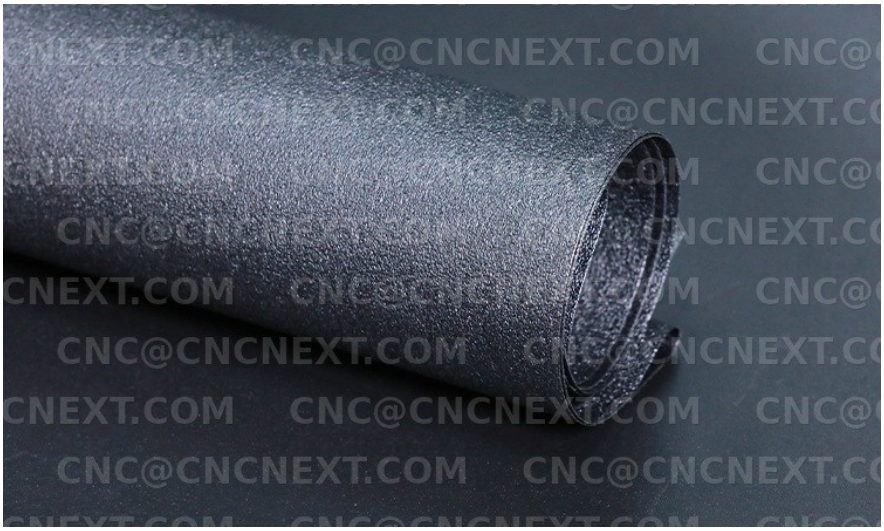



*Figure 1. Black EVA encapsulant film in roll form.*

## 1. Role in the Module

Once the module is laminated, the film has to keep its bond. After aging, peel strength remains high enough for outdoor modules to stay free of delamination through a 25-year service life. The formulation is stable in the stack and works cleanly with the other materials used in module assembly. On the laminator the film is straightforward to run: the cycle can be kept short, and throughput stays high.

## 2. Weathering and Electrical Isolation

The film is prepared to resist heat, humidity, and ultraviolet exposure, and it is resistant to potential-induced degradation (PID). These points matter for modules that will spend years outdoors. The table that follows lists the mechanical, electrical, and aging values for this encapsulant film.

| Property | Value |
|---|---|
| **Thickness** | 0.3–1.0 mm |
| **Width** | Up to 1,400 mm |
| **Roll length** | 150–350 m |
| **Areal-density tolerance** | ± 4 % |
| **Density** | 0.95–0.96 g/cm³ |
| **Degree of crosslinking** | ≥ 75 % |
| **Tensile strength** | ≥ 18 MPa |
| **Elongation** | ≥ 500 % |
| **Water absorption (20 °C, 24 h)** | ≤ 0.1 % |

| | |
|---|---|
| **Peel strength to glass** | ≥ 60 N/cm |
| **Peel strength to the backsheet** | ≥ 40 N/cm |
| **Shrinkage, machine direction (MD)** | ≤ 3.0 % |
| **Shrinkage, transverse direction (TD)** | ≤ 1.5 % |
| **Volume resistivity** | ≥ $1 \times 10^{15}$ Ω·cm |
| **Dielectric breakdown strength** | ≥ 26 kV/mm |
| **UV aging, ΔYI (120 kWh/m², 1,000 h)** | ≤ 4 |
| **Damp-heat aging, ΔYI (85 °C / 85 % RH, 1,000 h)** | ≤ 4 |

## Lamination Guidance

The figures below are a starting window for a single-chamber laminator and for a two-chamber laminator. The temperature and the cycle times may be trimmed to suit the machine that is actually in use, provided the degree of crosslinking stays inside the accepted band; about 85 % is a practical target. Every other material in the stack should be a grade that has already passed inspection by a recognized testing body for this industry.

Single-chamber cycle

| Item | Typical setting |
|---|---|
| **Laminating temperature** | 142 ± 2 °C |
| **Vacuum time** | 360 ± 60 s |
| **Hold pressure, three stages** | −70 / −45 / −20 |
| **Hold time** | 600–660 s |

Two-chamber cycle

| Item | Typical setting |
|---|---|
| **First chamber temperature** | 122 ± 2 °C |
| **First chamber vacuum time** | 360 ± 60 s |
| **First chamber hold pressure, three stages** | −70 / −45 / −20 |
| **First chamber hold time** | 180 ± 30 s |
| **Second chamber temperature** | 145 ± 2 °C |
| **Second chamber vacuum time** | 30 ± 10 s |
| **Second chamber hold pressure, three stages** | −70 / −45 / −20 |
| **Second chamber hold time** | 480 ± 60 s |

## Storage and Handling

Keep the rolls in a cool, dry room held at a steady climate: not above 30 °C and not above 60 % relative humidity. The film may be stored for up to six months; it is better to put it into production within three months. The rolls are vacuum packed. The usual inner pack length is 150–300 m per roll, unless a different length is agreed. For long-term storage, stack the rolls no higher than five layers, so that the film is not bent or crushed under its own weight. Do not allow the film to pick up moisture. Once a pack has been opened, or once the film has been cut, it is best to use it within 48 hours. Static charge can disturb lamination, so the whole module line should be kept free of unwanted static.

## Commercial Notes

Please contact CNC@CNCNEXT.COM for pricing, roll widths, thickness options, and packing details for this black EVA encapsulant film.

## Contact Us

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*We will be glad to advise on this black EVA encapsulant film for photovoltaic module assembly.*