STR® Specialized Technology Resources, Inc.

PHOTOCAP® clear thinking • clear innovation

## *Technical Data*

# PHOTOCAP® 15420P

PHOTOCAP® 15420P is an ultra fast cure EVA (ethylene vinyl acetate copolymer) photovoltaic encapsulating film material with improved curing kinetics and photo-thermal stability. The cure kinetics of PHOTOCAP 15420P are improved relative to fast-cure EVA PHOTOCAP 15295P, which allows for yet faster cycle time during photovoltaic cell encapsulation. PHOTOCAP 15420P was commercially introduced in 2002 and is now the PV industry standard low shrink, "ultra-fast curing" EVA encapsulant used worldwide.

PHOTOCAP 15420P can be used for all crystalline silicon photovoltaic module constructions, and for many thin film photovoltaic designs. PHOTOCAP 15420P is provided as rolled film ready for use in thermal lamination processes. The material is self-priming for adhesion to glass.

| Properties | Test Method ASTM | Units | Condition | Results |
|---|---|---|---|---|
| **Physical Mechanical** | | | | |
| Tensile Strength | D638 | MPa | 23℃, 250 mm/min elongation rate | 18 |
| Ultimate Elongation | D638 | % | 23℃, 250 mm/min elongation rate | 850 |
| 10% Secant Modulus | D638 | MPa | 23℃, 250 mm/min elongation rate | 9.9 |
| Hardness | D2240 | Shore A/D | 23℃ | 69 / 21 |
| Adhesion to Glass | STR | N/cm | 23℃ | 70-90 |
| MVTR | F1249 | g/m²/day | 25℃/100sccm flow, 100%RH | 23 |
| Water Absorption | D570 | wt% | 23℃ | < 0.1 |
| **Optical** | | | | |
| Optical Transmission | E424 | % | 23℃, 0.46 mm thickness | 92 |
| UV Cutoff Wavelength | E424 | nm | 23℃, 0.46 mm thickness | 360 |
| Refractive Index | D542 | - | 23℃, 0.46 mm thickness | 1.482 |
| **Electrical** | | | | |
| Volume Resistivity | D257 | ohm cm | 23℃ | >1 x $10^{14}$ |
| Dielectric Strength | D149 | kV/mm | 23℃, 500V/sec | 24 |

*Tests are made in accordance with the current issue of the ASTM, or other cited test method. Test data reported here are nominal values measured on extruded films, 0.5 mm thick, or compression molded sheets and test bars, which have been cured at 150℃ for 7 minutes with a laboratory press. Optical measurements made with glass-EVA coupons with high transmission solar glass.*


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# PHOTOCAP® 15420P

## AGENCY APPROVALS:

PHOTOCAP 15420P is a UL listed product in category QIHE2 Photovoltaic Polymeric Materials. Each STR manufacturing plant maintains a separate UL file. Please refer to UL file numbers E349543, E335471 and E335472.

## PRODUCT VARIATIONS:

| Suffix | Release Paper | Shrinkage | Notes |
|---|---|---|---|
| 15420P/UF | Yes | Zero | STR's User Friendly (UF) technology allows sheets to be cut closer to size, resulting in less voids and shifting of ribbon and cells |
| 15420P/UFP | No | Minimal | Paperless UF option, resulting in minimal shrinkage |
| 15420P/PL | No | Higher than UF or UFP | Possesses a greater tendency to shrink but perfectly acceptable for use |

## PROCESS GUIDELINES:

| Vacuum Lamination Step | | Heat Cure Cycle | |
|---|---|---|---|
| Nominal Temperature | 145 - 150℃ | Platen Temperature | 145 - 150℃ |
| Vacuum Range | < 60 mbar | Cure Time | 8 min |
| Evacuation Time | 4 min | Applied Bladder Pressure | 910 mbar |
| EVA Melting Range Via DSC | 60 - 70℃ | Target Temperature within the Encapsulant | 140℃ |
| | | Time Above the Target Temperature | > 3 min |

*Processing conditions shown here are a recommended starting point for a crystalline silicon photovoltaic module processed with a typical 2-step vacuum lamination system. Actual values required to achieve desired cure levels will depend on the specific PV module design and the lamination process used.*

*The temperature of the encapsulant should be at or above the EVA melting range before pressure is applied for the cure cycle. The encapsulant should reach the target temperature during the cure cycle, and should remain above that target temperature for the time shown. Temperatures within encapsulant should be periodically measured with embedded thermocouples to assess temperature uniformity of the laminator heating plate and the rate of heat transfer to the PV module. More information about how to laminate PV modules with PHOTOCAP encapsulants is available from STR.*

All PHOTOCAP grades are based upon over 30 years of STR's commercial experience in the photovoltaic market.

For further information, please contact the nearest Specialized Technology Resources office or agent.