



Performance Advantages of CERANOVUS® A155 PP Polymer in Modified Peel & Stick Membrane Formulation

CERANOVUS® A155 polypropylene (PP) polymer delivers operational processing advantages, formulation cost savings and improved product performance in polymer modified asphalt roofing membranes.

CERANOVUS® A155 PP (physical properties shown in **Table 1**) was evaluated as a partial replacement for approximately 20% of the SBS in the polymer modified Peel & Stick membrane formulation shown in **Table 2**.

The performance results summarized in **Table 3** confirm that **CERANOVUS® A155 PP** delivers the desired results such as reduced formulation viscosity, increased penetration hardness, better stability and improved adhesion to plywood, while maintaining low temperature flexibility.

Operational Processing Advantages and Formulation Cost Savings with CERANOVUS® A155 PP:

CERANOVUS® A155 PP dramatically reduces the formulation viscosity by ~50% (see **Graph 1**). This significant decrease in viscosity can enable both operational advantages and formulation cost savings through:

1. Ease of processing and lower overall energy requirements
2. Higher line speeds which could provide incremental capacity
3. Uniform film coating thickness for improved finished product quality
4. Flexibility to reduce film coating thickness

CERANOVUS® A155 PP incorporates easily into the compound with standard low shear mixing equipment and quickly achieves a homogeneous blend. **Table 4** shows the 45% improvement in the separation values which demonstrates greater overall stability of the compound.

Graph 1:
Viscosity, cps at 170°C
(ASTM D4402)

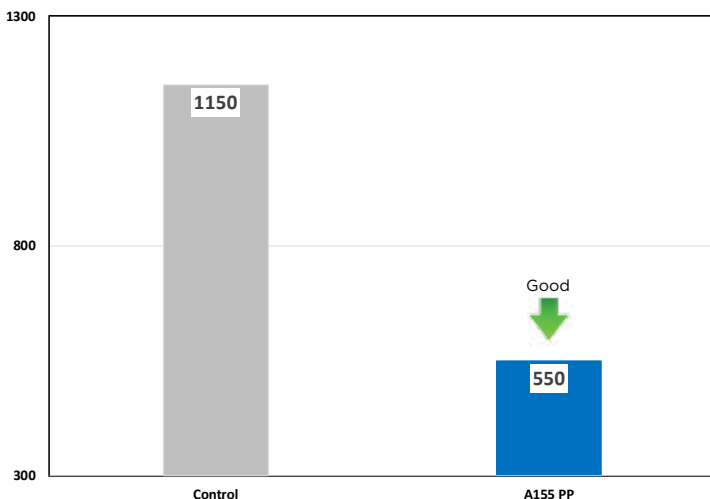


Table 1:
Typical Physical Properties of CERANOVUS A155 PP Polymer

Density (g/cm ³) ASTM D1298	Drop Point (°C) ASTM D3954	Penetration @ 25°C (dmm) ASTM D1321	Viscosity @ 190°C (cps) BROOKFIELD
0.90	155	2	75

Table 2:
Polymer Modified Peel & Stick Membrane Formulation

Formula Components	Control	A155 PP
Asphalt (PG 58S - 28)	91.0	91.0
Linear SBS	9.0	7.0
Sulfur Crosslinker	0.1	0.1
CERANOVUS® Polymer	0.0	2.0

Table 3:
Summary Results of 2% CERANOVUS A155 PP
in Peel & Stick Membrane Formulation

Properties	A155 PP	% Change	ASTM Method
Viscosity	Decreases	52%	D4402
Penetration	Decreases	12%	D5
Separation	Improves	45%	D7173
Softening Point	Maintain	-	D36
Adhesion to Plywood (Lo Temp)	Increases	30%	D1970 - 7.4
Adhesion Plywood (Hi Temp)	Increases	5%	D1970 - 7.4
Low Temperature Flexibility	Maintain	-	D1970 - 7.6

Table 4:
Separation by Softening Point, °F
(ASTM D7173)

Separation Data	Control	A155 PP
Top 1/3	213	210
Bottom 1/3	191	198
Difference	22	12

Improved Finished Properties of Modified Peel & Stick Membrane with CERANOVUS® A155 PP:

CERANOVUS® A155 PP delivers a -12% decrease in Penetration (see **Graph 2**) while maintaining the Softening Point (see **Graph 3**) of the modified roofing membrane formulation.

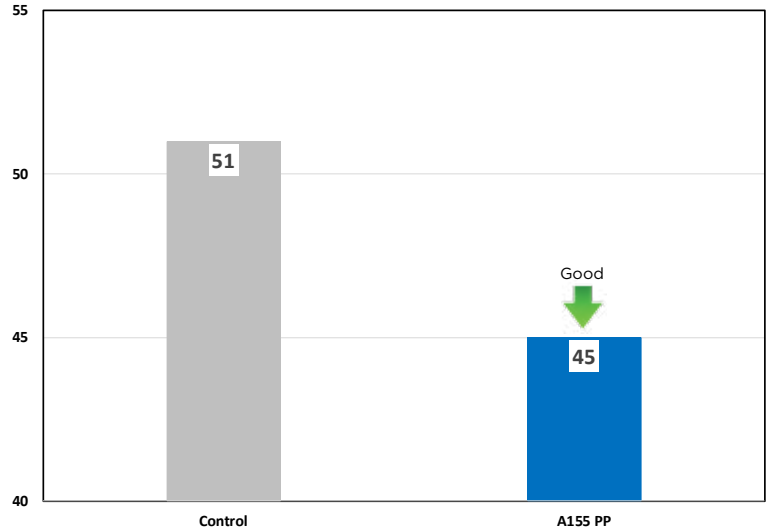
Lower Penetration indicates improved stiffness which should promote less deformation and fewer defects during installation from mechanical stresses such as foot traffic. Lower Penetration also prevents blocking during storage and shipping.

Better Adhesion to Plywood combined with Flexibility and Thermal Stability are critical properties to improve the overall durability and resistance to deformation from seasonal temperature fluctuations.

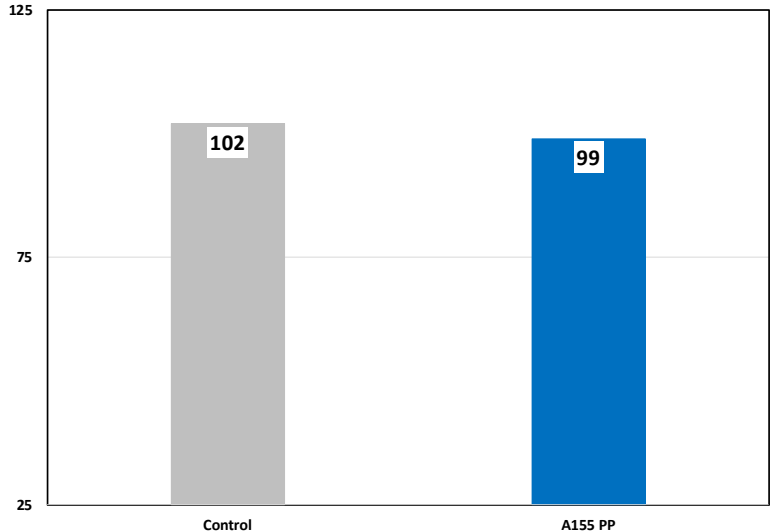
CERANOVUS® A155 PP improves the Adhesion to Plywood by 30% at 4 °C and 5% at 25 °C (see **Graph 4**). This expands the application temperature range and can prevent sagging, peeling and bubbling at high sustained temperatures.

CERANOVUS® A155 PP at a 20% replacement of SBS also pass the physical requirements of ASTM D1970 for Flexibility and Thermal Stability as shown in **Table 5**. This ensures that the formulation will not crack or become too sticky upon use.

Graph 2: Penetration at 25°C, dmm (ASTM D5)



Graph 3: Softening Point, °C (ASTM D36)



Graph 4: Adhesion to Plywood (ASTM D1970 - 7.4)

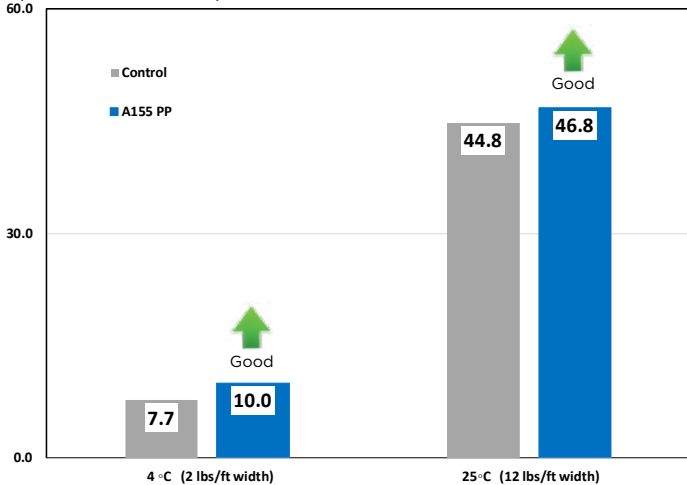


Table 5: Test results of Adhesion to Plywood (ASTM D1970 - 7.5 AND 7.6)

Properties	A155 PP	ASTM Method
Flexibility, @ -28 °C	Pass	D1970 - 7.6
Thermal Stability, @ 70 C	Pass	D1970 - 7.5



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