



POLCARB™ SB & POLCARB™ SV IN A uPVC WINDOW FORMULATION

Stearate coated ultrafine carbonates have been used for many years in uPVC window frames. They act as process aids, and improve impact strength. The particle size distribution of the filler is of great importance as coarse particles will reduce gloss, increase dirt pick-up and act as flaws reducing impact strength dramatically. The purity of the calcium carbonate is also of great importance, affecting light stability and weathering. Polcarb™ SB and SV are produced from a high purity chalk, coated with a carefully controlled level of stearic acid, and give very good balance of properties in a wide range of uPVC window profile formulations. The properties of Polcarb™ SB and Polcarb™ SV are given in Table 1.

EXPERIMENTAL

Polcarb SB and Polcarb SV have been compared with a widely used coated chalk also of French origin (CCF) in a typical uPVC window formulation (Table 2.)

TABLE 1: TYPICAL PRODUCT PROPERTIES

	Polcarb™ SB	Polcarb™ SV
Brightness (ISO)	87	85
+ 45 µm (% max)	0.01	0.01
+ 10 µm (% max)	0.5	1.0
- 2 µm (%)	88	90
Moisture as produced (% max)	0.2	0.2
Stearate (%)	1.2	0.9
Other Typical Properties		
Specific Gravity (g/cm³)	2.7	2.7
Surface Area (BET; m²/g)	9	10
pH	9	9

TABLE 4: BRABENDER PROCESSING PROPERTIES

	Polcarb™ SB	Polcarb™ SV	CCF
Fusion Time (mins)	4.2	4.2	3.9
Fusion Torque (Nm)	38	37	38
Extrusion Torque (Nm)	215	200	210
Die Pressure (p.s.i.)	1200	1070	1150

Dry blends were prepared in a Henschel mixer at 3000 rpm until a temperature of 120°C was reached and then cooled to 40°C. After aging for two days they were extruded using a Brabender twin screw extruder fitted with a 75 x 1.5 mm die. The strips were then tested for optical and mechanical properties.

CONCLUSIONS

Our results, shown in Tables 3 to 8, confirm that Polcarb™ SB and Polcarb™ SV perform as well as the CCF in uPVC window extrusions.

TABLE 2: uPVC FORMULATION

Formulation	phr
PVC(K68) resin	100
Impact Modifier	7.5
Processing Aid	0.5
Lead stabiliser composite	4.5
TiO ₂	4
Filler	6

TABLE 3: BRABENDER PROCESSING CONDITIONS

	Fusion Conditions	Extrusion Conditions
Charge weight (g)	58	-
Temperature (°C)	170	180-195
Speed (rpm)	12	8

TABLE 5: COLOUR (CIELAB) / GLOSS (ISO 2813) OF uPVC EXTRUSION

		Polcarb™ SB	Polcarb™ SV	CCF
Colour	L*	94	94	94
	a*	1	1	1
	b*	4	5	4
Gloss at	20°	17	18	17
	60°	66	67	65
	85°	97	93	97

TABLE 6: MULTIAxIAL IMPACT PROPERTIES (ISO 6603-2) OF uPVC EXTRUSIONS

	Polcarb™ SB	Polcarb™ SV	CCF
Peak Energy (-20°C: J/mm)	10	12	10
Fail Energy (-20°C: J/mm)	11	13	12

TABLE 7: TENSILE PROPERTIES (SIMILAR TO ISO 527) OF uPVC EXTRUSIONS

	Polcarb™ SB	Polcarb™ SV	CCF
Tensile Strength (Mpa)	40	39	40
Elong at Break (%)	175	160	170

TABLE 8: HEAT STABILITY (CONGO RED - ISO 182-1) OF uPVC EXTRUSIONS

	Polcarb™ SB	Polcarb™ SV	CCF
Heat Stability (Mins at 200°C)	52	56	56

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