

BUTVAR[®]

polyvinyl resins

Acid-etch wash primer coatings based on Butvar[®] polyvinyl resins

Butvar[®] polyvinyl butyral resins are unique polymers that offer a combination of properties that make them a key ingredient in a variety of successful formulations. Some of the properties for which Butvar is widely used include:

- Outstanding binding efficiency
- Optical clarity
- Adhesion to a large number of surfaces
- Toughness combined with flexibility

One particular application where Butvar resins can add value is in acid-etch wash primers. This type of coating is used to temporarily protect new or cleaned steel substrates from the effects of corrosion. Due to the properties of Butvar, these primers provide an excellent adhesive base for subsequent coating layers. Application is not limited to steel, and other metal substrates, such as aluminium, can also benefit from these primer coatings.

The main advantages of acid-etch wash primers are:

1. Good adhesion to various metal substrates.
2. Fast drying, allowing subsequent topcoat application within an hour.
3. Reduced surface preparation time.

Typically, wash primers are applied as thin protective films at approximately 8–20 microns. This is achieved by careful formulation at low-volume solids (~15%–25%).

Eastman has a range of PVB polymers, and a selection of them are shown in Table 1.

Table 1. Typical properties of selected Butvar products

Grade	Glass transition temperature (T _g), °C	Hydroxyl content ^a	Acetyl content ^b	Solution viscosity ^c (10% wt in ethanol), cP
Butvar B-98	72–78	18–20	2.5 max.	75–200
Butvar B-90	72–78	18.5–20.5	2.5 max.	200–400
Butvar B-74	72–78	17.5–20.0	2.5 max.	800–1300
Butvar B-72	72–78	17.5–20.0	2.5 max.	1600–2500

^a Hydroxyl groups in terms of polyvinyl alcohol

^b Acetyl groups in terms of polyvinyl acetate

^c Ostwald Viscometer at 25°C

Technical analysis—Corrosion protection

Wash primer formulations were prepared using four Butvar products according to instructions shown in Table 2. Corrosion testing using ASTM B117 neutral salt spray method was conducted on steel panels coated with the primers and a two-pack PU-acrylic topcoat. A control was included with no wash primer, only topcoat applied direct to steel. After 410 hours of salt spray testing, the control had significant paint-film blisters and corrosion to the steel substrate. In contrast, the panels containing Butvar wash primers had few blisters and little sign of corrosion to the steel. The results can be seen in Figure 1.

Our work shows Butvar grades B-98, B-90, B-74, and B-72 can all be formulated into protective acid-etch wash primer coatings.

Table 2. Two-pack wash primer formulation

Ingredient	Supplier	A	B	C	D
Part A					
Phenodur® 263/70B	Allnex	6.681	6.681	6.681	6.681
2-Propanol		11.841	11.841	11.841	11.841
1-Butanol		2.537	2.537	2.537	2.537
Disperbyk®	Altana	0.127	0.127	0.127	0.127
Shieldex AC5	Grace	5.497	5.497	5.497	5.497
MicroTalc IT extra	Mondo Minerals	4.229	4.229	4.229	4.229
Aerosil® R972	Evonik Industries	0.304	0.304	0.304	0.304
Bentone SD-2	Elementis	0.127	0.127	0.127	0.127
Butvar B-98 (13.9% NVC) ^a	Eastman	48.647	0	0	0
Butvar B-90 (11.4% NVC) ^a	Eastman	0	48.647	0	0
Butvar B-74 (9.8% NVC) ^a	Eastman	0	0	48.647	0
Butvar B-72 (9.0% NVC) ^a	Eastman	0	0	0	48.647
Part B (premixed)					
Water		1.226	1.226	1.226	1.226
Phosphoric acid (85%)		1.827	1.827	1.827	1.827
2-Propanol		15.308	15.308	15.308	15.308
1-Butanol		1.649	1.649	1.649	1.649
Total		100	100	100	100
Solids content (theo.)		21.6%	20.4%	19.6%	19.2%

^a Diluted with 2-propanol/2-methyl-1-propanol (58/42)

Figure 1. Effects of salt spray testing after 410 hours of exposure



No wash primer



Butvar B-98



Butvar B-90



Butvar B-74



Butvar B-72

Notes

Substrate: Mild steel (ref. Q-Panel S-36)

Wash primer DFT: 11 microns

2K topcoat DFT: 50 microns



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