

Firebrake ZB in flexible PVC

Firebrake® ZB, is a borate product used extensively as a partial or complete replacement for antimony oxide and other high-cost flame retardants in flexible polyvinyl chloride (PVC). Unlike antimony trioxide, *Firebrake* ZB's refractive index is similar to that of most polymer systems. This similarity helps maintain translucency and lower pigment loadings.



Firebrake ZB is used in applications such as wall coverings, wire and cable, roofing membranes, conveyor belts, carpet backing, auto upholstery, tenting materials and more.

Benefits of using *Firebrake* ZB in flexible PVC include:

Flame retardant synergist

Firebrake ZB is a cost-effective, multifunctional fire retardant with a stable supply source. The most efficient flame retardant function of *Firebrake* ZB is observed in its synergistic effect with antimony oxide in halogen-containing polymers, including flexible PVC.

Low-cost antimony oxide replacement

Depending on the desired fire standards, *Firebrake* ZB can either partially or completely replace antimony oxide. When used together, *Firebrake* ZB and antimony oxide display synergistic effects in fire test performance, as demonstrated in the Limiting Oxygen Index (LOI) test results (Figure 1).

Additional fire retardant fillers like alumina trihydrate (ATH), magnesium hydroxide, or magnesium carbonate can further enhance the synergistic effects (Figure 2).

Smoke suppression

In contrast to antimony oxide, which promotes smoke formation, *Firebrake* ZB drastically reduces smoke, especially in flexible PVC (Figure 3). The reduction in smoke is also evident in the presence of ATH, even when *Firebrake* ZB is used in conjunction with antimony oxide (Figure 4). A high ratio of *Firebrake* ZB to antimony trioxide is recommended for low smoke formulations in the absence of ATH.

Afterglow suppression

The borate component in *Firebrake* ZB forms a glassy layer on char to protect it from further oxidation and afterflow combustion.

Char promoter

During polymer combustion, the zinc component of *Firebrake* ZB catalyzes the decomposition of the halogen source to promote cross-linking and char formation. In addition, water from *Firebrake* ZB evaporates. The water cools the flame and promotes the formation of highly foamy and insulating char.

