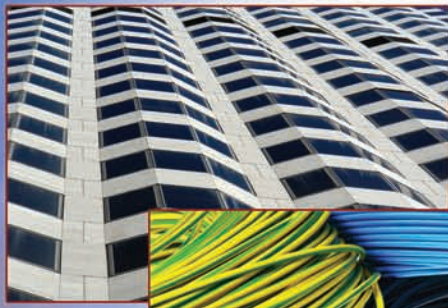


FLAME RETARDANT AND SMOKE SUPPRESSANT ADDITIVES



Marshall Additive
TECHNOLOGIES
DIVISION OF THE R.J. MARSHALL COMPANY



In thermoplastic compounds -- like wire, cable and hoses -- flame retardancy (FR) and low smoke (LS) are paramount. The H-TEC and C-TEC families of products by Marshall Additive Technologies deliver superior flame retardant and smoke suppressant performance.

Flame Retardant & Smoke Suppressant Additives

Marshall Additive Technologies offers an extensive line of flame retardants and smoke suppressants including alumina trihydrate (ATH), magnesium hydroxide, zinc borate, zinc stannate, zinc hydroxystannate, antimony oxide, ammonium octamolybdate and molybdenum oxide. Our proprietary C-TEC product line is designed to be cost effective replacements of antimony trioxide and ammonium octamolybdate (AOM).

C-TEC™

C-TEC™ FR (flame retardant) The FR series – FRZ30S, FRZ20S and FRZ8S - are lower-cost antimony oxide alternatives, making use of proprietary synergistic technology. In many vinyl and other halogen systems, they can provide flame retardant performance comparable to antimony oxide itself at lower cost, and they often have a smoke advantage as well.

C-TEC™ LS (low smoke) The LS series – LSZ20A, LSZ8A, LSZ4A - are lower-cost molybdate alternatives, making use of proprietary synergistic technology. In vinyl and other halogen systems, they may provide smoke reduction comparable to ammonium octamolybdate, but at lower cost. In some formulations, they also add flame retardancy and stability.

C-TEC™ SD200 (smoke defense) A new low-cost low-antimony molybdenum-free additive which provides flame retardancy equivalent to antimony oxide in a typical flexible PVC formulation, where in contrast to antimony oxide, it substantially lowers the smoke. Low temperature flexibility is expected to be better than some of the traditional FRZ or LSZ additives at comparable loadings.

C-TEC™ SD203 (smoke defense) A new very low-cost low-antimony molybdenum-free additive which provides still lower smoke than SD200 in a typical flexible PVC formulation. Compared to SD200, it may be slightly less powerful in flame inhibition.

C-TEC™ AO (antimony oxide) The classical flame retardant synergist for vinyls and other halogen systems. The excellent flame retardancy is often accompanied by elevated smoke.

C-TEC™ AOM & MO (ammonium octamolybdate & molybdic oxide) The classical smoke suppressants for vinyls and related halogen polymers. MO imparts some color, AOM only slightly. While mainly used for smoke suppression, they often provide a boost in char formation and flame retardancy. The high price of molybdenum in recent years suggests that the customer should try replacing MO or AOM with a CT-LSZ additive or our new totally molybdenum-free SD200 or SD203 additives.

C-TEC™

C-TEC™ ZB400 and ZB800 (zinc borate) and ZB200 (zinc metaborate)

Versatile low-cost flame retardants, flame retardant synergists, smoke suppressants and char-barrier-enhancers for halogenated and some non-halogenated polymers. They often can partly (and sometimes entirely) replace antimony oxide. They are often found to be synergistic with ATH, MH, or AO.

C-TEC™ ZST & ZHS (zinc stannate & zinc hydroxystannate) These are low smoke flame retardants which in PVC and other halogen-containing polymers can replace antimony oxide and molybdenum smoke suppressants. Synergism with antimony oxide is reported. Zinc stannate in combination with zinc hydroxystannate has been reported to be synergistic.

H-TEC™

H-TEC™ Magnesium Hydroxide Finely-divided white additive for flame retardancy and smoke suppression in plastics (both halogen-containing and non-halogen) allowing processing temperatures above ATH. Three grades are available based on particle size. Synergism with ATH has been reported.

H-TEC™ HTMC-9 A low-cost white finely-divided natural combination of magnesium calcium carbonate (huntite) and hydrated magnesium carbonate. Thermal stability is well above that of ATH. Cost is well below that of typical magnesium hydroxides, which it can often replace with equal and sometimes better flame- and smoke-suppressant activity. Useful in both halogenated and non-halogenated plastics. Synergism with ATH has been reported.

H-TEC™ HT910 (alumina trihydrate) A fine particle size and high surface area precipitated ATH.

Other Alumina Trihydrate- Mechanically Ground Products

A202 (2u)
A204 (4u)
A206 (6u)
A208 (8u)
A245 (80u)

Various surface treatments, blends and particle distributions are available upon request for the H-TEC line.

Marshall Additive Technologies provides high quality specialty additives and fillers to a variety of markets and applications. With over 25 years of experience in the polymer additive, flame retardant and smoke suppressant markets we can help you with your additive needs.

At Marshall Additive Technologies we seek to make our customers successful by supplying innovative, quality focused products and services. We serve our customers' needs with perseverance and create an environment where our customers, employees and suppliers are highly valued.

Other Products From Marshall Additive Technologies

ResNsand Ultra:

A series of sized polycarbonate particles that disperse clear in clear coat thermoset resins and considerably increases the abrasion resistance of the polymer. Its primary uses are anti-skid for thermoset poured floors, piers, decks, handicap ramps, shower stalls, baths, hot tubs and aircraft carrier decks.

(see ResNsand Ultra brochure)

Spectrasand:

A series of colored granules and granular blends designed to give color accents to floors and architectural coatings. (see Spectrasand brochure)

Fibers, Fiber Blends & Fiber Compounds:

Expanded Aramid Pulps- Designed for rapid dispersion in coatings, plastics, rubber, friction products and other applications requiring high temperature, high tensile and chemical resistant properties.

Kayocels- Cellulose pulps and pulp compounds designed for use in roof coatings, adhesives, caulks, friction products, textures and acoustical coatings.

Polyethylene Pulps- Designed for reinforcement and texture in sealants, adhesives, coatings and caulks. (see Fibers brochure)

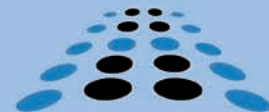
Specialty Additives:

Rapid dispersing, "non-balling" tire sealant fibers for use in both on- and off-road tires that provide structure and strength in sealing tire punctures.

Wood fibers for glass partitioning and glass APC (atomized protective coat) used in preventing glass oxidation during the cooling process.

Q2350, which is a nano surface modified alumina monohydrate, designed to decrease cycles in the manufacture of thermoplastic injection molding.

(see Specialty Additives brochure)



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