



Imagine that you are an airline pilot on one of your regularly scheduled trans-Atlantic cargo flights. The weather conditions are almost perfectly clear and everything around you is normal, when all of a sudden the instrument panel lights up a flashing signal indicating fire in the cargo compartment. You are three hours from land and you helpless to do anything except hope that the automatic fire-suppression system will contain the fire and that you are able to land safely. Will you have time to find a place to land before the fire spreads?

In scenarios such as this, personal safety is enhanced and property loss is reduced if fires are contained within a small space until fully suppressed or extinguished. This would be the case if the fuselage's interior walls, ceilings, floors, and partitions were coated with a fire-retardant coating such as CEASEFIRE™. For even in manned or robotic, land or sea vehicles, such a passive system would provide an additional margin of safety and will improve survivability because it provides an added thermal insulator that would cause a delay in the spread of fire and it would also give an active fire suppression more time to activate. Tests have proven that the use of this coating resulted in fires that produced very low smoke toxicity and a reduced level of smoke density.

The CEASEFIRE™ thin (3 mil) coating system requires no maintenance after it has fully cured. In powder or liquid form, the fire retardant additives have been incorporated into some thermal plastics used in the aviation industry and may be added to all types of coatings.

#### Background of the technology

In the 1960's, work was done in pioneering intumescent fireproof technology with the introduction of Para-nitroaniline ortho-sulfonic acid ammonium salt, code named NASA Salt. This was a key component in heat/fire protection during the early days of space exploration. The next generation of heat/fire protection systems was the Apollo Heat Shield. This was a thick ablative coating-potting compound that was used to fill a honeycomb layer on the reentry capsule. With the end of the Apollo program in 1970, the use of this technology for military ordinance protection and offshore oil rig protection. In 1995, the efforts were refocused to develop yet another new generation of intumescent agents.

CEASEFIRE™'s developers were key participants in the development of this technology, which has now been further improved so that a new patent pending technology incorporates the now traditional phosphate technology for char formation with a synergistic secondary catalytic approach. Performing this combination more than doubles the efficiency of traditional phosphate intumescent technology.

## Agent Characteristics

- Foam char swells from 1 to 1.5 inches
- Activated at 300 °C
- Protects to 1800 °C for 4 hours
- Provides efficient flame barrier
- Stops fire, spread of flame and smoke
- ASTM E84 Flame Spread Test Rating = 5
- ASTM E84 Smoke Density Test Rating = 5
- Very Low Smoke Toxicity (MSC.41)
- Pittsburgh Protocol > 15 minutes
- International Marine Organization (IMO) A.653(16) certified
- Intumescent agent/powder can be added to many types of coatings and compounds
- Indoor and Outdoor Use



## CEASEFIRE™ Product Features

1. Insoluble in water: will not leach out over time.
2. When added to the final coating or compound, it passes and surpasses all fire standard tests.
3. The fire retardant agent/powder is currently incorporated in these stand alone coatings:
  - (a) A unique two-part epoxy coating with excellent adhesion and durability. Contains no VOC's. Viscosity is reduced by the addition of solvents.
  - (b) A two-part clear epoxy with the same properties for indoor use.
  - (c) A one-component latex coating with very low smoke generation during char formation. Recommended for coating wood, composites, plastic, and metals. Adding water reduces viscosity.
  - (d) A unique two-part phenolic intumescent coating with extremely low smoke emissions. Viscosity is reduced with the addition of solvents.
4. Mature intumescent technology, i.e., already in commercial production.
5. Final performance tests are nearing completion for the incorporation of the intumescent agent/powder in DURABAK (a one part moisture cured, totally flexible, extremely



6. durable, repairable, slip resistant, waterproof, polyurethane protective coating); and DRENCHCOTE (a one part totally flexible, acrylic, waterproof coating for roofs, parapets, metal gutters, flashing, side walls)
6. Compared to other flame-retardant coatings, the weight is minimal because much less agent/powder has to be added to the coating or compound for it to be totally effective.
  7. CEASEFIRE™ contains no organic material such as sugars and starches that attract bacteria, fungi, and mold.
  8. Once the char has formed and the fire is out, the char can be scraped off the surface and the undamaged substrate can be refurbished.
  9. The shelf life of the agent/powder is indefinite. When incorporated into a coating or compound, the shelf life depends upon that of the coating or compound. The CEASEFIRE™ agent/powder is not primarily sold commercially.

## **PRODUCT TESTING**

### **IMO (International Marine Organization) - A.653(16) Certified**

The CEASEFIRE™ High Performance 2-part epoxy is DNV (Det Norske Veritas) and ABS (American Bureau of Shipping) certified for use on ceilings, bulkheads, and floors for any marine vessel worldwide in accordance with IMO A.653(16). Thin coatings means that the weight is minimal. The DNV and ABS certification for the IMO was achieved at a 10 mil thickness with the 2-part epoxy for steel, fiberglass composites and wood ceilings, bulkheads and floors. Epoxy and polyurethane coatings are extremely durable by themselves and are repairable if there were to be any damage. The quality of the agent/powder added to the coatings is checked through strict quality control procedures based on DNV ([www.dnv.com](http://www.dnv.com)) standards.

### **MSC.41(64) Standard Test for Measuring Smoke and Toxic Products of Combustion**

The toxicity of the smoke generated has been analyzed and found to be well below the minimum safety standards allowed for confined spaces on ships and mobile offshore units as specified in MSC 41(64).

### **ASTM E 84 Class A - Certified**

This tests the relative performance of the test material under standardized fire exposure. The black smoke produced by the flame on the coating will turn to a white non-toxic smoke within seconds and it was rated at 5 for Smoke Density where a score of 450 or below is passing. Flame spread on surface achieved a rating of 5 where a score of 25 or below is passing. The standard measurement for this test gives solid concrete flame spread a rating of 0 and red oak wood a rating of 100.

CEASEFIRE™ meets U.S. National Fire Protection Association Life Safety Code NFPA 100 Class A Standard, i.e., zero to 25 Flame Spread and zero to 450 Smoke Developed.

Simply used as a top coating, it protects onboard electrical wiring harnesses, electronic modules, telecommunication devices, sensors, panels, as well as engine compartment and undercarriage fuel and hydraulic lines from damage due to heat and fire. It can provide an effective fire and thermal barrier between the fuel tank and the adjoining vehicle compartment(s) to retard the spread of fire. And it would provide additional thermal protection to ammunition compartments. It can be used to protect sensitive computer circuitry and components, communication devices, including those used in robotic vehicles.

### **Simple Application**

The application of CEASEFIRE™ two-part epoxy coating is no more complicated than the standard labor by a painting contractor to apply most standard paints and coatings. No special preparation is needed because two parts are pre-measured so that there is no pre-measuring involved in mixing part "A" with part "B" in a standard gallon. Amount of time to do an application would vary depending on such factors as: degree of difficulty of the particular application, prep work to condition the surface, location, size of the application, special tools or fittings required, specialized workspace requirements.

The cost for each project will depend on the thickness of the coating applied, which, in turn is dependent on the degree of fire protection desired. Generally, more fire protection can be achieved by increasing the mil thickness and hence the cost. However, overall cost is less than comparable fire retardants because of the lower levels of the additive needed to produce superior results.

For more information on CEASEFIRE™, contact Jerry Brown, ADI Technologies, Inc. at (703) 734-9626, [ADIT22101@aol.com](mailto:ADIT22101@aol.com) or [www.aditechnologies.com](http://www.aditechnologies.com).

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