



Nevada Thermal Spray Technologies (NTST)

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NTST Fire Prevention (FP) Paint & Coatings

1.0 Executive Summary

NTST has developed economical fire prevention (FP) intumescent and non-intumescent paint and coating systems. These non-carbon-based ceramic materials can mitigate the hazard of fire for any underlying material (e.g. metal, wood, oriented strand board, plastic, paper, cardboard, shingles, etc.). The coatings are durable enough to withstand extreme temperatures which occur in aerospace applications. The material systems meet durability standards for exposure testing to moisture and low temperature environments.

2.0 NTST FP Materials

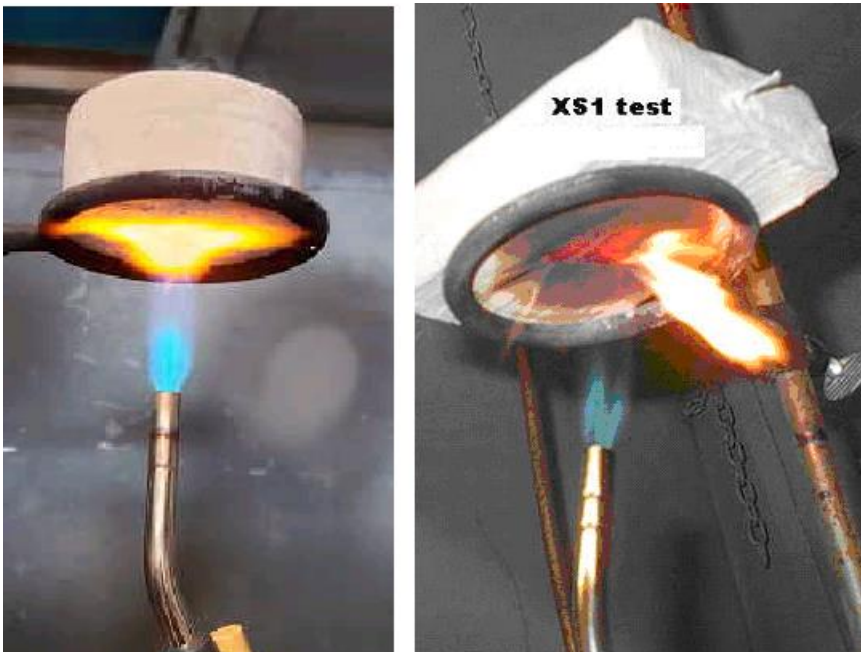
NTST FP materials are the most economical product in the marketplace and can be marketed as a green fire protective material. The materials are inert, non-toxic, and odorless. They are applied using brush, roller, or low-pressure spraying equipment. NTST FP materials have been shown to withstand temperatures of 3500 F for long term tests (i.e., 30, 60, and 120 minutes).

3.0 FP Material Testing Approach

Testing on the NTST FP intumescent paint and coatings utilized a propane torch illustrated in Figure 1. The torch was operated at 2100 F and 3100 F for testing times of 30, 60, and 120 minutes, which is a higher temperature than a house or forest fire which are typically 1500 F.

Temperatures obtained during testing used a Rayteck Raynger 3i Series infrared temperature measurement device.

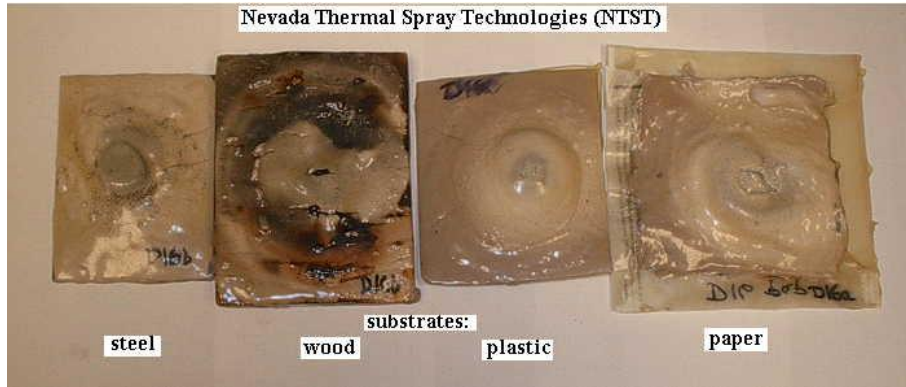
Figure 1. Propane Torch Utilized in NTST FP Material Testing (i.e., wood substrates).



3.0 FP Materials for House and Building Fires

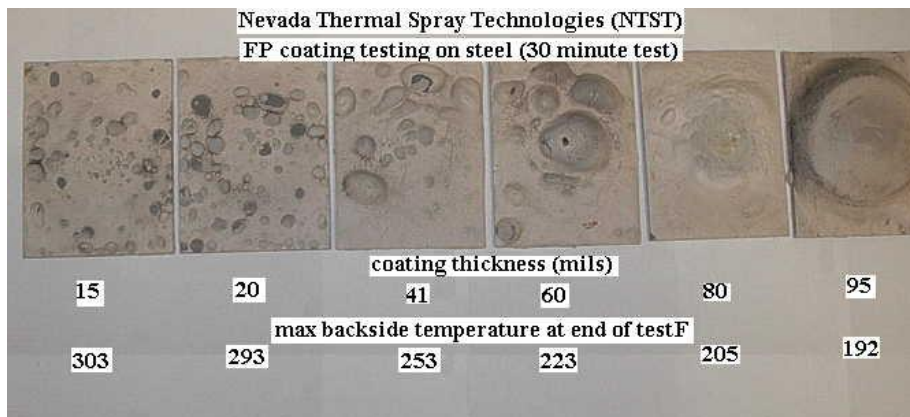
Testing was accomplished, as illustrated in Figure 2, for the NTST FP intumescent coatings for 30 minutes using substrates of steel, wood, plastic, and paper. The backside substrate temperature measurements ranged from 180F to 255F for the four substrate materials. As a result of heat exposure, the NTST FP materials exhibited the typical swelling characteristic of intumescent coatings (i.e., forming a protective coating between the flame source and the substrate). The low substrate temperatures for the four cases is attributed to the massive decrease in heat transfer to the substrates.

Figure 2. NTST Fire Protection Intumescent Coating 30 Minute Testing on Various Substrates.



Additional experimentation on the NTST FP coatings was conducted using steel substrates. Unprotected metal structures can reach a critical temperature (i.e., ~800 F) where the mechanical properties are degraded to the point where the material strength is compromised. All the samples illustrated in Figure 3 survived the 30-minute tests with backside substrate temperatures ranging from 192 to 273 F at the end of the testing.

Figure 3. NTST FP Coatings on Steel.



4.0 FP Application for Forest Fires

In cases where an intumescent coating is not required such as forest fires, a modified formulation of the NTST FP formulation is available. Testing on the NTST FP non-intumescent paint and coatings involved using a propane torch illustrated in Figure 1. The torch was operated at 2100 F for various testing times. Average forest fire temperatures are typically 1500 F. The wood substrate survived the testing for 30 minutes.



Figure 4. NTST Fire Protection Non-Intumescent Coating 30 Minute Test on Wood.