NASA TECH BRIEF

John F. Kennedy Space Center

An Improved Technique For the Use of Zinc-Rich Coatings

The problem:

Many users have reported blistering and peeling of topcoats used over ethyl silicate, inorganic, zinc-rich protective coatings. These failures occurred even though the manufacturers' instructions were followed during the application of both the zinc-rich coating and the topcoat. Typically, a surface was sandblasted, he zinc-rich coating applied and cured for 24 hours, and then the topcoat added.

The solution:

It was found that blistering and peeling are virtually eliminated when the primer is allowed to cure outdoors for an extended period of time and is moistened during the process.

How it's done:

One type of inorganic, zinc-rich coating uses an ethyl silicate vehicle. This type is prepared by replacing the alcohol radicals in ethyl silicate esters with water. As the coating cures, the remaining alcohol radicals are eliminated by further hydrolysis resulting from moisture absorbed by the coating. Though it was generally recommended that 24 hours be allowed for this process, laboratory experiments have shown that zinc films are still quite soft and have poor adhesion and cohesion after this period of time.

Test panels were coated with various inorganic zinc-rich primers and exposed to wet outdoor weather for an extended period of time. Similar panels were tested indoors. A startling improvement in physical properties was noticed for the outdoor panels after five to seven days, but there was no appreciable change in the indoor panels.

Following this, zinc-rich coatings were subjected to outdoor conditions and occasional hosings with fresh water for periods of approximately one week. Then topcoats were applied. There was no evidence of the bubbling commonly observed with the standard 24 hour curing. Furthermore, the zinc-rich coatings showed an improvement by a factor of 10 to 15 in adhesion and abrasion resistance.

The bubbling in topcoats over the short-cured primers was discovered to be caused by gas trapped in the pores of the soft zinc film. These pores are filled in as the zinc cures.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Kennedy Space Center
Code AD-PAT
Kennedy Space Center, Florida 32899
References: B73-10149

Patent status:

NASA has decided not to apply for a patent.

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