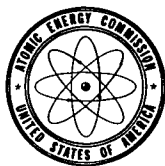


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AEC-NASA TECH BRIEF

Space Nuclear Systems Office



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Methyl Alcohol Used as Penetrant Inspection Medium for Porous Materials

The problem:

To provide a penetrant that can be used as an inspection medium on porous structural materials such as graphite rocket nozzle liners, nozzle skirt extensions, and ceramics. Such materials cannot be inspected for cracks and porous areas with dye penetrants because these penetrants leave a residue which can adversely affect performance in subsequent processing or service.

The solution:

A readily evaporating liquid, such as methyl alcohol. When a porous material with a dull surface is thoroughly wetted with alcohol, it will show a persistent wet line or area at the locations of cracks or porosity.

How it's done:

Dip the part in alcohol, or flow alcohol on the part's surface, and observe the surface as it dries. Areas without discontinuities will dry quickly, usually within 20 seconds. Areas with discontinuities will remain wet longer because they will retain more alcohol. Wet areas appear darker than the surrounding area and are readily visible for a brief period, during which the discontinuity can be marked.

Graphite, unglazed ceramics, green powder-metal-lurgy billets, and composites of chopped fiber and plastic that have a dull surface (as after machining) are all amenable to the use of methyl alcohol. It evaporates and leaves no residue or discoloration. Any other liquid that evaporates quickly can be used on porous materials with equal efficiency,

providing the liquid is compatible with the part being inspected.

Methyl alcohol is recommended because it is relatively inexpensive. It is also quick, and effective. Though this type of inspection is usually qualitative, it can be used quantitatively, with carefully selected samples, to grade density variations in graphite blocks. The surface wetting effect around small discontinuities results in outlining defects too small to be seen by unaided visual inspection. In addition, the inspection process may be repeated as often as required, and photography can be employed to achieve a permanent record of the test results.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
AEC-NASA Space Nuclear Systems Office
U.S. Atomic Energy Commission
Washington, D.C. 20545
Reference: B71-10103

Patent status:

No patent action is contemplated by AEC or NASA.

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