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### Ablative and Insulating Properties of Outgassed Boron Nitride and Boron Nitride Composite

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**Abstract:** Hot-pressed boron nitride that had been outgassed in vacuum ablated with negligible spalling when exposed to a jet of arc-heated air. The measured heats of ablation ranged from 30 to 35 MJ/kg for an enthalpy potential range of 16 to 23 MJ/kg. No ablation occurred in nitrogen at enthalpies up to 26 MJ/kg. A composite of boron nitride and phenolic resin, produced in an attempt to reduce thermal conductivity, was evaluated in both arc-heated air and nitrogen at enthalpy potentials from 8 to 15 MJ/kg and from 15 to 21 MJ/kg, respectively. Poor high-temperature bonding characteristics reduced the heats of ablation to approximately half those of hot-pressed boron nitride. The insulation efficiencies of the composite, pyrolytic boron nitride, boron nitride, and phenolic nylon, were studied at cold-wall convective heating rates of 1.4 to 2 MJ/sq meters-sec in arc-heated air and 1.9 to 2.5 MJ/sq meters-sec in arc-heated nitrogen. When compared on the basis of the total cold-wall heat input per initial pound of material for a back-face temperature rise of 167 deg K, the composite was twice as effective as either pyrolytic boron nitride or hot- pressed boron nitride.

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