

NASA TECH BRIEF

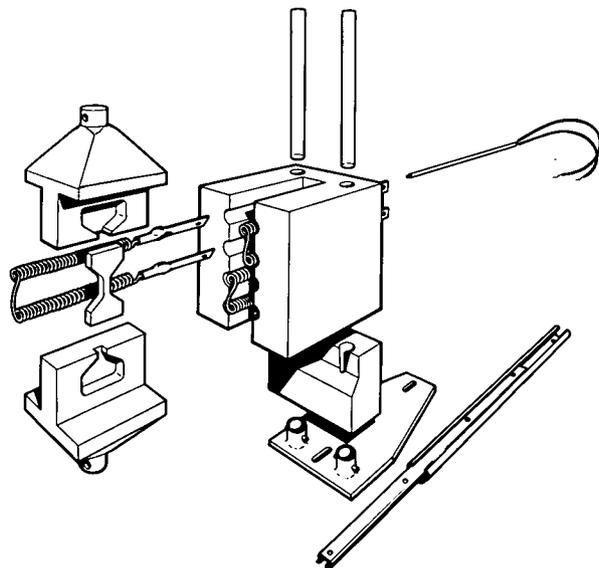
Ames Research Center



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High-Temperature Tensile Tester for Ceramics

An apparatus has been developed for measuring the tensile strength of rigid, low-density ceramic materials at temperatures up to 1375°K. As shown in the diagram, the tensile grips are designed to mate



with the tensile specimen and to form the top and bottom of a lightweight furnace (less than 2.3 kg). The apparatus can only be used with rigid materials; the grips must be stronger than the material under test.

The tensile grips and specimen mate in a well-matched mortise and tenon arrangement which prevents slippage or crushing of the specimen so that a true tensile fracture can occur in the test section. When used for testing silica surface-insulation materials, the tensile grips are made from foamed silica

because there is little or no thermal expansion mismatch between the ceramic grips and the ceramic specimen. The shape of the tensile specimens may have to be modified slightly for different materials to assure a tensile break in the test section.

The furnace is made of foamed silica and includes a Nichrome heating element; temperature is controlled by an on-off regulator and a variable transformer. Two quartz rods are used to connect the furnace to the horizontal slide bar which, in turn, is attached to the cross bar of the testing apparatus. Thus, the hot furnace is isolated from the test equipment and can be moved away from the test specimen to permit rapid changing of the specimen or moved forward to enclose the specimen and grips. Because the furnace remains at test temperature while specimens are being changed, only 15 minutes is required to make a tensile test at 1150°K.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
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Reference: TSP 74-10244

Patent status:

NASA has decided not to apply for a patent.

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Category 04