

NASA TECH BRIEF



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Cobalt-Tungsten, Ferromagnetic High-Temperature Alloy

The problem:

To provide a material with improved high temperature strength as well as good high temperature magnetic properties for use in electric power generator rotors. Presently available materials with suitable high temperature magnetic properties have rapidly decreasing strength at temperatures above 1200°F.

The solution:

A cobalt-base alloy which combines both good high temperature strength and magnetic properties. The alloy has a composition in weight percent of 7-1/2 tungsten, 2-1/2 iron, 1 titanium, 1/2 zirconium, 1/2 carbon, and the balance cobalt.

How it's done:

Systematic alloying modifications were made to an earlier NASA alloy which had been developed for high temperature service as a structural material for space power systems. Magnetic induction was determined as a function of test temperatures up to 1800°F. This new alloy in the aged condition (72 hours at 1700°F) when exposed for 1000 hours at 1300°F has a magnetic induction of 8.4 kilogauss. Its coercive force in the aged condition was 10.5 oersteds at room temperature. At projected use temperatures of 1200°, 1300°, and 1400°F and a stress of 42,500 psi, the alloy has rupture lives up to 8000, 850 and 4 hours, respectively, in the aged condition. This alloy can be rolled into sheet form, and at 1300°F and 42,500 psi the stress rupture life of the annealed sheet was about 80 hours. This alloy compares favorably in stress-rupture prop-

erties with the strongest high temperature magnetic alloy commercially available today.

Notes:

1. This high temperature alloy may be used as construction material for electric motors and generators operating at high temperatures.
2. Additional details are contained in NASA Technical Note D-4338, *Development of a Cobalt-Tungsten Ferromagnetic, High Temperature, Structural Alloy*, by R. L. Ashbrook, Anthony C. Hoffman, Gary D. Sandrock, and Robert L. Dreshfield, 1967. Copies of this publication are available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151; price \$3.00.
3. Inquiries concerning this invention may be directed to:

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Reference: B68-10095

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA, Code GP, Washington, D.C. 20546.

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