NASA TECH BRIEF

Directionally Solidified Superalloy

Metallurgists and industries using metal alloys will be interested in a cast directionally solidified cobalt-tungsten superalloy with improved stress rupture characteristics.

Screened, arc-melted, cast binary alloys were alloyed with selected modifying elements and investment cast into stress rupture test bar clusters. A resulting composition that showed good behavior and properties was Co-15W. Appropriate additions were made to this base alloy using microprobe analyses and a fractional factorial experiment to aid in the selection of alloying elements.

The composition of the resulting superalloy was 85% Co-15W base, 10% Cr, 2% Zr, 2% Ti, and 1% C by weight. This yielded an approximate overall composition of 72.3% Co, 12.7% W, 10% Cr, 2% Zr, 2% Ti, and 1% C by weight.

Stress rupture cast bars of this superalloy with a diameter of 0.250 inch and a gage length of 1.25 inch were cast conventionally and unidirectionally on a water-cooled, copper chill block in a vacuum after vacuum melting. Stress rupture tests were carried out. The stress rupture properties of this modified Co-15W alloy in both the conventionally and unidirectionally cast form compared favorably with those of similar types of high quality cast superalloys.

Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price $3.00
(or microfiche $0.65)

Reference: NASA CR-89651 (N67-40235), Dependence of Stress Rupture and Superplasticity on Structure in Co-W Alloys
NASA-CR-89650 (N67-39657), Effects of Ti, Zr, and C on Structure and Properties of a Co-35W-3Cr-0.1B Alloy

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: J. F. Wallace of
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