

Parametric analyses of high-temperature data for aluminum alloys

Kaufman, J. Gilbert, author

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Abstrak

The book is intended to be a handbook, a general reference, and a textbook. It contains the background educational materials on parametric analyses, extensive data, and previously unpublished master high-temperature curves for wrought and cast aluminum alloys.

ASM International has previously published extensive numeric factual data on the high-temperature tensile and creep properties of aluminum alloys in the book *Properties of Aluminum Alloys: Tensile, Creep, and Fatigue Data at High and Low Temperatures*. In addition to interest in the properties themselves, there is a great amount of interest in how these properties are analyzed to provide estimates of long-time service performance. The latter analysis makes use of parametric time-temperature relationships based upon rate-process theory, enabling the user to combine all time-temperature exposure curves into one master curve useful for extrapolation as well as interpolation. The purpose of this book to explain and illustrate such analytical tools, and to provide a broad range of illustrative examples based upon data from the previous publication, plus much previously unpublished data from Alcoa Laboratories.

The theory of and procedures for the development of master parametric relationships for high-temperature creep and stress rupture data for aluminum alloys are based upon rate-process theory. The advantages and limitations of several such analyses will be discussed. Previously unpublished master curves will be provided for a number of aluminum alloys, including wrought alloys 1100, 2024, 3003, 3004, 5050, 5052, 5154, 5454, 5456, 5083, and 6061, plus several castings alloys, including 224.0, 249.0, C355.0, and 357.0.