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MILITARY HANDBOOK

**METALLIC MATERIALS AND ELEMENTS
FOR
AEROSPACE VEHICLE STRUCTURES**



AMSC N/A

FSC 1560

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FOREWORD

1. This military handbook is approved for use by all Departments and Agencies of the Department of Defense and the Federal Aviation Administration.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Chairman, MIL-HDBK-5 Coordination Activity (937-656-9134 voice, 937-255-4997 fax), AFRL/MLSC, 2179 Twelfth St., Room 122, Wright-Patterson AFB, OH 45433-7718, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of Chapter 1 or by letter if using the hard copy.

3. This document contains design information on the strength properties of metallic materials and elements for aerospace vehicle structures. All information and data contained in this handbook have been coordinated with the Air Force, Army, Navy, Federal Aviation Administration, and industry prior to publication, and are being maintained as a joint effort of the Department of Defense and the Federal Aviation Administration.

4. The electronic copy of the Handbook is technically consistent with the paper copy Handbook; however, minor differences exist in format, i.e., table or figure position. Depending on monitor size and resolution setting, more data may be viewed without on-screen magnification. The figures were converted to electronic format using one of several methods. For example, digitization or recomputation methods were used on most of the engineering figures like typical stress-strain and effect of temperature, etc. Scanning was used to capture informational figures such as those found in Chapters 1 and 9, as well as most of the S/N curves and the majority of graphics in Chapters 4 through 7. These electronic figures were also used to generate the paper copy figures to maintain equivalency between the paper copy and electronic copy. In all cases, the electronic figures have been compared to the paper copy figures to ensure the electronic figure was technically equivalent. Appendix E provides a detailed listing of all the figures in the Handbook, along with a description of each figure's format.

Custodians:

Army—AV
Navy—AS
Air Force—11
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EXPLANATION OF NUMERICAL CODE

For chapters containing materials properties, a deci-numeric system is used to identify sections of text, tables, and illustrations. This system is explained in the examples shown below. Variations of this deci-numerical system are also used in Chapters 1, 8, and 9.

Example A 2.4.2.1.1

General material category (in this case, steel)			
A logical breakdown of the base material by family characteristics (in this case, intermediate alloy steels); or for element properties			
Particular alloy to which all data are pertinent. If zero, section contains comments on the family characteristics			
If zero, section contains comments specific to the alloy; if it is an integer, the number identifies a specific temper or condition (heat treatment)			
Type of graphical data presented on a given figure (see following description)			

Example B 3.2.3.1.X

Aluminum			
2000 Series Wrought Alloy			
2024 Alloy			
T3, T351, T3510, T3511, T4, and T42 Tempers			
Specific Property as Follows			
Tensile properties (ultimate and yield strength)			1
Compressive yield and shear ultimate strengths			2
Bearing properties (ultimate and yield strength)			3
Modulus of elasticity, shear modulus			4
Elongation, total strain at failure, and reduction of area			5
Stress-strain curves, tangent-modulus curves			6
Creep			7
Fatigue			8
Fatigue-Crack Propagation			9
Fracture Toughness			10

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