Strategic Services

ESDU MMDH

Engineering Sciences Data Unit
Metallic Materials Data Handbook

The design engineer faces an ever-increasing demand for products with a performance that must be substantiated under stringent conditions of cost and environment. Assuming the basic skill of the designer, no other single factor can contribute more to the economic preparation of a satisfactory, competitive engineering design than ready access to good reliable design data.

Data concerning aerospace structural materials is widely scattered and, when located, is of variable quality and relevance to industrial applications. The task of collecting and evaluating all the relevant data available on a particular material property is time-consuming and therefore expensive. Even if such a task is performed, it is often found that the customer will wish to view the design, not against some locally derived data, but against what can be demonstrated to be the best data that can be ascertained and which are vouched for by a significant cross-section of the engineering and scientific community concerned with both derivation and application of materials data.

Accordingly, the MMDH has been prepared to meet design requirements with regard to aerospace structural metallic materials properties for both the designer and his customer and, by serving the needs of many, accomplishes the task at much lower cost and with a higher reliability than could the individual.

The methods of analysis and materials data provided in the MMDH are monitored and guided by ESDU Panel M with the approval of the Civil Aviation Authority, Safety Regulation Group. The Handbook is recognized as a valuable source of materials data by the Society of British Aerospace Companies (SBAC), and many of its member companies are involved in continually reassessing and defining the scope and focus of the content of the Handbook. The current constitution of Panel M is provided at the end of this article.

The collection, evaluation and analysis of the data in the MMDH were originally carried out at British Aerospace, Woodford, and are now carried out by Mr. A. P. Johnson. The work was initially funded by a United Kingdom Government contract and, since January 1986, has been funded by ESDU International plc. The Handbook was

Ministry of Defence Standard (Def Stan) 00-932 until August 1999 at which time, due to changes in the role of the Ministry of Defence in providing such standards, the Def Stan status was removed and the Handbook was renamed 'ESDU 00932, The Metallic Materials Data Handbook'.

Sections of the Handbook

Although this Handbook is intended primarily for use in aerospace applications, both military and civil, it is expected to be of use in a wide range of other applications. The data presented in this Handbook has been obtained through an extensive collection and evaluation exercise. The MMDH contains the following Volumes/Sections:

Introduction

1. Derivation and use of design data
2. Notation and definitions
3. Property relationships
4. Limitations and variations of allowable stresses
5. Standardised test procedures
6. Aluminium alloys
7. Copper alloys
8. Heat resisting alloys
9. Magnesium alloys
10. Corrosion resisting steels
11. Non-corrosion resisting steels
12. Titanium alloys

Sections 1 to 5 of the Handbook give the details of the presentation of the data, their statistical basis and interpretation, particularly with respect to airworthiness requirements, together with the standards of testing demanded. A full understanding of these five sections is necessary if proper use is to be made of the data provided in subsequent sections.

Sections 6 to 12 provide individual Data Sheets for each material specification. Each section deals with a well defined material group. The Handbook contains Data Sheets covering a wide range of materials in common use in the aerospace industry. Within each section, the Data Sheets are placed in alpha-numerical order. The format of the Data Sheets is standardised as much as possible. However, the wide range of materials and forms has necessitated many minor variations in presentation, all of which must be interpreted in strict accordance with Sections 1 to 5. Currently, all the dimensional values provided in the Handbook are presented in SI units. A list of factors for conversion from the British System of units is provided.

Each of Sections 6 to 12 is preceded by a Check List of Data Sheets and a Table of Related Specifications, followed by a list of the specifications for which data is provided, along with their form and condition, and, where applicable, their suitability for a particular purpose.

Metallic Materials Data Handbook

Section 6. Aluminium alloys

Preamble:

Support Documentation
Check list of Data Sheets on aluminium alloys
Table of related specifications for aluminium alloys

DTD specifications:

Spec	Form	Condition	Suitable for
DTD150	Forgings	T4	airscrew blades
DTD297	Bar, Extruded section, Forgings	O	
DTD372	Extruded bar, Extruded section	T4	welding

From the list of specifications, customers can select a specific specification and view property tables and figures. The properties covered include physical properties (thermal and electrical conductivity, coefficient of thermal expansion, etc.), composition, mechanical properties (strength, stiffness, proof stresses, etc.), and information on processability, for example, weldability by different methods. Graphs giving data on, for example, creep, creep- and stress-rupture, and the effects of elevated temperature are also included. All the data within MMDH is electronically searchable. As new data becomes available, the Data Sheets are amended and updated accordingly; changes are highlighted and details of a change can be obtained by clicking on the particular property. Alternatively, the superseded Data Sheet can be viewed in its entirety.

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