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D. B. SPALDING

Handbook of Heat Transfer. Edited by W. M. Rohsenow and J. P. Hartnett. Mc-Graw-Hill, New York (1973). 1518 pp., 908 illustrations.

THIS imposing volume was planned in the early nineteen sixties, before computer methods of analysis were well developed, when the value of having an internationally accepted system of units was still not widely recognised, and at a time when the U.S. space program attracted more attention than the environmental and energy crises. It reveals its date of conception by under-emphasis of numerical methods (there is no mention of "finite elements"), by tables presented in a miscellany of units, and by inclusion of space-oriented applications at the expense of terrestrial ones. All the authors work in the U.S.A.

To bring so large an enterprise to completion at all is an achievement which will have taxed the energies and negotiating powers of the editors; therefore one may regret, but should not censure, the non-uniformity of style (psi in the ammonia tables; in Hg in the air tables; lb/in^2 in the Freon and subcritical stêam tables; psia in the supercritical-steam tables; atm for gases; mm Hg for metals; lb/ft^3 for fluids in the saturated state; etc.), or the lack of balance (7 pages of text for basic concepts, 31 pages for analog methods, and 50 for high-temperature thermal-protection systems). The larger the number of participants in any enterprise, the more blemishes of construction one must expect, and tolerate.

The positive merits of this handbook are considerable; and many a teacher and research worker will find it the best place in which first to search for data, correlations and references. Of course, he will often have to go further; for example, the handbook cannot replace the Kays–London volume for compact-heat-exchanger data, or the Chemical Engineer's Handbook for property values and practical knowledge. However, its price is not incommensurate with its size; and its appearance is pleasing. The publisher and editors deserve the gratitude of the heat-transfer community.

D. B. SPALDING

D. T. JAMIESON, J. B. IRVING and J. S. TUDHOPE (Editors), **Liquid Thermal Conductivity: A Data Survey to 1973.** HMSO, Edinburgh (1975), 221 pp., Price £9.40.

THE HEAT-TRANSFER specialist, whether engaged in research or design, is very much dependent on accurate physical data for the materials with which he is concerned. Despite the enormous amount of work which has been carried out it is still surprisingly difficult to locate information for any but the commonest of substances. It is even more difficult to assess the reliability of the data when it has been located. This is not always appreciated, especially by the inexperienced; it is salutary to explore the background of some of the data appearing in handbooks, and used with confidence by countless workers; frequently it is based on a single experiment carried out many years ago, and on the occasions when more than one investigation can be tracked down a comparison between the different sets of data can be rather a shock. Thermal conductivity, particularly for fluids, is a prime example: crucial for much heat transfer work and notoriously difficult to measure with precision. The National Engineering Laboratory is to be congratulated in having collected into one volume a great mass of information on the thermal conductivity of about 850 liquids, including all types other than liquid metals.

Perhaps the most useful service that can be offered by the reviewer of a book of this kind is to explain just what it contains. The largest section, extending to over 80 pages, is concerned with organic liquids arranged in alphabetical order. The first entry reads as follows: "Name and formula, acenaphthene $C_{10}H_6(CH_2)_2$; Temperature, °C, 110·0; Thermal conductivity, ($mWm^{-1}K^{-1}$), 129·0; Temperature coefficient ($mWm^{-1}K^{-2}$), and range (°C), -0.084 (110 to 150); Grade, B; Note, 5; Reference, 37; Briggs 1957". "Note 5" is to be found in a collection of over a hundred such notes at the end of the book, and provides a brief account of the experimental method. "Grade B" means that the accuracy and reliability are likely to be within $\pm 5\%$; the other grades used in the book are A for $\pm 2\%$, and C, for worse than $\pm 5\%$. The temperature coefficient is for use in a linear relation, and the range indicates the limits within which such a relation is likely to afford data within the stated accuracy.

For some substances a single entry is all that can be provided, but for many of the commonest the list is very long, for instance there are over 40 for benzene and carbon tetrachloride. In such cases the entries are grouped in descending order of grade: benzene has eight entries in grade A, 28 in grade B and eight in grade C. Table 2 deals with inorganic liquids, but here the treatment is quite different: no attempt is made to list all the published observations individually, but recommended values are tabulated over as wide a range of temperatures as possible. Thus the first entry, for ammonia, merely quotes two key references, and gives data at ten degree intervals between 270 and 390 K. Twenty-nine liquids, including liquefied gases, are covered in two pages. Tables 3 and 4 return to the