

# BOOKS

**Flowmeters, A Basic Guide And Source-Book For Users**, Alan T. J. Hayward, John Wiley & Sons, New York (1979). 197 pages, \$24.95.

This interesting book is intended as a reference for those practicing engineers and managers who must select or specify flowmeters for application in the transmission and/or process industries. The author's main intent is to sufficiently describe most important types of flowmeters and their suitability in numerous circumstances, allowing the reader to make intelligent choices. Mr. Hayward is former Deputy Head of the Flow Measurement Division at the National Engineering Laboratory, at East Kilbride, Scotland.

Each chapter includes a list of pertinent references to more detailed literature on the subject(s) discussed. Where appropriate, advantages and disadvantages of each device are presented.

The first two chapters give a casual review of the fundamental principles of fluid phenomena and flow measurement. With only twenty pages covering fluid properties, flow regimes, velocity measurement, meter factors, coefficient of discharge, repeatability, accuracy, etcetera, it is obvious that many equations are left to the references.

Chapters three and four are concerned with various differential pressure meters, orifice plates, venturis, nozzles, target meters, rotameters, and some not-so-common devices. Basic descriptions are given, together with capabilities and limitations for each device.

Chapters five and six cover volumetric flowmeters, positive displacement meters, turbine meters, Pelton-Wheel meters, electromagnetic flowmeters, ultrasonic flowmeters, vortex-shedding meters, tracer meters, and other meters of this type. Sufficient detail is given concerning suitability, principles of operation and fine points for installation.

Chapter seven is devoted to velocity-type flowmeters, pitot tubes, propellers, vane anemometers, hot-wire anemometers, annubars, fluidic meters, insertion meters and similar equipment based upon fluid velocity measurement.

Chapter eight reviews special metering problems, measurement of pulsating flow, two-phase flow, cryogenic liquids, corrosive liquids, potable liquids, and wide range measurement. Considerable treatment of pulsating flow problems is welcomed by the practitioner. The author's

advice concerning two-phase flow metering is clear—"Don't"!

Chapter nine briefly comments on the author's criteria for meter selection, such as, how to narrow down the possible choices for particular applications. A cross-reference table is included as an aid in meter selection.

Chapter ten covers some common pitfalls in application and installation of flowmeters, such as bad installation conditions, disturbances upstream and downstream, entrained gases in liquids, cavitation, condensation of liquids from gases, wear and dirt. Guidelines for correcting or avoiding most of these problems are given, including safety advice.

Chapter eleven discusses calibration methods, such as master meters, provers, gravimetric devices, etcetera. These are quite fundamental in qualifying meters for critical service.

Chapter twelve covers instrumentation used in connection with flow measurement, such as, thermometry, density measurement, pressure measurement, etcetera. These techniques are very important, if the flow measurement is to be accurate.

Chapter thirteen, the finale, surveys the available sources of additional help and information, such as national standards agencies, government laboratories, industry committees, and short courses on flow measurement.

Though no single section is outstanding from the rest, it appears that the work is thorough, reasonably unbiased, and should be helpful to engineers beginning work in flow measurement, as well as to manager-engineers who need to refresh themselves on principles and types of meters for various applications. It should be included in the reference library of any instrument department.

Though not a factor in the above opinion of the contents of the book, the price appears out-of-line, approximately 12½ cents per page. This could deter some from purchasing the work. A more acceptable price would be in the neighborhood of \$12, rather than about \$25.

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**Spray Drying Handbook (Third Edition)** by K. Masters, 687 pages, George Godwin Limited (London) (1979); John Wiley & Sons (New York) (1979), \$79.95.

This 3rd edition, which has been correctly renamed a 'Handbook', constitutes a marked improvement over the earlier editions. The original format of five sections with a total of 18 chapters (discounting the appendices) has been retained. It continues to be largely descriptive in nature, with a strong emphasis on applications and should therefore be most useful to practising engineers. The section on rotary atomization (obviously the author's forte) is truly excellent. General conceptual design for open-and-closed-cycle drying systems is also particularly well treated.

The section on spray drying applications has been thoroughly updated and a treatment of the use of spray dryers as absorbers for the scrubbing of power station effluent gases constitutes a new and important addition.

A review of the patent literature is another important feature of the book, and this has been thoroughly updated. Finally, a brief but interesting history of spray drying has been given in the Introduction.

The book cannot be considered as a reference text for the worker or the researcher in the field. It offers even fewer references (435) than the first edition published in 1972 (520), in spite of the feverish research activity which has taken place in recent years, and many important references, published subsequently to 1976, have been left out, particularly those pertaining to the design and performance evaluation of spray-dryers by means of computer programs. The theoretical treatment continues to be weak, and considerations of flow pattern configuration and calculation, turbulence phenomena and secondary flows due to pressure distribution in the spray drying chamber have been completely left out, in spite of their governing importance in the design and optimization of spray drying equipment.

In spite of these minor weaknesses, this 3rd edition should be of considerable usefulness to chemical engineering students and practising engineers.

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