

Book reviews

Heinrich Groh (Ed.), *Explosion Protection: Electrical Apparatus and Systems for Chemical Plants, Oil and Gas Industry, Coal Mining*, Elsevier/Butterworth-Heinemann, Oxford, UK, 2004, 539 pp. (US\$ 74.95, ISBN: 0-7506-4777-9).

Explosion protection is a process of utilizing science and engineering for the avoidance of ignition sources in areas endangered by combustible gases, vapours, mists or dusts when contacted with oxygen from the air. The science began, the author notes, in 1815 with the creation of Sir Humphrey Davy's lamp. Since then, considerable advances have been made in the engineering of safe electrical equipment to be used in hazardous areas. The focus of the book is the prevention of explosions due to electrical apparatus and systems in hazardous areas.

The book evolved from a series of explosion protection courses taught by the author to personnel in chemical plants. Dr. Groh describes the book's contents (in the preface) thusly:

The book is organized into three parts (Chapters 1–5, 6–8, 9–12) and a bibliography followed by an extensive index. The first chapter gives an introduction into basic physics – the determination of ignition temperatures and energies, of the maximum experimental safe gap and other safety-related data, and summarizes these values into tables and diagrams. Chapter 2 deals with the classification of hazardous areas into 'zones' according to national and international standards or directives. In addition, a survey of standards for zones 0, 2 and 20–22 as well as for M1-equipment closes this chapter. In Chapter 3, national and international standardization for zone 1 and approval procedures are described, including European Harmonization, the 'New Approach' – ATEX 100a-Directive – and the IECEx-Scheme. Chapter 4 presents the grouping and classification of combustible substances according to their safety-related data, e.g. ignition temperature and maximum experimental safe gap. Chapter 5 closes the first part with marking requirements according to international standards or directives and deals with selection aspects related to explosion-protected apparatus.

Part two – as the main part of the book – starts with Chapter 6. Here, detailed descriptions of the different types of explosion

protection are given, combined with illustrations of today's explosion-protected apparatus. Chapter 7 deals with modern contents of 'pressurization'. According to those, an internal release of combustible substances can be handled in a safe way by dilution, and a draft standard for 'manned' pressurized enclosures has been published for voting. Closing the second part, Chapter 8 describes type testing procedures for 'flameproof enclosure, d' or 'intrinsic safety, i', accompanied by a description of partial discharge measurements, a highly efficient test method for monitoring the quality of insulation materials in electrical apparatus.

In the final part of the book, focal points are financial considerations (Chapter 9), inspection, maintenance and repair of explosion-protected apparatus (Chapter 10), apparatus for installation in zone 0 and in zone 2 (Chapter 11) and cable protection systems, especially for underground installations in coal mines (Chapter 12).

Groh discusses both theory and practice. The technical (mathematical) basis for explosion protection is well developed. The theory and practice are well illustrated with numerous figures and photographs of installations.

The book is written, I believe, for European utilization as the standards and code references are European, although at one point US and Canadian standards are cited. Additionally, most of the references are to European publications and many of the citations are written in German which is not surprising since the author is German although several of the paper citations are from the *Journal of Hazardous Materials*.

One of the goal of this book is to guide engineers on the selection of equipment to suit the required level of safety and thus avoid overspending on high specification equipment that is not necessary. Another feature is the provision of information on inspection and maintenance of explosion-protected equipment. I believe the book will be of significant interest to engineers in the field.

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