



Books

Corrosion-Resistant Linings and Coatings

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Marcel Dekker, New York, NY,
427 pp., \$175, 2001

Linings and coatings are frequently used to provide corrosion protection to process equipment and structures made of carbon steel, concrete or other substrates. Process equipment made of carbon steel and protected with appropriate linings and coatings is usually more economical than the same equipment fabricated of an alloy or more corrosion-resistant metal, such as titanium or tantalum. This book presents a thorough discussion of the various types of linings and coatings that can be used to provide corrosion resistance. Each chapter follows, for the most part, a similar format that includes physical, mechanical, and corrosion-resistant properties, as well as areas of application, for each of the materials discussed. Also included are discussions of vessel-design practices and surface preparation, which are of critical importance to ensure that the lining or coating will not fail in service.

The book consists of 18 chapters and a rather short subject index. Chapter 1 is an introduction to linings and discusses various aspects such as thin, thick and sheet linings; permeation; liquid absorption; environmental stress cracking; lining selection; lining systems; and lining specification. A general discussion of sheet linings is presented in Chapter 2, including the following topics: causes of lining failure; vessel-shell design and preparation; liner design considerations; bonded and unbonded linings; inspection of linings; and installation at the site.

Chapters 3 and 4 discuss specific thermoplastic sheet-lining materials and specific elastomeric sheet linings, respectively. Both chapters contain thorough discussions of the various types of sheet linings, including their advantages and disadvantages, tables of physical and mechanical properties, and compatibility with selected corrosives.

A general review of liquid-applied linings, including topics such as design of the vessel, lining selection (liquid lining types), vessel-shell construction and preparation, lining application, inspection of the lining, safety during application, causes of failure, and vessel operating instructions that spell out the operating temperature limitations and cleaning instructions is presented in Chapter 5.

In Chapter 6, specific liquid-applied lining materials are discussed in detail, including their chemical composition, trade names, application suitability, and compatibility with selected corrosives.

Masonry linings are discussed in good detail in Chapter 7, which covers the following subjects: metal-shell design considerations; application in concrete vessels; membranes; masonry materials; various types of brick; cellular borosilicate glass; and various types of mortars. Chapter 8 is a short, but informative, discussion of glass linings, such as those used for glass-lined process equipment. Chapter 9 presents tables of comparative corrosion resistance of lining materials for 71 pure chemicals and solutions.

An introduction to coatings is presented in Chapter 10, which discusses principles of corrosion protection, corrosion cells, EMF corrosion protection, cathodic-control protection, anodic-control protection, and resistance-control protection. In Chapter 11 the author discusses the principles of coating application, including topics such as rheology, viscosity behavior, surface tension, wetting, coalescence, sagging and slumping, surfactants, leveling, adhesion, and detection of adhesion defects. Chapter 12 covers corrosion protection by organic coatings. Topics discussed include: composition of organic coatings; surface preparation; application methods; factors affecting life of the film; types of corrosion under organic coatings; causes of coating failure; and maintenance of coatings.

A review of specific organic coatings is offered in Chapter 13, including thermoplastic resins, thermosetting resins, auto-oxidative cross-linking paints, bituminous paints, and zinc-rich paints. Criteria for selecting a paint system are discussed in Chapter 14. Chapter 15 discusses conversion coatings (coatings in which the substrate metal provides ions that become part of the protective coating). Metallic coatings are discussed in good detail in Chapter 16, which describes methods of producing coatings and various types of metal coatings.

Chapter 17 offers a short discussion of cementitious coatings, such as silicates, calcium aluminate and Portland cement. The final chapter is concerned with coatings for concrete, and discusses surface preparation, coating selection, installation of coatings and various types of coatings used.

This book contains a wealth of information on corrosion-resistant linings and coatings, including many useful tables. It covers all aspects of the subject, and is a most valuable reference source for any chemical engineer who has to select, specify and install these types of linings and coatings.

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