Fuel Furnaces And Refractories By Op Gupta 2017

Furnace designers and refractory engineers recognize that optimized furnace superstructure design and refractory selection are needed as glass production furnaces are continually striving toward greater output and efficiencies. Harsher operating conditions test refractories to the limit, while changing production technology (such as the conversion to oxy-fuel from traditional air-fuel firing) can alter the way the materials perform. Refractories for both oxy- and air-fuel fired furnace superstructures are subjected to high temperatures during service that may cause them to excessively creep or subside if the refractory material is not creep resistant, or if it is subjected to high stress, or both. Furnace designers can ensure that superstructure structural integrity is maintained if the creep behavior of the refractory material is well understood and well represented by appropriate engineering creep models. Several issues limit the abilities of furnace designers to (1) choose the optimum refractory for their applications, (2) optimize the engineering design, or (3) predict the service mechanical integrity of their furnace superstructures. Published engineering creep data are essentially non-existent for almost all commercially available refractories used for glass furnace superstructures. The limited data that do exist are supplied by the various refractory suppliers. Unfortunately, these suppliers generally have different ways of conducting their mechanical testing and they also interpret and report their data differently; this makes it hard for furnace designers to draw fair comparisons between competing grades of candidate refractories. Furthermore, the refractory supplier's data are often not available in a form that can be readily used for furnace design and for the prediction and design of long-term structural integrity of furnace superstructures. With the aim of providing such comparable data, the US DOE's Office of Industrial Technology and its Advanced Industrial Materials program is sponsoring work to conduct creep testing and analysis on refractories of interest to the glass industry. An earlier stage of the project involved identifying which refractories to test and this is described elsewhere. Conventional silica was one such identified refractory category, and the present report describes the creep behavior of this class of refractories. To portray a more complete understanding of how these refractories perform at service temperatures, their fundamental corrosion resistances, dimensional stabilities, and microstructure were characterized as well.

Furnace designers and furnace/refractories engineers recognize that improved optimization of furnace superstructure design and the use of appropriate refractories are needed as glass production furnaces are continually driven toward greater output and energy efficiencies (and concomitant harsher operating conditions). The conversion to oxy-fuel from traditional air-fuel-firing is a means to meet these objectives. Refractories for both oxy- and air-fuel-fired furnace superstructures are subjected to high temperatures during service and may appreciably creep or subside if the refractory material is not creep resistant or if it is subjected to high stress. Furnace designers can ensure that superstructure structural integrity is maintained or predicted if the creep behavior of the refractory material they are using is well-understood and well-represented by appropriate engineering creep models. Several issues currently limit the abilities of furnace designers to choose the best refractory for their application, optimize the engineering design, or predict the service mechanical integrity of their refractory superstructures. Published engineering creep data are essentially nonexistent for almost all commercially available refractories used for glass furnace superstructures, and the various refractory suppliers supply the limited data that does exist. Unfortunately, these suppliers typically conduct their mechanical testing differently, and interpret and report their obtained data differently, making it difficult for furnace designers to compare competing grades of candidate refractories in an equitable fashion. Furthermore, the refractory supplier's data is often not in an available form that can be used for furnace design, modeling, or the prediction of long-term structural integrity of furnace superstructures. The intent of this project was to meet needs in the topical areas of the Energy Efficiency and Environment. For example the application of oxy-fuel fired furnaces for glass production have several benefits over the use of currently used regenerative furnaces. The NOx emission is an order of magnitude less for oxy-fueled furnaces compared to conventional regenerative furnaces. The particulate level is much less as well. The capital cost per ton of glass pulled is approximately 50% and 67% less for oxy-fueled furnaces compared to conventional regenerative and all electric furnaces, respectively. The downside to oxy-fuel fired furnaces is that their higher operating temperatures and alkali partial pressures in an oxygen-rich environment hastens alkali-induced corrosion (particularly in silica refractories); this necessitates that refractories with both increased creep and corrosion resistance be used in their superstructure. Through this project, the high temperature mechanical behavior of spinel refractories was quantified and modeled to aid in the efficient design of furnace superstructures; thus, realizing the beneficial energy and pollutant savings oxy-fuel firing may yield.

This book provides a state-of-the-art collection of papers presented at the 67th Conference on Glass Problems at The Ohio State University, October 31-November 1, 2006. Provides a state-of-the-art collection of recent papers on glass problems as presented at the 67th Conference on Glass Problems. Sections on furnaces, refractories, raw materials, and environmental issues are included.

Dieses amerikanische Standardwerk wurde vom Übersetzer angepaßt auf die deutschen Verhältnisse. Es bietet wertvolle Informationen für Installation, Betrieb und Wartung, technische Details der Auslegung, Kennzahlen und vieles mehr.

This book provides process engineers with all of the information necessary for installation, maintenance and management of refractory in a cement industry. It describes how to characterize the refractory material and select refractories for various equipments in the cement plant. The author explains refractory installation, in general, and the rotary kiln specifically, as it is distinct from static furnaces used in metallurgical or process industries. It also details the chemical and physical factors that influence refractory performance and has discussed the mechanism of degradation of refractories with special emphasis on thermo-chemical and thermo-mechanical aspects. The heat transfer calculation and energy loss from the equipment surfaces has been addressed. A chapter in the book is dedicated for the management of refractory quality and the installation quality at the site. Maximizes reader understanding of the operating conditions in different equipments and how those are related to selection of refractories; Details the process variables and their influences on the performance of the refractories; Elucidates subtle points of refractory installation to ensure optimal performance; Presents heat transfer calculations and quality management protocols of refractory installation. Reinforces the concepts with many illustrations and tables.

Fuels, Furnaces and RefractoriesInternational Series on Materials Science and TechnologyElsevier

The book provides process engineers, an insight into refractories focusing on its importance and requirements in chemical process industries such as refinery and petrochemicals, syngas manufacturing, coal gasification, limestone calcinations, carbon black, glass, and cement production. Additionally the book discusses the refractory requirements for the CFBC boiler, and waste heat utilization process to generate steam. The book describes characterization of refractory material and selection process of the refractory for lining different equipments pertaining to the chemical process industry. The book covers refractory installation techniques, and the precautions to be taken during installation are discussed in detail along with the theoretical background. It explains the physical and chemical factors that influence the performances of refractory, mechanism of its degradation in service and emphasizes on the thermo-chemical and thermo-mechanical aspects and their role in that process . The content lays out different methods of monitoring Refractory lining conditions while the furnace is in operation and also elucidates few methods to repair the worn out lining without taking a shutdown. The scheme of investigation of a refractory failure is an added feature.

Present day technology is vibrant and changing rapidly. But the essential characteristics remain the same; when a fuel is burnt, the aim will always be to completely burn it and derive maximum heat out of it. A furnace and its refractory linings are must to utilize the fuel. When the fuel is burnt and some process(s) are performed in the furnace, it becomes a consequential necessity to measure the temperature in the furnace, to have a proper control over the operations. An effort is made to give the students a deep insight into the utilization of fuels, with some fundamentals, essential to have a grasp of the subject. This book thus tries to encompass the fuel utilization to a satisfactory level. Salient features - Units are converted to S.I. Units from CGS or FPS systems - More material is added in Nuclear and Solar Energy topics

VI Es ware unmoglieh, hier die vielen Personen und Firmen aufzuzah len, die uns dadureh halfen, daB sie uns gestatteten, ihre Arbeiten zu zi tieren, uns Auskiinfte gaben oder Abbildungen zur Verfiigung stellten. Ihre Namen finden sieh in dem Literaturverzeiehnis, das alphabetiseh geordnet und so mit dem Autorenverzeiehnis kombiniert ist. Es konnten nieht alle Masehinen, Apparate oder Produkte besehrie ben oder abgebildet werden, wir hoffen aber, eine gute Auswahl getrof fen zu haben. Was an Auskiinften zur Verfiigung stand, hat oft die Auf nahme in dieses Bueh bestimmt. South Croydon, im.

Fundamentals of shipboard machinery, equipment, and engineering plants are presented in this text prepared for engineering officers. A general description is included of the development of naval ships, ship design and construction, stability and buoyancy, and damage and casualty control. Engineering theories are explained on the background of ship propulsion and steering, lubrication systems, measuring devices, thermodynamics, and energy exchanges. Conventional steam turbine propulsion plants are presented in such units as machinery arrangement, plant layout, piping systems, propulsion boilers and their fittings and controls, steam turbines, and heat transfer apparatus in condensate and feed systems. General principles of diesel, gasoline, and gas turbine engines are also provided. Moreover, nuclear power plants are analyzed in terms of the fission process, reactor control, and naval nuclear power plant. Auxiliary equipment is also described. The text is concluded by a survey of newly developed hull forms, propulsion and steering devices, direct energy conversion systems, combined power plants, central operations systems, and fuel conversion programs. Illustrations for explanation purposes are also given.

This volume is part of the Ceramic Engineering and Science Proceeding (CESP) series. This series contains a collection of papers dealing with issues in both traditional ceramics (i.e., glass, whitewares, refractories, and porcelain enamel) and advanced ceramics. Topics covered in the area of advanced ceramic include bioceramics, nanomaterials, composites, solid oxide fuel cells, mechanical properties and structural design, advanced ceramic coatings, ceramic armor, porous ceramics, and more.

Naval Engineering Plants (19551990) takes a look back over a thirty-five year period of the fundamentals of shipboard machinery, equipment, and engineering plants. Engineering theories on the background of ship propulsion and steering, measuring devices, lubrication systems, and energy exchanges are explained. Conventional steam turbine propulsion plants are presented in propulsion boilers, steam turbines, and heat transfer apparatus in condensate and feed systems. Common principles of diesel, gasoline, and gas turbine engines are provided. Nuclear power plants are examined in terms of the fission process, reactor control, and naval nuclear power plant. This book covers a select period of engineering machinery and systems of ships. The reader will learn the operation and maintenance of main power plants and the associated auxiliary machinery and equipment for the propulsion of various ships, without the details. Inside, you will find a host of systems like diesel engines, gas turbines, boilers, steam turbines, heat exchangers, and pumps and compressors, electrical machinery; hydraulic machinery, refrigeration machinery, lubricating oil, compressed gas, and equipment for automation and control. An emphasis has been placed on helping the reader to acquire an overall view of Navy shipboard engineering plants from 1955 through 1990.

Written in a student-friendly manner, the book begins with the introduction to fuels, furnaces and refractories. It further exposes the reader to the different types of fuels with their testing methods. Besides covering the recent developments in the field of non-recovery coke ovens, dry coke cooling, use of coal in DRI and blast furnace, and new energy recovery system, the book also covers all the aspects of refractory systems. For better understanding of the text, the book includes a large number of illustrations. The book also facilitates a thorough understanding of different environmental issues associated with the use of fuel. Finally, the reader is made familiar with the Indian industrial scenario regarding fuels, furnaces and refractories.

Furnace designers and refractory engineers recognize that optimized furnace superstructure design and refractory selection are needed as glass production furnaces are continually striving toward greater output and efficiencies. Harsher operating conditions test refractories to the limit, while changing production technology (such as the conversion to oxy-fuel from traditional air-fuel firing) can alter the way the materials perform [1-3]. Refractories for both oxy- and air-fuel fired furnace superstructures (see Fig. 1) are subjected to high temperatures that may cause them to creep excessively or subside during service if the refractory material is not creep resistant, or if it is subjected to high stress, or both. Furnace designers can ensure that superstructure structural integrity is maintained if the creep behavior of the refractory material is well understood and well represented by appropriate engineering creep models. Several issues limit the abilities of furnace designers to (1) choose the optimum refractory for their applications, (2) optimize the engineering design, or (3) predict the service mechanical integrity of their furnace superstructures. Published engineering creep data are essentially nonexistent for almost all commercially available refractories used for glass furnace superstructures. The limited data that do exist are supplied by the various refractory suppliers. Unfortunately, the suppliers generally have different ways of conducting their mechanical testing, and they interpret and report their data differently. This inconsistency makes it hard for furnace designers to draw fair comparisons between competing grades of candidate refractories. Furthermore, the refractory suppliers' data are often not available in a form that can be readily used for furnace design or for the prediction and design of long-term structural integrity of furnace superstructures. As a consequence, the U.S. Department of Energy (DOE) Industrial Technology Program (ITP) Glass Industry of the Future sponsored research and development at industry, university, and national laboratory sites with the intent to help domestic glass manufacturers improve their energy and operating efficiencies. The optimization of furnace superstructure design using valid engineering creep data is a means to achieving these ITP goals. The present project at Oak Ridge National Laboratory (ORNL) aided in this endeavor by conducting creep testing and analysis on refractories of interest to glass manufacturers at representative service temperatures, enabling the availability of new and improved refractories by refractories suppliers and by generating creep data on equivalent refractories that furnace designers could use for optimizing the design of their superstructures or for predicting their long-term structural integrity. Similar refractory creep-testing projects have been conducted at ORNL [4-6], so many of the unique experimental nuances and difficulties associated with the high-temperature creep testing of refractories have been encountered and overcome.

Fuels, Furnaces and Refractories focuses on the sources and efficient use of energy available to modern industry. This book begins with the classification, properties, tests, and different kinds of fuels, as well as trends in fuel utilization. This text also tackles the generation and distribution of electricity from both chemical and nuclear energy sources. Subsequent chapters focus on the thermodynamics, physics, chemistry, and kinetics of combustion of fuels; the burner design; the heat transfer and flow of gases through furnaces and flues; and ways of controlling energy supply rates and temperatures. The refractory materials, which are heat-resisting substances, are also described.

Energy Technology is an integral part of the degree, postgraduate & diploma curriculum of various branches of engineering. besides, it is also a compulsory paper for various associate membership examination conducted by professional bodies like institution of engineering (AMIE), Indian Institute of Metals (AMIIM), Indian Institute of Chemical Engineering (AMIIChE), BEE etc. This book has been prepared strictly as per the syllabus of these examinations. Short questions & answer and multiple-choice questions & answers drawn from the examination papers of various engineering colleges and professional bodies examinations given at the end of the book enhances its utility for the student.

This book describes the essential features of refractory technology and is useful for degree & diploma courses in engineering. AMIE, AMIIM and IIChE examinations. Short question & answers and multiple choice question & answers drawn from the examination paper of various engineering colleges and professional bodies examinations given at the end of the book enhances its utility for the students.

The book provides, in a compact format, basic knowledge and practically oriented information on specific properties of refractory materials, on their testing and inspection, and on interpretation of test results. Tables and illustrations are used to clarify fundamental concepts on a comparative basis. This pocket format manual provides an overview of the diverse range of modern refractories and their application-relevant properties. Its main feature is a series of practice-derived articles by well-known authors in the field on the various material groups and their characteristic property data. The content has deliberately been kept concise and instructive, abstracting and more detailed works are referenced.

This book contains detailed description of solid, liquid, gaseous fuels, combustion and furnaces. Beside short questions and answers and multiple choice questions & answers and multiple choice questions; answers drawn from the examination papers of various engineering Colleges and professional bodies examinations are also included. The book will be useful for degree & diploma curriculum of various branches of Engineering and for various associate membership examinations conducted by professional bodies like Institution of Engineers (AMIE), indian Institute of Metals(AMIIM), Indian Institute of Chemical Engineers(AMIIChE), Institute of Chemicals etc.