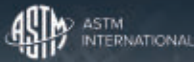




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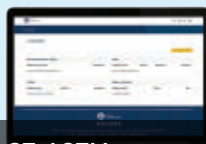
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Special Issue



Special Issue on Education and Curriculum for Smart and Sustainable Manufacturing

Editors: Jeremy L. Rickli, Yinlun Huang

Learn more about advances and outcomes of education initiatives, learning approaches, and curricula in smart and sustainable manufacturing systems in this special issue.

The featured peer-reviewed papers cover a broad spectrum of smart and sustainable manufacturing learning approaches and engineering disciplines, covering such topics as:

Key standards include:

- research experiences for undergraduates and teachers
- new teaching methods for smart and sustainable manufacturing
- community engaged teaching elements
- new programs or curriculum development to close the smart and sustainable manufacturing skill gap

103 Pages (2021); Price \$55
Stock # SSMS2102

ASTM Additive Manufacturing Technology Related Standards

Get the key standards you need to measure properties of additive manufacturing materials. Includes all the standards listed in the National Institute of Standards and Technology's (NIST) reports on additive manufacturing materials. This compilation of 128 standards is a useful guide for consumers, federal agencies, manufacturers, suppliers, trade and professional associations, and members of academia, and anyone working with AM materials, processes, and parts.

Key standards include:

- F2924, Standard Specification for Additive Manufacturing Titanium-6 Aluminum-4 Vanadium with Powder Bed Fusion
- F2971, Standard Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing
- F3122, Standard Guide for Evaluating Mechanical Properties of Metal Materials Made via Additive Manufacturing Processes
- F3049, Standard Guide for Characterizing Properties of Metal Powders Used for Additive Manufacturing Processes

With purchase of this compilation, you'll automatically receive a free subscription to ASTM's new journal Smart and Sustainable Manufacturing Systems.

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Special Issue

Special Issue on Smart and Sustainable Manufacturing in the Post-COVID-19 Manufacturing Era

Editors: Soundar Kumara, Manoj Kumar Tiwari, Yinlun Huang

This special issue features 21 peer-reviewed papers addressing post COVID-19 manufacturing. Authors from all over the world provide thought leadership and present possible actions from both practical and policy perspectives.

From the intricate details of manufacturing to the philosophical aspects of economy, the featured papers cover several areas.

Topics include:

- standardization of biotechnology platforms for vaccine production
- pandemic-proof factories
- artificial intelligence
- building resilient supply chains
- overcoming supply and demand chain inefficiencies
- self-engineering systems
- demand and supply of face masks
- standardization and smart manufacturing
- hybrid and sustainable manufacturing

107 Pages (2020); Price \$55
Stock # SSMS2003

Special Issue

Special Issue on Technology Infrastructure for Enabling Smart Manufacturing

Editors: Steven Shooter, Björn Johansson, Yan Lu, Hareesh Malkani, Seung-Jun Shi

Smart manufacturing experts from across the world provide their views on gaps, challenges, opportunities, and disruptive technologies in transitioning research to technology, products, and the marketplace in this special issue

Thirteen peer-reviewed articles give the latest information and trends, addressing such topics as:

- computer-aided manufacturing/ computer numerical control
- foundations of information governance
- analyzing manufacturing issues on factor floors
- enabling data of production systems for decision support
- privacy-preserving data mining
- deep neural network architectures for machining
- development of decision support systems
- microstructures in 3D-printed Ti-6Al-4V using acoustic emission cepstrum
- smart machining process monitoring
- process control for manual grinding operations
- hybrid concepts for factory layouts

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“Cellular Agriculture: An Outlook on Smart and Resilient Food Agriculture Manufacturing”

— Salil Bapat, Vishvesh Koranne, Neha Shakelly, Aihua Huang, Michael P. Sealy, John W. Sutherland, Kamalakar P. Rajurkar, and Ajay P. Malshe

“Evaluation of Robot Degradation on Human-Robot Collaborative Performance in Manufacturing”

— Vinh Nguyen and Jeremy Marvel

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Additive Manufacturing

Air Quality



STP1637

Structural Integrity of Additive Manufactured Parts

Editors:
Nima Shamsaei, Mohsen Seifi

This informative book features 29 peer-reviewed papers that were presented at the ASTM International Conference on Additive Manufacturing (ICAM 2020). A must-attend event for the AM industry, ICAM 2020 received over 325 abstracts, and included 150+ invited talks, 10 panel discussions, and close to 600 attendees representing industry, academia, and government from more than 30 countries.

You'll find detailed research from global AM experts, with a significant emphasis on nondestructive evaluation in-situ monitoring and process control of additively manufactured parts. Other key topics include:

- recent advances in standardization, qualification, and certification
- safety-critical applications
- the effects of design, process, and post-process parameters on fatigue and fracture properties
- optimization to improve the structural integrity of additively manufactured parts

432 Pages (2022); Price \$158
ISBN 978-0-8031-7721-5
Stock # STP1637
eBook ISBN 978-0-8031-7722-2
eBook Stock # STP1637-EB



STP1631

Structural Integrity of Additive Manufactured Materials and Parts

Editors:
Nima Shamsaei and Mohsen Seifi

The 24 peer-reviewed papers in this book were presented at the Fourth ASTM International Symposium on the Structural Integrity of Additive Manufactured Materials and Parts held in 2019.

A wide variety of topics were covered at the event, including a focus on design principles as well as qualification and certification challenges. The selected technical papers chosen for this volume delve further into:

- nondestructive evaluation in situ monitoring and process control of AM parts
- fatigue, fracture, tensile, and corrosion behavior of materials and parts fabricated using AM
- effects of design, process, and post-process parameters on fatigue and fracture properties
- process optimization to improve structural integrity of AM parts
- applicability of existing test methods to AM materials and parts and innovative approaches to standardization
- recent advances in standardization, qualification, and certification

378 Pages (2020); Price \$129
ISBN 978-0-8031-7708-6
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eBook ISBN 978-0-8031-7709-3
eBook Stock # STP1631-EB



STP1632

Asbestos and Other Elongate Mineral Particles

Editor(s):
James R. Millette, James S. Webber

Get this useful reference featuring the latest scientific information, technical ideas, and data interpretations related to air quality and sampling, analysis, management of asbestos, and other microscopic particles.

This special publication features 19 peer-reviewed papers covering six areas of interest:

- medical research, dose/response, toxicology
- sampling, exposure assessment
- environmental monitoring
- international and domestic analytical methods
- soils, natural occurrences of asbestos, and talc products
- mineralogy, asbestos analysis, quality assurance, and training

540 Pages (2021); Price \$181
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eBook Stock # STP1632-EB

Aviation



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TR1-EB

Autonomy Design and Operations in Aviation: Terminology and Requirements Framework

This document can serve as guidance to aviation-related ASTM technical committees as they discuss and develop standards related to increasingly autonomous systems in aviation. This document provides definitions related to automation, autonomy, artificial intelligence, and machine learning and a proposed framework that can be used to determine the appropriate applicability of various requirements to these systems. Specifically, this document will help standards committees produce a consistent and cohesive body of standards by providing harmonized terminology and a holistic framework for discussing and determining requirements for increasingly autonomous systems.

28 Pages (2019); Price \$60
eBook ISBN 978-0-8031-7115-2
eBook Stock # TR1-EB

TR2-EB

Developmental Pillars of Increased Autonomy for Aircraft Systems

Increased automation for aircraft systems holds the promise to increase safety, precision, and availability for manned and unmanned aircraft. Specifically, established aviation segments, such as general aviation and light sport, could utilize increased automation to make significant progress towards solving safety and piloting difficulties that have plagued them for some time. Further, many emerging market segments, such as urban air mobility and small unmanned (e.g., small parcel delivery with drones) have a strong financial incentive to develop increased automation to relieve the pilot workload, and/or replace in-the-loop pilots for most situations. Produced by members of the manned and unmanned small aircraft community, represented by ASTM task group AC 377, this work strives to suggest and describe certain fundamental principles, or “pillars”, of complex aviation systems development, which are applicable to the design and architectural development of increased automation for aviation systems.

45 Pages (2020); Price \$68
eBook ISBN 978-0-8031-7128-2
eBook Stock # TR2-EB

TR3-EB

Regulatory Barriers to Autonomy in Aviation

As technology advances and increased automation and autonomy in aviation become ever more within reach, it makes sense to turn our attention to the operational regulatory landscape within which these aircraft will be flown. Technical standards that could be part of the means of compliance for the airworthiness certification of these aircraft are receiving attention within a variety of standards development organizations (SDOs). The operational rules and their implications for autonomous aircraft, however, remain largely unexplored.

This effort is an in-depth exploration into one such operational rule, U.S.C. Title 14 Code of Federal Regulations Part 91—General Operating and Flight Rules (Amdt 91-349). As stated in 14 CFR §91.1, Part 91 rules govern the operation of aircraft within the United States National Airspace System*. Interpreting the Part 91 regulations required a clear understanding of the semantics, hence it was essential to include 14 CFR §1.1- General Definitions in the formal analysis as well.

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- Deltek (Formerly MASTERSPEC® and SPECTEXT®)
- BSD SpecLink®
- NFPA5000™ – Building Construction and Safety Code™ (NFPA)
- SPECTEXT® Master Guide Specifications
- Green Standards: [Federal Green Construction Guide for Specifiers, International Green Construction Code (IgCC), Green Globes®]
- American Welding Society: Structural Welding Code D1.1/D1M: 2020 (AWS)
- UL Global Standards
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Test methods included for sample and testing of the following materials:

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Performance, Properties, and Resiliency of Thermal Insulations

Editor(s): Diana Fisler, Marcin Pazera

Featuring nine peer-reviewed papers with state-of-the-art knowledge on topics related to performance of resiliency of thermal insulation materials in the built environment.

More frequent and extreme weather events, increasing global temperatures, and recently, a global pandemic, are stressing the ingenuity of the building industry and building professionals to respond. This book provides key information the industry needs, with separate sections on mechanical and pipe insulations and the building envelope and materials therein.

Sponsored by ASTM International Committee C16 on Thermal Insulation.

184 Pages (2021); Price \$76
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 eBook ISBN 978-0-8031-7705-5
 eBook Stock # STP1629-EB

**STP1636**

Standards Development for Cement and Concrete for Use in Additive Construction

Editor: Scott Z. Jones, Eric L. Kreiger

As the field of additive construction continues to grow exponentially, new standards will be needed for this expanding technology to ensure the safety of the public.

Sponsored by ASTM International Committee C09 on Concrete and Concrete Aggregates, this book provides the latest qualification procedures being proposed by researchers and practitioners and highlights where the industry will benefit from standardization.

177 Pages (2021); Price \$71

ISBN 978-0-8031-7718-5

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**STP1633**

Durability of Building and Construction Sealants and Adhesives: 7th Volume

Editor(s):

Christopher C. White, Hiroyuki Miyauchi

This compilation includes a selection of peer-reviewed technical papers which were presented at a symposium sponsored by ASTM International Committee C24 on Building Seals and Sealants and Subcommittee C24.01 on Terminology of Building Seals and Sealants. The goal of this symposium was to provide a forum for the global sealant and adhesives community to continue the discussion on the durability of structural and weatherproofing sealants and adhesives.

Topics of this STP cover aspects of sealant durability, which include:

- outdoor exposure
- characterization
- finite element modeling
- monitoring of critical properties
- development of accelerated testing; and
- relating accelerated testing to in-service performance and modeling of sealant durability.

265 Pages (2022); Price \$108

ISBN 978-0-8031-7712-3

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**STP1635**

Building Science and the Physics of Building Enclosure Performance: 2nd Volume

Editor:

Daniel J. Lemieux, Jennifer Keegan

This compilation contains peer-reviewed papers which were presented during the second of a two part symposium held in April and June of 2022 to provide a forum for the exchange of ideas on current research regarding building science and the physics of building enclosure and whole-building performance, including testing and assessment of building envelope heat, air, and moisture transfer, energy use, and our environment.

This symposium series is sponsored by Committee E06 on Performance of Buildings, Committee D08 on Roofing and Waterproofing, and Committee C16 on Thermal Insulation.

332 Pages (2022); Price \$129

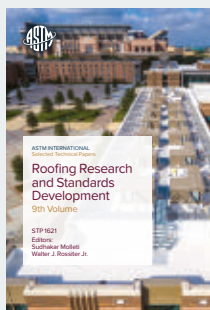
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Building and Construction



STP1621

Roofing Research and Standards Development: 9th Volume

Editors: Sudhakar Molleti, Walter Rossiter

Sponsored by ASTM International Committee D08 on Roofing and Waterproofing, the research presented in this book is consistent with the broad range of standards activities within the committee. Both practical and fundamental topics are addressed, with papers on:

- the impact of cool roof technologies upon heat wave meteorology and human health in Boston and Chicago
- validation of roofing membrane composition by NMR: products of ketone-ethylene ester and polyvinyl chloride
- the IBHS roof aging farm program
- the necessity of underlayment
- understanding walkability and grip to deck of roof underlayment
- lab conditioning methods for asphalt shingles
- the thermal impact of typical roof penetrations
- energy resistance of commercial roofs
- durability of polyolefin polymers in steep slope roofing underlayment materials
- effects of moisture in concrete roof decks on vapor retarder adhesion

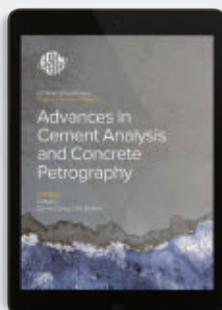
232 Pages (2020); Price \$86

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STP1613

Advances in Cement Analysis and Concrete Petrography

Editors: Derek Cong, Don Broton

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- Alkali-carbonate reaction (ACR)
- Alkali-silica reaction (ASR) and its assessment using damage rating index
- Determination of water-to-cementitious binder ratio using fluorescent techniques
- Quantitative determination of ground calcium carbonate in concrete
- Evaluation of particulate-based admixtures in hardened concrete
- Case studies in cement analysis and concrete petrography

The papers presented in this book were part of the international symposium on Advances in Cement Analysis and Concrete Petrography held in San Diego, CA, in June 2018.

214 Pages (2019); Price \$80

ISBN 978-0-8031-7671-3

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STP1615

Whole Building Air Leakage: Testing and Building Performance Impacts

Editors: Theresa Weston, Keith Nelson, Katherine Wissink

An important reference for design and construction professionals, this book features 16 peer-reviewed papers written by architects, engineers, testing agencies, code officials, contractors, and building owners from around the world. Topics addressed include:

Topics include:

- Benefits to building air tight buildings - energy saving, emissions reductions
- Methods and techniques for testing whole building air leakage
- Energy modeling
- Testing methods for new and existing buildings: low-rise, high-rise, multizone, single-zone, educational, residential, commercial, specialty use

310 Pages (2019); Price \$110

ISBN 978-0-8031-7675-1

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Cement and Concrete



ASTM Standards for Ready-Mixed Concrete

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- Architects
- Contractors
- Builders
- Testing labs
- Concrete manufacturers

Standards in this compilation, such as ASTM C94/C94M, are referenced in the ACI 318 Building Code for Structural Concrete and ACI 301 Specification for Structural Concrete, published by the American Concrete Institute as well as in most project specifications.

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STP1613 Advances in Cement Analysis and Concrete Petrography

Editors: Derek Cong, Don Broton

Learn more about new supplementary cementitious materials and recent developments in cement analysis and concrete petrography.

You'll get 12 peer-reviewed papers that cover a broad range of subjects related to material characterizations in the construction industry, including:

- Cement manufacturing process
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- Determination of water-to-cementitious binder ratio using fluorescent techniques
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Special Issue



ACEM 8(3) Special Issue on Concrete Using Seawater and Salt-Contaminated Aggregates

Editor: Prannoy Suraneni

Get a fundamental understanding of the science of concrete-mixed seawater and other similar materials in this special issue.

While very different from conventional Portland-cement concretes, concretes using seawater, salt-contaminated aggregates, and alternative cements such as calcium sulfoaluminate are a promising option in science and engineering. These concrete types may have significant value in locations like the Middle East, various coasts and islands, and in post-disaster reconstruction scenarios where fresh water is scarce.

This book features nine peer-reviewed papers on cementitious materials made using seawater, brine, other impure waters, and salt-contaminated aggregates.

Topics include:

- hydration behavior
- compressive strength
- corrosion and shrinkage
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Corrosion

Energy



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- methods for measuring corrosive compounds in air, soil, and concrete
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MNL20-2nd Corrosion Tests and Standards: Application and Interpretation: Second Edition

Editor(s): Robert Baboian

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Eight sections cover:

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- Testing for Corrosion Types
- Testing in Environment
- Materials Testing
- Testing in Industries
- Corrosion-Related Standards

882 Pages (2005); Price \$282
ISBN 978-0-8031-2098-3
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Environment



Special Issue



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Zirconium in the Nuclear Industry: 19th International Symposium

Editor: Arthur T. Motta
and Suresh K. Yagnik

Featuring 37 peer-reviewed and award-winning papers from industry experts that were presented at this 2019 symposium held in Manchester, United Kingdom.

Topics covered include:

- fabrication and alloy development
- mechanical behavior
- in-reactor behavior and irradiation effects
- corrosion
- hydrogen effects
- hydrides in zirconium alloys
- high-temperature transients and modelling of process or phenomenon

Sponsored by ASTM International Committee B10 on Reactive and Refractory Metals and Alloys and its subcommittee Zirconium and Hafnium.

942 Pages (2021); Price \$259

ISBN 978-0-8031-7079-7

Stock # STP1622

eBook ISBN 978-0-8031-7691-1

eBook Stock # STP1622-EB

Smart and Sustainable Manufacturing Systems Special Issue on Smart Manufacturing in Energy Intense Process Industries

Editor: Tom Edgar, Yinlun Huang

You'll get eight peer-reviewed papers in this first special issue of Smart and Sustainable Manufacturing Systems. State-of-the-art research in the key areas of smart manufacturing in the energy intensive process industries is presented, with topics that include:

- Natural gas-based hydrogen production utilizing hybrid energy resources
- Dynamic modeling and explicit control of a PEM water electrolysis process
- Stochastic programming approach versus estimator-based approach for sensor network design
- Data-based nonlinear model identification in economic model predictive control
- Proactive automation of a batch manufacturer in a smart grid environment
- Reliability of C-H-O symbiosis networks under source streams uncertainty
- Data-driven modeling and analysis of energy efficiency of geographically distributed manufacturing
- Manufacturing (IoTfM) enterprise software architecture

189 Pages (2018); Price \$55

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Medical Devices



STP1616

Fourth Symposium on Fatigue and Fracture of Metallic Medical Materials and Devices

M.R. Mitchell, Brian T. Berg, Terry O. Woods, Kenneth L. Jerina.

This collection provides 10 peer-reviewed papers covering fundamental mechanical response and fatigue methodologies applied for medical alloys and devices.

Topics include:

- NiTi alloys
- generalized fatigue of medical devices
- fatigue-to-fracture methodology
- fatigue of CoCr alloys
- additive manufacturing

171 Pages (2019); Price \$68
 ISBN 978-0-8031-7677-5
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 eBook Stock # STP1616-EB



ASTM Standards for Additive Manufacturing in Medical Devices

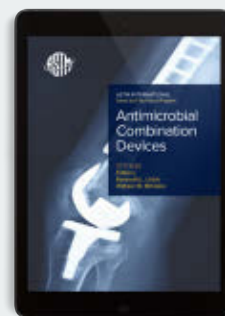
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Key standards include:

- **F2924** Standard Specification for Additive Manufacturing Titanium-6 Aluminum-4 Vanadium with Powder Bed Fusion
- **F2971** Standard Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing
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Guest Editor: Kenneth L. Urish and William M. Mihalko

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Metals



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Materials Performance and Characterization Special Issue on Materials for Extreme Environments, Part 1

Editors: S.V.S. Narayana Murty, Richard W. Neu

The need to develop materials that can perform well in severe operating environments is a major challenge for materials scientists, and it requires a fundamental understanding of material response under extreme conditions of heat flux, stresses, strain rates, and corrosive environments.

Learn about the latest advances in materials for extreme environments in the first part of this two-part special issue of Materials Performance and Characterization.

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Editors: S.V.S. Narayana Murty, Richard W. Neu

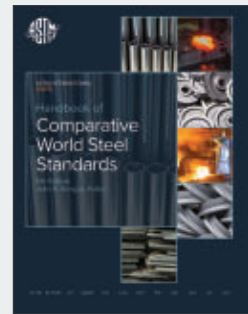
The need to develop materials that can perform well in severe operating environments is a major challenge for materials scientists, and it requires a fundamental understanding of material response under extreme conditions of heat flux, stresses, strain rates, and corrosive environments.

As a follow-up to Part 1 of this special issue published in 2021 (MPC2102), Part 2 features 18 new peer-reviewed papers.

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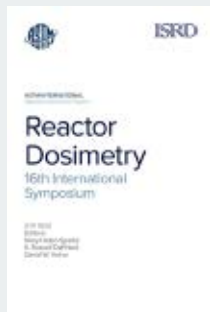
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Editors: Mary Sparks, K. DePriest, David Vehar

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Editor: Curtis Elsik

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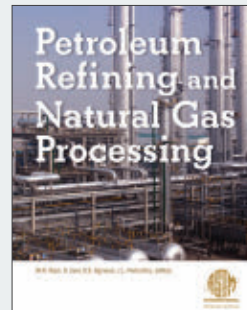
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Manual 58

Petroleum Refining and Natural Gas Processing

Editor: M.R. Riazi

This one-of-a-kind, comprehensive handbook provides the latest industry and research advances in petroleum refining, natural gas processing, and refinery management. Over 40 scientists, experts and professionals from both academia and industry have contributed to the 33 chapters in this handbook.

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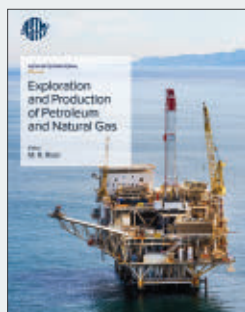
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Petroleum



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Exploration and Production of Petroleum and Natural Gas

Editor: M.R. Riazi

This manual highlights the most recent advances in petroleum upstream activities, with emphasis on:

- Economic and environmental considerations
- Production of unconventional oil and gas resources
- Drilling methods
- Offshore activities
- Future trends in the industry

With the current climate of increased world population and consumption, the knowledge of advances in petroleum technology is vital to keeping fossil fuel usage affordable and clean. This book will be useful for designers, researchers, operators, managers, decision-makers, business professionals and government officials.

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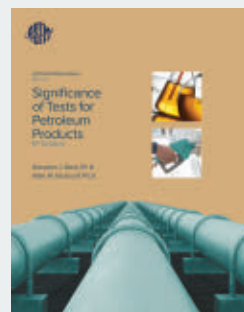
Monograph 12

U.S. Reformulated Spark-Ignition Engine Fuel and the U.S. Renewable Fuels Standard

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U.S. Reformulated Spark-Ignition Engine Fuel and the U.S. Renewable Fuels Standard was prepared by members of Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants. It was formerly known as Research Report D02: 1347.

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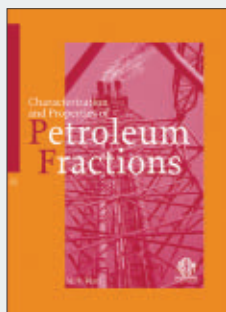
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Petroleum



Manual 50 Petroleum Fractions

Editor: M.R. Riazi

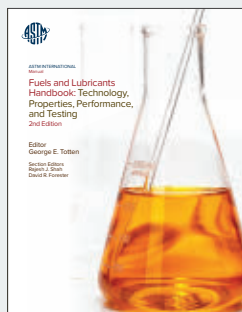
Both petroleum professionals and those without a technical engineering background will find this unique new manual to be a vital and comprehensive reference for the petroleum industry in both processing and production.

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- Discusses light and heavy, liquid and vapor, and low and high pressure systems
- Provides specific recommendations for each listed property and its applications
- Includes solved practical problems and presents exercise problems with a large number of actual data for oils from around the world.

This manual is a unique and comprehensive resource for professionals in the petroleum industry, research, and government, as well as environmental organizations and academia.

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Manual 37 2ND Fuels and Lubricants Handbook: Technology, Properties, Performance, and Testing

Editor: George E. Totten

Section Editors: Rajesh J. Shah,
David R. Forester

Get detailed assessments of crude oil sampling in this newly revised comprehensive manual.

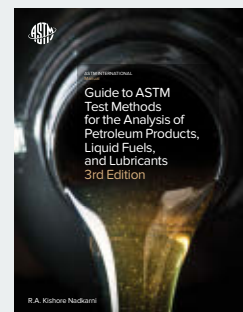
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1,686 Pages (2019); Price \$367
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New!



Manual 44 Guide to ASTM Test Methods for the Analysis of Petroleum Products, Liquid Fuels, and Lubricants: 3rd Edition

Editor: R. Nadkarni

Originally published in 2000, this new and enlarged third edition features over 130 new and 75 revised petroleum test methods published through 2018. Featuring the essential elements of all standard analytical tests used to characterize petroleum products and lubricants, this book is a useful tool for oil industry researchers, analysts, marketers, and regulators.

Brief descriptions of 600+ tests are described, including principles involved, test summary, advantages, limitations, and test precision data. Where available, equivalent tests from IP, ISO, JIS, DIN, and AFNOR are also referenced.

The test methods covered involve a variety of analytical techniques to identify and/or quantify over 220 chemical and physical properties of crude oils, gasoline, reformulated gasoline, lubricating oils, additives, transmission fluids, lubricating greases, gear oils, aviation fuels, diesel and heating fuels, petroleum waxes, marine fuels, and other specialty petroleum products.

406 Pages (2020); Price \$119
ISBN 978-0-8031-7122-0
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Petroleum

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Manual 68 2ND

Crude Oils: Their Sampling, Analysis, and Evaluation 2nd Edition

Editors: Harry N. Giles and Clifford Mills

Get detailed assessments of crude oil sampling in this newly revised comprehensive manual.

New for the second edition: discussion of new and revised ASTM standards, issues related to tight (unconventional) oil, advances in determination of crude oil properties.

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STP1624

Performance of Protective Clothing and Equipment: 11th Volume, Innovative Solutions to Evolving Challenges

Editors: Karen Lehtonen, Brian Shiels, R. Ormond

Get the latest information on the current and future state of the personal protective clothing and equipment industry. This book features 17 peer-reviewed papers from academic and industrial researchers. The papers were part of the ongoing symposia series sponsored by ASTM International Committee F23 on Personal Protective Clothing and Equipment that has spanned over 30 years.

Featured papers discuss the challenges facing those developing, testing, and using PPE, and the common goal of increasing protection for all users.

Topics include:

- the impacts of soiling and repeated laundering on protective clothing
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- PPE standards development

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Safety in Ice Hockey: 6th Volume

Editors: Terry Smith, Alan Ashare

The sixth volume of this important series presents the latest research on safety for researchers, coaches, players, parents, and anyone with a love and interest in the game.

Nine peer-reviewed papers provide key, timely information on preventing and decreasing the risk of both acute and long-term injury, particularly brain injury. With new technologies that provide further insight into the biomechanics of head impacts, we include research from experts related to other contact sports for a holistic and multi-disciplinary approach.

The research in this book will help provide better understanding of injuries and the mechanisms of those injuries, leading to better solutions and prevention techniques.

Discussions include:

- background and data to help identify injury patterns
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- clinical observations of injured players
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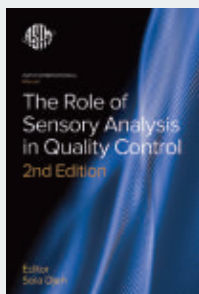
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Sensory Evaluation



Manual 14-2ND

The Role of Sensory Analysis in Quality Control: 2nd Edition

Editor: Olusola A. Ojeh

The first edition of this key industry resource was released in 1992. Since that time, the field of sensory evaluation has become further refined, expanding its capabilities and scope, and fueling the need for this new, updated edition.

Each chapter in this book addresses a key practical question affecting the implementation and success of a sensory quality program. Together they provide a comprehensive approach to sensory quality.

Topics include:

- objectives for plant sensory function in QA/QC programs
- establishing new plant sensory programs
- resource assessment
- methods
- sampling
- program implementation
- basis of sensory data for QC: sensory specification

79 Pages (2021); Price \$68

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New!



Manual 26-3RD

Sensory Testing Methods: 3rd Edition

Mona Wolf

Get this third edition of the classic Manual on Sensory Testing Methods, fully updated and revised with new authors and articles.

The science of sensory evaluation consists of a broad spectrum of methods and techniques that encompass psychology; statistics; product sciences, such as food science or cosmetic chemistry; other biological sciences; physics and engineering; ergonomics; sociology; and other mathematics, sciences, and humanities. Some of its most powerful methods require an understanding of how people use language and other communication.

Manual 26 gives the reader a general knowledge of sensory evaluation methods. It provides a base of practical techniques and the controls that are necessary to conduct simple sensory studies.

147 Pages (2020); Price \$68

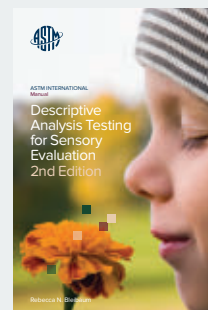
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New!



Manual 13-2ND

Descriptive Analysis Testing for Sensory Evaluation: 2nd Edition

Rebecca N Bleibaum

With new authors and fresh perspectives that bring a collective 250 years of experience to the sensory evaluation field, ASTM International announces its newly updated Manual on Descriptive Analysis for Sensory Evaluation.

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Get compelling information ranging from perceptual experience of a product to effective technical language that will help predict consumer behavior.

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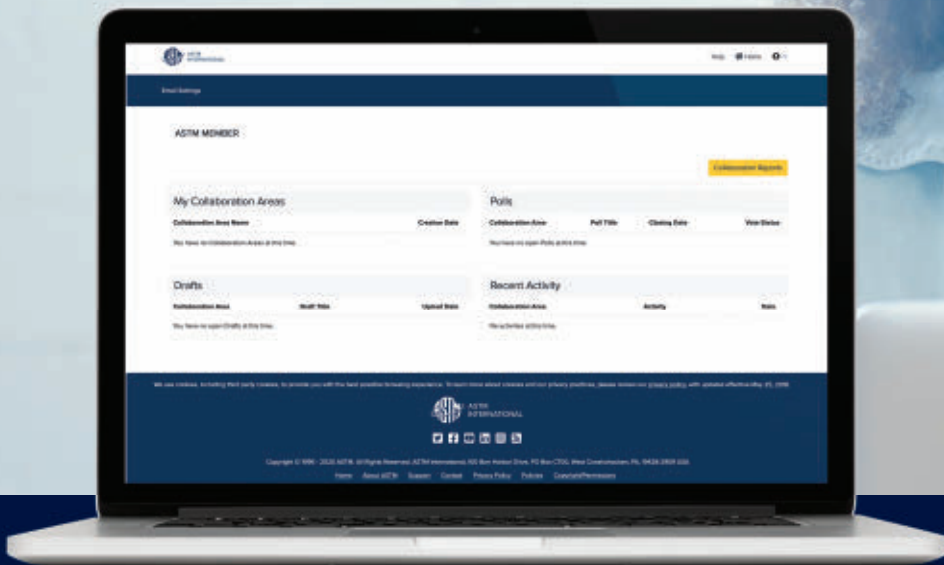
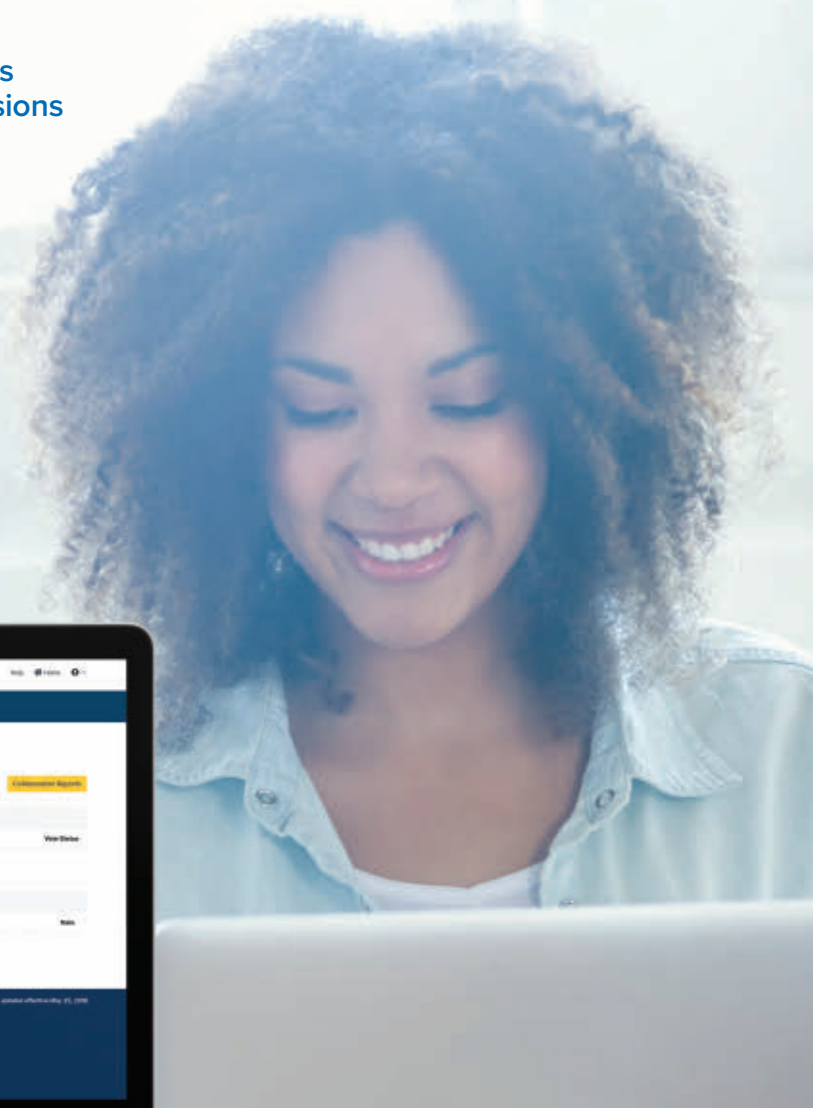
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01.06	Coated Steel Products	\$432	\$864	142	\$336	Feb
01.07	Ships and Marine Technology (I): F670 - F1511	\$451	\$902	115	\$352	Jan
01.08	Ships and Marine Technology (II): F1546 - latest	\$237	\$474	67	\$185	Jan
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02.03	Electrical Conductors	\$281	\$562	93	\$219	May
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03.03	Nondestructive Testing (I): B594 - E2373	\$437	\$874	164	\$341	Oct
03.04	Nondestructive Testing (II): E2374 - latest	\$205	\$411	73	\$159	Oct
03.05	Analytical Chemistry for Metals, Ores, and Related Materials	\$616	\$1,232	112	\$480	Oct
03.06	Molecular Spectroscopy and Separation Science; Surface Analysis	\$354	\$707	84	\$276	Oct
03.07	Magnetic Properties	\$220	\$440	52	\$172	April

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04.02	Concrete and Aggregates	\$452	\$905	194	\$353	Oct
04.03	Road and Paving Materials; Vehicle–Pavement Systems	\$575	\$1,150	301	\$449	June
04.04	Roofing and Waterproofing	\$344	\$689	180	\$269	June
04.05	Chemical–Resistant Nonmetallic Materials; Vitrified Clay Pipe; Concrete Pipe; Fiber-Reinforced Cement Products; Mortars and Grouts; Masonry; Precast Concrete; Stormwater Control Measures	\$571	\$1,143	252	\$445	June
04.06	Thermal Insulation; Building and Environmental Acoustics	\$648	\$1,295	227	\$505	Nov
04.07	Building Seals and Sealants; Fire Standards; Dimension Stone	\$571	\$1,143	210	\$445	Nov
04.08	Soil and Rock (I): D420–D5876/D5876M	\$650	\$1,299	183	\$507	Mar
04.09	Soil and Rock (II): D5878–Latest	\$584	\$1,169	190	\$455	April
04.10	Wood	\$419	\$838	92	\$327	July
04.11	Building Constructions (I): E72–E2166	\$774	\$1,549	150	\$604	Nov
04.12	Building Constructions (II): E2168–latest; Asset Management; Sustainability; Technology and Underground Utilities	\$493	\$985	171	\$384	Nov
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05.02	Petroleum Products, Liquid Fuels, and Lubricants (II): D4177–D6468	\$655	\$1,310	219	\$511	Mar
05.03	Petroleum, Liquid Fuels, and Lubricants (III): D6469–D7398	\$677	\$1,355	134	\$528	Mar
05.04	Petroleum Products, Liquid Fuels, and Lubricants (IV): D7412–D8128	\$571	\$1,142	167	\$445	Mar
05.05	Petroleum Products, Liquid Fuels, and Lubricants (V): D8144–latest; Combustion Characteristics; Manufactured Carbon and Graphite Products	\$554	\$1,107	108	\$427	Feb
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06.03	Paint—Pigments, Polymers, Resins, Naval Stores, Cellulosic Esters, and Ink Vehicles	\$471	\$942	141	\$367	Mar
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08.03	Plastics (III): D5117–Latest; Reinforced Plastic Piping Systems and Chemical Equipment; Plastic Building Products	\$605	\$1,210	229	\$472	July
08.04	Plastic Piping Systems (I): D1598–F2735	\$407	\$814	182	\$317	Jan
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10.03	Electrical Insulating Liquids and Gases; Electrical Protective Equipment	\$329	\$659	100	\$257	May
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11.04	Waste Management	\$339	\$677	103	\$265	Sept
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11.06	Environmental Biological Effects and Environmental Fate; Industrial Biotechnology	\$500	\$1,000	50	\$390	Aug
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Specifications and test methods cover the properties of various steel bars for specific or general applications. Standards focus on carbon and alloy steel axles, wrought carbon steel wheels, steel tires, and carbon and alloy steel forgings for railway use.

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Volume 02.02

Aluminum and Magnesium Alloys

882 Pages; 78 Standards; Available September

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The specifications in this volume cover aluminum, aluminum alloys, and aluminum-covered steel, including bars, rods, wire, shapes, castings, forgings, fasteners, pipes, tubes, sheet, plates, foil, and cable. It also includes ANSI H35.2 American National Standard on Dimensional Tolerances for Aluminum Mill Products.

Other standards fix the property requirements for magnesium-ingot and magnesium-alloy castings, including sheet, forgings, anodes, bars, rods, and shapes; these measure indentation hardness, shear testing, tension testing, and ultrasonic inspection.

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Electrical Conductors

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Volume 02.03 focuses on electrical conductors, primarily aluminum, aluminum-alloy, aluminum-covered steel, copper, copper-alloy, copper-covered steel, and steel wire. Various specifications define the required properties for stranded conductors and wire. Others detail the properties of aluminum-clad, copper-clad and core steel wire, as well as guys, messengers, and span wires.

Volume 02.04

Nonferrous Metals—Nickel, Titanium, Lead, Tin, Zinc, Zirconium, Precious, Reactive, Refractory Metals and Alloys; Materials for Thermostats, Electrical Heating and Resistance Contacts, and Connectors

1,368 Pages; 259 Standards; Available June

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Over half of the standards featured are specifications for nickel and nickel alloys which cover castings, forgings, pipe, tube, plate, sheet, strip, rod, bar, and wire. Also included are specifications for zinc, recycled zinc, zinc alloys, copper, gold, titanium, zirconium, and more.

Procedures for measuring such properties as cross curvature and flexivity of thermostat materials and resistance of electrical contacts to atmospheric corrosion also appear in this volume.

Volume 02.05

Metallic and Inorganic Coatings; Metal Powders and Metal Powder Products

1,128 Pages; 195 Standards; Available May

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Under the heading of metallic and inorganic coatings, specifications establish requirements for electrodeposited coatings of cadmium, tin, and mechanically-deposited zinc. This volume includes tests for measuring the properties of anodically-coated aluminum; determining coating thickness and corrosion; and electroforming, electroplating, and surface preparation.

Volume 02.05 features standards for metal powders and metal powder products. It includes test methods and specifications that deal with base metal powders, cemented carbides, refractory metal powders, density, flow rate, hardness, and particulate size. This volume also features standards for powder metallurgy (P/M) and metal injection molded (MIM) structural parts.



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Volume 03.02

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Offering procedures for measuring atmospheric corrosion, corrosion cracking, corrosion fatigue, natural waters and soil corrosion and in-plant corrosion, this volume also includes a joint ASTM/NACE standard and practices on assessing wear and erosion of materials and structures.

Volume 03.03

Nondestructive Testing (I): B594—E2373

1,424 Pages; 164 Standards; Available October

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Print ISBN 978-1-6822-1824-2; Stock # S030323
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Volumes 03.03 and 03.04 provide standards on non-destructive testing of engineering materials, structures and assemblies to detect flaws and characterize the properties of materials. NDT methods cover: Reference Radiological Images, Radiology (Neutron, X, Gamma), Digital Imaging, Acoustic Emission, Liquid Penetrant and Magnetic Particle, Electromagnetic, Leak Testing, and Ultrasonic.

Volume 03.04

Nondestructive Testing (II): E2374—latest

916 Pages; 73 Standards; Available October

Print \$159
Print ISBN 978-1-6822-1825-9; Stock # S030423
Online \$205; Stock # VX0304

Volumes 03.03 and 03.04 provide standards on non-destructive testing of engineering materials, structures and assemblies to detect flaws and characterize the properties of materials. NDT methods cover: Reference Radiological Images, Radiology (Neutron, X, Gamma), Digital Imaging, Acoustic Emission, Liquid Penetrant and Magnetic Particle, Electromagnetic, Leak Testing, and Ultrasonic.

Volume 03.05

Analytical Chemistry for Metals, Ores, and Related Materials

1,098 Pages; 112 Standards; Available October

Print \$480
Print ISBN 978-1-6822-1826-6; Stock # S030523
Online \$616; Stock # VX0305

Includes procedures for obtaining and reporting chemical analyses of ferrous and nonferrous metals, metal-bearing ores, and refractories. Also covers analytical equipment, practices for conducting proficiency tests, and reporting statistical test results.

Volume 03.06

Molecular Spectroscopy and Separation Science; Surface Analysis

858 Pages; 84 Standards; Available October

Print \$276
Print ISBN 978-1-6822-1827-3; Stock # S030623
Online \$354; Stock # VX0306

Covers chromatography, fiber optics, waveguides, infrared spectroscopy, molecular luminescence, uv and visible spectroscopy. Addresses surface analysis and auger electron spectroscopy, X-ray photoelectron spectroscopy, and ion beam sputtering.

Volume 03.07

Magnetic Properties

400 Pages; 52 Standards; Available April

Print \$172
Print ISBN 978-1-6822-1828-0; Stock # S030623
Online \$220; Stock # VX0306

Under the heading of magnetic properties and materials, this volume contains standards on property requirements and measurement techniques for magnetic materials, primarily electrical steel. It includes tests for determining alternating current and direct current properties.

Section 4 Construction



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930 Pages; 146 Standards, Available September

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Print ISBN 978-1-6822-1931-7; Stock # S040123
Online \$402; Stock # VX0401

Volume 04.01 features specifications and test methods that establish the property requirements and measurement procedures for hydraulic cements, including portland, natural, pozzolanic, masonry, rapid hardening, and slag. It includes standards that define the appropriate qualities of lime and limestone and how to analyze them for environmental and industrial uses. The remaining standards address gypsum and related building materials and systems, including application procedures and related accessories, including exterior insulation and finishing systems (EIFS). ASTM's Manual of Cement Testing, a valuable companion to these standards, also appears in this volume.

Volume 04.02 Concrete and Aggregates

1,208 Pages; 194 Standards; Available October

Print \$353
Print ISBN 978-1-6822-1932-4; Stock # S040223
Online \$452; Stock # VX0402

This volume includes test methods, specifications, and practices on concrete and concrete aggregates, curing materials, grout, and expansion joint fillers. These standards address abrasion testing, fluid penetration, chemical admixtures and reactions, concrete for radiation shielding, evaluation of data and laboratories, petrography, self-consolidating concrete, pervious concrete, and more. It also includes the ASTM Manual of Aggregate and Concrete Testing.

Volume 04.03 Road and Paving Materials; Vehicle-Pavement Systems

1,974 Pages; 301 Standards; Available June

Print \$449
Print ISBN 978-1-6822-1933-1; Stock # S040323
Online \$575; Stock # VX0403

Specifications, tests, and practices examine the properties of various road and paving materials and explain how to measure their characteristics.

They cover aggregates, asphalt mixtures, bridges, and structures; as well as highway traffic materials, such as retroreflective sheeting and pavement markers.

It also includes standards on vehicle-pavement systems, including field methods for measurement of tire pavement friction, measurement and control of roughness in construction and rehabilitation of pavements, surface characteristics related to tire pavement slip resistance, and tire characteristics.

Volume 04.04 Roofing and Waterproofing

812 Pages; 180 Standards; Available June

Print \$269
Print ISBN 978-1-6822-1934-8; Stock # S040423
Online \$344; Stock # VX0404

Specifications, test methods, and practices focus on roofing and waterproofing materials such as asphalt roof coatings, single-ply membranes, underlayments, roll, sheeting, and EPDM roofing materials. Standards also cover bituminous emulsions; felts and fabrics; nonbituminous organic roof coverings; prepared roofings, shingles, and siding materials; roofing membrane systems; solvent-bearing bituminous compounds; surfacing and bituminous materials for membrane waterproofing.

Volume 04.05 Vitrified Clay Pipe; Concrete Pipe; Fiber-Reinforced Cement Products; Mortars and Grouts; Masonry; Precast Concrete; Stormwater Control Measures

1,628 Pages; 252 Standards; Available June

Print \$445
Print ISBN 978-1-6822-1935-5; Stock # S040523
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Included in this volume are standards on mortar and grout for masonry construction and manufactured masonry units. Volume 04.05 also features specifications for concrete pipe, joints, manholes, vitrified clay pipe, clay drain tile, fiber-reinforced cement products, precast concrete products, and stormwater control measures.

Volume 04.06 Thermal Insulation; Building and Environmental Acoustics

1,716 Pages; 227 Standards; Available November

Print \$505
Print ISBN 978-1-6822-1936-2; Stock # S040623
Online \$648; Stock # VX0406

Volume 04.06 features specifications that establish the property requirements for various types of insulation, including blanket, block, board, loose fill, and pipe. Standards on environmental acoustics address community noise, acoustical materials and systems, mechanical and electrical system noise, open plan spaces, sound absorption, and sound transmission.

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1,868 Pages; 210 Standards; Available November

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Online \$571; Stock # VX0407

Specifications, tests, and practices detail the property requirements for caulking and glazing compounds; structural, emulsion, hot-applied, and solvent-release sealants; lock-strip gaskets; aerosol foam sealants; pipe gaskets; sealing tapes; and other building sealants. Also featured are standards on how to measure sealant properties. It includes test methods on the combustibility and fire resistance of various materials, including building construction materials, mattresses, and upholstered furniture. Other standards cover fire safety engineering and large-scale fire tests under controlled conditions. Volume 04.07 also includes standards on dimension stone, including dimension stone anchoring systems and selection of dimension stone for different applications.

Volume 04.08

Soil and Rock (I): D420—D5876/D5876M

1,682 Pages; 183 Standards; Available March

Print \$507

Print ISBN 978-1-6822-1837-2; Stock # S040823

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Volume 04.09

Soil and Rock (II): D5877—Latest

1,938 Pages; 190 Standards; Available April

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Online \$584; Stock # VX0409

Volumes 04.08 and 04.09 feature geotechnical and geoenvironmental standards that cover soil testing. Topics include compaction, sampling, field investigation, soil texture, plasticity, density characteristics, hydrological properties, hydraulic barriers, and rock for erosion control. Other standards focus on ground water and vadose zone investigations, and how to measure the properties of soil-cement. In addition, Volume 04.09 includes standards on surface and subsurface characterization, erosion and sediment control technology, frozen soils and rock, geotechnics of waste management, and information retrieval and data automation.

Volume 04.10

Wood

958 Pages; 92 Standards; Available July

Print \$327

Print ISBN 978-1-6822-1839-6; Stock # S041023

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Test methods feature how to perform chemical analysis of wood and how to evaluate mechanical and physical properties. Others detail structural grading, wood paving blocks, and modified wood.

Volume 04.11

Building Constructions (I): E72—E2166

1,642 Pages; 150 Standards; Available November

Print \$604

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Volume 04.12

Building Constructions (II): E2168—Latest; Asset Management; Sustainability; Technology and Underground Utilities

1,534 Pages; 171 Standards; Available November

Print \$384

Print ISBN 978-1-6822-1841-9; Stock # S041223

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Volumes 04.11 and 04.12 cover standards for measuring the performance of buildings, including: air leakage and ventilation; building economics; preservation; durability; structural performance; exterior insulation and finish systems; roof systems, windows, and doors. Volume 04.12 includes standards on sustainability, including the design, construction, and operation of green buildings and environmental life cycle assessment. With 04.12, you'll also have standards for designing and implementing efficient, cost-effective personal asset management systems. These standards encompass the entire life cycle of personal property and establish the guiding principles of asset management. Lastly, you'll have access to standards on technology and underground utilities such as rehabilitation of sewers that use chemical grouting techniques, seismic fragility of water conveyance systems, and deployment of optical fiber systems in natural gas pipelines.

Volume 04.13

Geosynthetics

938 Pages; 165 Standards; Available April

Print \$257

Print ISBN 978-1-6822-1842-6; Stock # S041323

Online \$329; Stock # VX0413

Volume 04.13 focuses on the mechanical, endurance, permeability, and filtration properties of geosynthetics. Applications such as roadway stabilization and repair, erosion control, geomembranes, soil drainage, and reinforcement, as well as hydraulic barriers composed primarily of man-made polymer sheets or spray applied systems are included. Also featured are standards on geosynthetic clay liners.

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Volume 05.01 Petroleum Products, Liquid Fuels, and Lubricants (I): C1234—D4176

2,202 Pages; 250 Standards; Available February
Print \$554
Print ISBN 978-1-6822-1945-4; Stock # S050122
Online \$710; Stock # VX0501

Standards cover carbon residue, viscosity, cloud point, density, flash point, and sulfur content. Other subjects include natural and liquefied petroleum, pure light hydrocarbons, crude petroleum, wax and petrolatum, and hydraulic fluids.

Also includes standards for evaluating the properties of film lubricants, lubricating greases, lubricating oil, used oils, cutting oils, turbine oils, and engine tests (octane and cetane numbers).

Volume 05.02 Petroleum Products, Liquid Fuels, and Lubricants (II): D4177—D6468

2,154 Pages; 219 Standards; Available March
Print \$511
Print ISBN 978-1-6822-1946-1; Stock # S050222
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Volume 05.05 Petroleum Products, Liquid Fuels, and Lubricants (V): D8144—latest; Combustion Characteristics; Manufactured Carbon and Graphite Products

1,564 Pages; 108 Standards; Available February
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Volume 05.05 also covers test methods to determine characteristics of motor and aviation fuels and the ignition characteristics of diesel fuels. This volume contains all the newest standards from ASTM Committee D02 – including D7974-15 Standard Test Method for Determination of Farnesane, Saturated Hydrocarbons, and Hexahydrofarnesol Content of Synthesized Iso-Paraffins (SIP) Fuel for Blending with Jet Fuel by Gas Chromatography. Features ASTM D7974, the first standard to identify the protocols necessary to blend mid-level ethanol fuels at the terminal and retail level that equal the fuel quality and performance expected from fuels meeting other ASTM fuel specifications.

Volume 05.03 Petroleum Products, Liquid Fuels, and Lubricants (III): D6469—D7398

2,086 Pages; 134 Standards; Available March
Print \$528
Print ISBN 978-1-6822-1947-8; Stock # S050322
Online \$677; Stock # VX0503

Volume 05.04 Petroleum Products, Liquid Fuels, and Lubricants (IV): D7412—D8128

2,066 Pages; 167 Standards; Available March
Print \$445
Print ISBN 978-1-6822-1948-5; Stock # S050422
Online \$571; Stock # VX0504

These 5 volumes provide over 750 standards that cover fuels, oils, lubricants, and solvents. They address alternative diesel fuels and diesel fuel blend components, (including biodiesel), ethanol, and ethanol blends. They also feature standards for evaluating the properties of motor, diesel, automotive spark-ignition engine fuel, ethanol, aviation fuels, solvent hexane, and naphtha.

Volume 05.06 Gaseous Fuels; Coal and Coke; Catalysts; Bioenergy and Industrial Chemicals from Biomass

1,414 Pages; 205 Standards; Available September
Print \$400
Print ISBN 978-1-6822-1950-8; Stock # S050622
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This volume provides tests and practices to evaluate the properties of gaseous fuels, coal and coke. This volume includes standards on bioenergy and industrial chemicals from biomass, and covers characterization, manufacturing, and sustainability. It includes tests that evaluate catalytic materials, and standards for performing chemical and physical tests on manufactured carbon and graphite products.

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1,568 Pages; 248 Standards; Available February

Print \$459

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This volume features the latest test methods for the chemical analysis of paints and paint materials, including determination of volatiles, nonvolatiles, pigments, water content, and other constituents. Other standards focus on accelerated testing, physical properties of applied paint films, such as film thickness and adherence, physical strength, resistance to chemicals and environmental factors, as well as the physical and optical properties of liquid paints.

In addition, Volume 06.01 includes tests and practices on color and appearance analysis, color order systems, fluorescence, high visibility materials for individual safety, image based color measurement, photoluminescent safety markings, retroreflective materials, spectrophotometry and colorimetry, and visual methods.

Volume 06.02

Paint—Products and Applications; Protective Coatings; Pipeline Coatings

1,424 Pages; 269 Standards; Available February

Print \$403

Print ISBN 978-1-6822-1852-5; Stock # S060222

Online \$517; Stock # VX0602

Volume 06.02 covers architectural finishes and paint products, such as traffic coatings, marine coatings, industrial protective coatings, and masonry treatments. Standards examine paint applications in factories, coil coal metal, coatings on preformed products, printing inks, artists' paints, and paint application tools. Other subject areas include the determination of graffiti resistance and definitions for problems that develop with printed matter as a result of deficiencies in ink, substrate, or press. Tests for applying and evaluating protective coatings and linings in power generation facilities, and standards on the durability of pipeline coatings and linings also appear in this volume.

Volume 06.03

Paint—Pigments, Polymers, Resins, Naval Stores, Cellulosic Esters, and Ink Vehicles

704 Pages; 141 Standards; Available March

Print \$367

Print ISBN 978-1-6822-1853-2; Stock # S060322

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Volume 06.03 includes specifications and test methods that establish property requirements for various pigments, including white, black, bronze, blue, and red; resins; and polymers.

Other standards pertain to pine chemicals, primarily rosins, cellulose and cellulose derivatives, and ink vehicles, and hydrocarbon resins.

Volume 06.04

Paint—Solvents; Aromatic, Industrial, Specialty and Related Chemicals

1,064 Pages; 206 Standards; Available March

Print \$450

Print ISBN 978-1-6822-1854-9; Stock # S060422

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This volume features specifications that establish the standard property requirements for various solvents, including aromatic hydrocarbons, alcohols, ketones, and esters. Accompanying the specifications are tests that define standard procedures for conducting physical and chemical tests on solvents and for determining solubility and miscibility. Others cover aromatic hydrocarbons and related chemicals, excluding those used as fuels or lubricants.

Section 7 Textiles



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Volume 07.01

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1,158 Pages; 175 Standards; Available November

Print \$422

Print ISBN 978-1-6822-1856-3; Stock # S070122

Online \$542; Stock # VX0701

Volume 07.02

Textiles (II): D4465—Latest

1,098 Pages; 159 Standards; Available November

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Volumes 07.01 and 07.02 feature over 335 textile-related standards covering the characteristics, properties, nomenclature, and uses of textiles. These tests, practices, and specifications cover:

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- Glass fiber
- Home furnishings
- Inflatable restraints
- Pile floor coverings
- Subassemblies, such as zippers, hooks, and loops
- Tire cord and fabrics

Volume 07.02 also contains standard body measurement charts used for the sizing of apparel for men, women, children, and infants; standard guidelines for care labeling of apparel and other textile products; standards for UV protective

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924 Pages; 127 Standards; Available June

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Volume 08.02

Plastics (II): D3222—D5083

930 Pages; 128 Standards; Available June

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Online \$486; Stock # VX0802

Volume 08.03

Plastics (III): D5117—Latest; Reinforced Plastic Piping Systems and Chemical Equipment; Plastic Building Products

1,530 Pages; 229 Standards; Available July

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These 3 volumes feature over **480** plastics-related standards, including test methods that establish standard procedures for assessing physical, mechanical, optical, permanence, and thermal properties.

Volume 08.03 also covers:

- Plastic Building Products—standards deal with plastic siding products, glass-fiber-reinforced polyester plastic panels, and PVC building products.
- Reinforced Plastic Piping Systems and Chemical Equipment—covers testing requirements for glass-fiber-reinforced thermosetting resin pipes, fittings, and joints; and establish chemical resistance of thermosetting resins.

Volume 08.04

Plastic Piping Systems (I): D1598—F2735

Standards from Committee F17 on Plastic Piping Systems will now appear in **TWO** volumes of the Annual Book of ASTM Standards, split as follows:

Volume 08.04 Plastic Piping Systems (I): D1598 – F2735

Volume 08.05 Plastic Piping Systems (II): F2737 – latest (new volume to be released January 2022)

1,408 Pages; 182 Standards; Available January

Print \$317

Print ISBN 978-1-6822-1761-0; Stock # S080421

Online \$407; Stock # VX0804

Specifications, practices, and test methods for plastic piping systems deal with composites, DWV, fittings, gas pipe, joining, land drainage, sewer pipes, trenchless technology, vinyl-based pipe, and irrigation systems.

Volume 08.05

Plastic Piping Systems (II): F2737—Latest

This is a new volume for 2022.

644 Pages; 78 Standards; Available January 2022

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Print ISBN 978-1-6822-1863-1; Stock # S080522

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1,416 Pages; 220 Standards; Available July

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Online \$560; Stock # VX0901

Volume 09.01 contains tests and practices for evaluating rubber, rubber-like materials, carbon black, and recovered carbon black (rCB). Some general tests and practices fix standard procedures for performing chemical analysis, assessing processability, physical properties, aging and weathering effects, low temperature effects, and adhesion. Others evaluate compounding

materials, carbon black, and synthetic rubbers, such as CR, IIR, IR, NBR, BR, and SBR. This volume also details standards on natural rubber, thermoplastic elastomers, and terminology.

Volume 09.02

Rubber Products, Industrial—Specifications and Related Test Methods; Gaskets; Tires

886 Pages; 135 Standards; Available August

Print \$269

Print ISBN 978-1-6822-1967-6; Stock # S090222

Online \$344; Stock # VX0902

Volume 09.02 features specifications, tests, and practices for evaluating rubber surgical

and examination gloves, automotive and aeronautical rubber, packing, seals, gasket materials, hose and belting, coated fabrics, latex foam, sponge, expanded cellular rubber, and tires.

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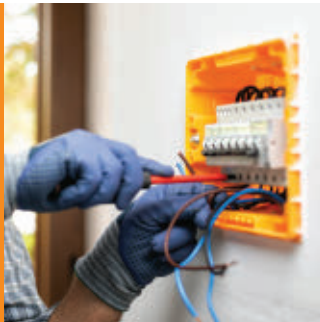
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556 Pages; 50 Standards; Available May

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Volume 10.02

Electrical Insulation (II): D2519—Latest

722 Pages; 90 Standards; Available May

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Volume 10.03

Electrical Insulating Liquids and Gases; Electrical Protective Equipment

736 Pages; 100 Standards; Available May

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Volume 10.03 provides guides, practices, specifications on electrical insulating liquids and gases, as well as chemical, physical, analytical, and electrical test methods.

It also includes specifications and tests on tools, equipment, wearing apparel, and materials used to protect workers from electrical hazards.

Volume 10.04

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1,280 Pages; 155 Standards; Available April

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1,448 Pages; 145 Standards; Available April

Print \$408
Print ISBN 978-1-6822-1974-4; Stock # S110122
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Volume 11.02 Water (II)

1,866 Pages; 220 Standards; Available May

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Volumes 11.01 and 11.02 provide standard procedures for assessing water. Topics cover: reagent water, wastewater, fluvial sediment, water sampling and analysis, general properties of water, inorganic constituents and methods of radiochemical analysis.

Volume 11.03 Occupational Health and Safety; Protective Clothing

904 Pages; 98 Standards; Available October

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Occupational Health and Safety standard practices and guides look at the health and safety aspects of various working environments. Standards also cover hazard communications and the safe handling of metalworking fluids. Protective clothing and equipment standards evaluate the performance of biological, chemical, physical, flame-resistant, and thermal protective clothing.

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876 Pages; 103 Standards; Available September

Print \$265
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Online \$339; Stock # VX1104

Tests, practices, and guides address medical waste, municipal solid waste, sampling and monitoring, physical and chemical characterization, site remediation, treatment, recovery and reuse, and processing equipment.

Volume 11.05 Environmental Assessment, Risk Management and Corrective Action

1,834 Pages; 71 Standards; Available August

Print \$326
Print ISBN 978-1-6822-1978-2; Stock # S110522
Online \$418; Stock # VX1105

Environmental Assessment—includes the popular ASTM Phase I Environmental Site Assessment (ESA) standard (E1527) and Phase II ESA standard (E1903). Other standards address corrective action, environmental risk management, pollution prevention, real estate assessment and management, Brownfield redevelopment, property condition assessments (PCAs), mold baseline survey process, asbestos screens, use of activity and use limitations (AULs), and screening for vapor encroachment. It also covers financial disclosures and risks attributed to climate change assessment.

Volume 11.06 Environmental, Biological Effects and Environmental Fate; Industrial Biotechnology

1,114 Pages; 50 Standards; Available August

Print \$390
Print ISBN 978-1-6822-1979-9; Stock # S110622
Online Plus \$500; Stock # VX1106

11.06 covers Environmental Assessment, Risk Management and Corrective Action and features standards on aquatic sediment; terrestrial assessments and toxicology; environmental fate of chemical substances; and risk assessment, communication, and management.

Volume 11.07 Air Quality

2,082 Pages; 212 Standards; Available October

Print \$430
Print ISBN 978-1-6822-1980-5; Stock # S110722
Online \$551; Stock # VX1107

Volume 11.07 provides standards on air quality in outdoor, indoor, and workplace environments. Analysis includes inorganic compounds (e.g., lead, mercury, beryllium, various sulfur and nitrogen compounds), organic compounds (e.g., formaldehyde, volatile organic compounds, pesticides, and PAH), and asbestos and mold. Also included are standards for measuring and analyzing meteorological parameters.

Volume 11.08 Pesticides, Antimicrobials, and Alternative Control Agents; Hazardous Substance and Oil Spill Response

948 Pages; 165 Standards; Available August

Print \$432
Print ISBN 978-1-6822-1981-2; Stock # S110822
Online \$554; Stock # VX1108

Pesticides, Antimicrobials, and Alternative Control Agents—standards cover health hazards and effectiveness of antimicrobial agents, insect control agents, pesticide formulation and delivery systems, and natural multi-cellular biological control organisms.

Hazardous Substances and Oil Spill Response—standards assess spill response devices, sorbent performance, in-situ burning, removal, shoreline countermeasures, and ecological considerations when using chemical dispersants.

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Nuclear Energy (I)

1,656 Pages; 172 Standards; Available August

Print \$425

Print ISBN: 978-1-6822-1882-2; Stock #: S120122

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Volume 12.01 focuses on materials for nuclear reactor applications and covers:

- Fuel and Fertile Materials—property requirements for fuel and other related subjects.
- Nuclear Grade Materials—standard procedures for chemical, mass spectrometric, spectrochemical, nuclear, and radiochemical analysis of these materials.

Volume 12.02 covers:

- Nuclear Technology and Applications—standards address behavior and use of nuclear structural materials, nuclear radiation metrology, and decontamination and decommissioning of nuclear facilities and components.
- Radiation Processing—covers radiation processing for dosimetry systems, food irradiation, and sterilization for medical devices and packaging.
- Solar Energy—covers solar heating and cooling systems, measuring spectral response of photovoltaic cells or transmittance, and reflectance of sheet materials.
- Geothermal Energy—examines geothermal field development, materials, and utilization.

Volume 12.02

Nuclear (II), Solar, and Geothermal Energy; Radiation Processing

1,546 Pages; 159 Standards; Available September

Print \$430

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Volume 13.01

Medical and Surgical Materials and Devices (I): E667— F2477

1,420 Pages; 204 Standards;
Available September

Print \$358

Print ISBN 978-1-6822-1885-3; Stock # S130122

Online \$460; Stock # VX1301

Volume 13.02

Medical and Surgical Materials and Devices (II): F2502-Latest; Emergency Medical Services; Search and Rescue

1,840 Pages; 230 Standards;
Available September

Print \$438 Print ISBN 978-1-6822-1886-0; Stock # S130222

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Volumes 13.01 and 13.02 include over 380 standards on medical and surgical materials and devices. They cover metals, polymers, and ceramics for implants, prostheses, and surgical devices; silicone elastomers, gels, and foams in medical applications; and tissue engineered medical products. Each

standard typically covers manufacture, chemical requirements, mechanical requirements, special tests, and certification.

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Volume 14.01

Statistical Methods; Hazard Potential of Chemicals; Thermal Measurements; Manufacture of Pharmaceutical and Biopharmaceutical Products; Healthcare Informatics

Standards previously published in **Volume 14.05** will now appear in Volume 14.01. Volume 14.05 has been discontinued.

1,670 Pages; 162 Standards; Available June

Print \$737

Print ISBN 978-1-6822-1989-8; Stock # S140122
Online \$960; Stock # VX1401

Statistical Methods; Hazard Potential of Chemicals; Thermal Measurements; Manufacture of Pharmaceutical and Biopharmaceutical Products; Healthcare Informatics

Standards cover:

- Single-use systems—guide for specification, design, verification, and application of single-use systems
- Hazard Potential of Chemicals—covers flash point, thermal stability and instability, explosibility, and autoignition temperatures of chemicals.
- Quality and Statistics—practices and guides evaluate statistical methods, sampling and data analysis, and quality statements.
- Thermal Measurements—practices and test methods cover thermal analysis and thermophysical properties.
- Manufacture of Pharmaceutical and Biopharmaceutical Products—covers the application of process analytical technology (PAT) within the pharmaceutical and biopharmaceutical industry, highlighting PAT system management, implementation, and practices.
- Healthcare Informatics—specifications and guides that address the Continuity of Care Record (CCR), transcription, documentation, transfer, management,

security, and privacy of health information and the content of electronic health records. Other standards cover controlled health vocabularies for healthcare informatics and eXtensible Markup Language (XML) Document Type Definitions (DTD).

Volume 14.02

Particle and Spray Characterization; Forensic Sciences; Accreditation & Certification; Forensic Psychophysiology; Nanotechnology; Forensic Engineering

1,124 Pages; 157 Standards; Available July

Print \$288

Print ISBN 978-1-6822-1990-4; Stock # S140222
Online \$371; Stock # VX1402

Standards cover:

- Forensic Psychophysiology—guides and practices address polygraph training and recommended practices for the design, conduct, and interpretation of psychophysiological detection of deception examinations.
- Forensic Sciences—the majority of standards in this section deal with criminalistics, including forensic analysis, examination of physical evidence, documenting, labeling, storing, and retrieving evidence.
- Conformity Assessment—criteria for agencies and bodies performing inspections, selecting assessors, and certifying personnel engaged in inspection and testing of construction activities
- Particle and Spray Characterization—standards cover sieving and nonsieving methods and screening media.
- Nanotechnology—standards cover terminology, environmental and occupational health and safety, and characterization, including physical, chemical, and toxicological properties
- Forensic Engineering—addresses the scientific, engineering, ethical, and legal considerations inherent in forensic engineering investigations, reporting, and testimony.

Volume 14.03

Sensory Evaluation; Temperature Measurement; Language Services and Products

1,314 Pages; 95 Standards; Available July

Print \$445

Print ISBN 978-1-6822-1991-1; Stock # S140322
Online \$585; Stock # VX1403

Specifications, guides, and test methods cover sensory evaluation, language services and products, liquid-in-glass, thermometers and hydrometers, thermocouples, medical thermometry, radiation thermometry, and resistance thermometers.

Volume 14.04

Laboratory Apparatus; Degradation of Materials; SI; Oxygen Fire Safety

1,088 Pages; 131 Standards; Available July

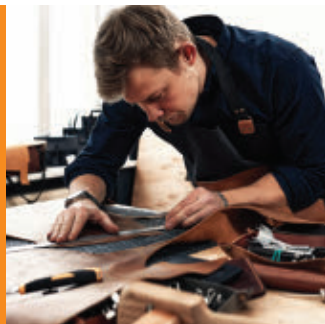
Print \$331

Print ISBN 978-1-6822-1992-8; Stock # S140422
Online \$429; Stock # VX1404

Standards cover:

- Laboratory Apparatus—specifications for sampling and testing of laboratory glassware, calibration of laboratory apparatus, weighing devices.
- Degradation of Materials—standards that evaluate outdoor and laboratory accelerated weathering tests and cover biological deterioration, joint weathering projects, natural and environmental exposure tests, and service life prediction.
- SI—the Unified American National Standard IEEE/ASTM SI-10 Standard for the Use of the International System of Units (SI): The Modern Metric System.

Section 15 General Products, Chemical Specialties, and End Use Products



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Volume 15.01

Refractories; Activated Carbon; Advanced Ceramics

1,294 Pages; 155 Standards; Available March

Print \$373
Print ISBN 978-1-6822-1994-2; Stock # S150122
Online \$478; Stock # VX1501

- Refractories—standards establish procedures for evaluating chemical behaviors, thermal properties, strength, monolithics, and refractories for glass.
- Activated Carbon—specifications and test methods evaluate the properties of activated carbon, including gas phase evaluation tests and liquid phase evaluation.
- Advanced Ceramics—standards cover thermal systems including heat engines, heat exchangers, armor, fuel cells, sensors/actuators, electronics, coatings, and catalyst substrates. Most feature tests in the areas of mechanical properties, physical properties, performance, and ceramic composites.

Volume 15.02

Glass; Ceramic Whitewares

732 Pages; 122 Standards; Available April

Print \$254
Print ISBN 978-1-6822-1995-9; Stock # S150222
Online \$326; Stock # VX1502

This volume features specifications for assessing the physical and chemical properties of glass and glass products. Other standards establish procedures for measuring such properties as abrasion resistance, hardness, particle size, and strength of ceramic whiteware materials.

Volume 15.03

Space Simulation; Aerospace and Aircraft; Composite Materials

1,714 Pages; 206 Standards; Available October

Print \$422
Print ISBN 978-1-6822-1996-6; Stock # S150322
Online \$542; Stock # VX1503

These standards cover:

- Space Simulation—specifications and practices cover contamination of cleanrooms and controlled environments, space simulation, and thermal protection.
- Aerospace and Aircraft—standards deal with cleaning materials, flammability, contamination, hydrogen embrittlement, transparent enclosures, and materials.
- Composite Materials—test methods assess properties of high modulus fibers, interlaminar properties, laminates, sandwich construction, and structural methods.

Volume 15.04

Soaps and Other Detergents; Polishes; Leather; Resilient Floor Coverings

1,106 Pages; 278 Standards; Available September

Print \$357
Print ISBN 978-1-6822-1997-3; Stock # S150422
Online \$458; Stock # VX1504

Volume 15.04 includes the latest standards for:

- Soaps and Other Detergents—establishes the chemical requirements for assorted soaps, alkaline detergents, and synthetic detergents.
- Polishes—standards evaluate properties such as acid number, black marking resistance, saponification number of waxes, powdering, and soil resistance.
- Leather—standards address tear strength, bursting strength, tensile strength, and water absorption and resistance.
- Resilient Floor Coverings—specifications and test methods for floor preparation, installation, and measuring the properties of floor coverings.

Volume 15.05

Engine Coolants and Related Fluids; Halogenated Organic Solvents and Fire Extinguishing Agents

528 Pages; 118 Standards; Available August

Print \$233
Print ISBN 978-1-6822-1998-0; Stock # S150522
Online \$298; Stock # VX1505

This volume features the latest standards on:

- Engine Coolants—standards cover the chemical and physical properties of engine coolants, dynamometer and road tests, glassware performance tests, and heavy-duty coolants. This section also includes specifications on glycol base engine coolants, recycled engine coolants, reference test materials, and simulated service tests.
- Halogenated Organic Solvents and Fire Extinguishing Agents—standards cover virgin and reclaimed halogenated solvents and substitutes for ozone depleting chemicals, as well as the handling, transportation, and storage of compressed gases.

Volume 15.06

Adhesives

676 Pages; 126 Standards; Available August

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Print ISBN 978-1-6822-1999-7; Stock # S150622
Online \$361; Stock # VX1506

These standards concentrate on the adhesive material classification system, adhesives for plastics and construction, hot melt pressure sensitive adhesives, metal bonding adhesives, wood adhesives, and the working properties and durability of adhesives.

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Amusement Rides and
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Water Sports**

1,758 Pages; 261 Standards; Available November

Print \$360

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- Sports Equipment and Facilities—standards cover headgear and helmets, eye protectors, paintball, and playground surfacing. These include baseball helmet and bicycle helmet tests not found in ANSI or SNELL standards.
- Pedestrian/Walkway Safety and Footwear—standards measure slip resistance of footwear on various walking surfaces and devices used for the evaluation of pedestrian traction.
- Amusement Rides and Devices—test methods, guides and practices on the design, manufacturing, inspection, operations and maintenance of amusement rides and devices.
- Snow and Water Sports—these standards play a preeminent role in all aspects of the snow and water sports industries...snowboarding, retail and rental show procedures, freestyle jumping features, slalom water skis, and water inflatables.

Volume 15.08

**Security Systems and
Equipment; Detention and
Correctional Facilities;
Homeland Security
Applications; Robotics;
Automation, and Autonomous
Systems; Exoskeletons and
Exosuits**

1,878 Pages; 174 Standards; Available November

Print \$208

Print ISBN 979-8-88773-001-1; Stock # S150822

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- Homeland Security Applications—standards address CBRNE sensors and detectors, emergency preparedness, training procedures, decontamination, personal protective equipment, building and infrastructure protection, security controls, operational equipment, and terminology.
- Sensory Evaluation—tests and guides establish standard procedures for controlling and evaluating the characteristics of products, including food, beverages, personal care products, and household items. Standards also cover general sensory applications and sensory theory and statistics.
- Security Systems and Equipment—standards focus on protective design of buildings, including blast and forced entry resistant glazing, blast resistant doors, vehicle crash testing of perimeter barriers, and boat barrier perimeters. Test methods and practices also cover controlled access security screening equipment, as well as locking devices.
- Detention and Correctional Facilities—covers security control systems and detention hardware, including hinges and locks, furnishings, and physical barriers, including swinging door assemblies and chain link barrier systems.
- Robotics, Automation, and Autonomous Systems develop standards for industrial/commercial robotics, automation, and autonomous systems (i.e.: terminology, practices, classifications, guides, test methods, and specifications). These

standards are applicable to, but not limited to, automatic/automated/autonomous vehicles, robotic arms/manipulators, and the sensors used in these systems; for smart infrastructures, advanced manufacturing, logistics and other automation.

- Exoskeletons and Exosuits—addresses safety, quality, performance, ergonomics and terminology for systems and components during the full life cycle of the product – from before usage, to maintenance, to disposal – including, security and information technology considerations. The activities cover industrial, emergency response, medical, military and consumer applications covering passive and active systems, enhancing and decreasing effects systems, as well as systems with physical and cognitive integration.

Volume 15.09

**Light Sport Aircraft;
Unmanned Aircraft Systems;
Aircraft Systems; General
Aviation Aircraft; Aerospace
Personnel; Commercial
Spaceflight**

1,336 Pages; 134 Standards; Available June

Print \$195

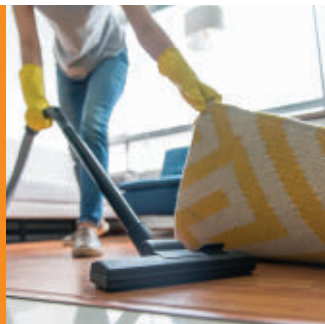
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Aerospace Personnel—these standards play a preeminent role in all aspects of aerospace personnel education, training, qualification, testing, certification requirements, and continued education concurrent with technological advancement.

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Aircraft Systems—electrical wiring systems as well as the design, alteration and certification of electric propulsion systems in general aviation aircraft.

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1,624 Pages; 251 Standards; Available June

Print \$407

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- Packaging— performance of transport containers, pallets, crates; packaging materials such as tapes, cushioning, strapping, stretch wrap and labels; package distribution and handling; measurement of transport packaging and distribution environment; reuse, recycling and disposal of materials related to packaging; performance of hazardous materials (dangerous goods) packaging.
- Primary Barrier Packaging—child resistant packaging and closure systems, food, consumer, pharmaceutical and medical device packaging; bottles, vials, pouches, blisters and trays; materials: papers, nonwovens, plastic films, rigid plastic, glass, and metal foils.
- Cannabis— water activity in cannabis flower; security procedures for a cannabis operation; cleaning and sanitation;

corrective and preventative action, product recall; hazard analysis and critical control points, disposal of raw materials; method validation, product complaints and compliance auditing.

Volume 15.11

**Consumer Products;
Vacuum Cleaners**

1,606 Pages; 147 Standards; Available November

Print \$312

Print ISBN 979-8-88773-004-2; Stock # S151122

Online \$402; Stock # VX1511

These standards address:

- Consumer Products—consumer safety specifications, guides, and performance requirements cover products such as public and home playground equipment, juvenile products, toys, furniture, candles, and pool safety.
- Vacuum Cleaners—tests evaluate filtration efficiency, air performance characteristics, cleanability, durability, and reliability.

Volume 15.12

**Livestock, Meat, and Poultry
Evaluation Systems; Food
Service Equipment**

928 Pages; 101 Standards; Available November

Print \$265

Print ISBN 979-8-88773-005-9; Stock # S151222

Online \$339; Stock # VX1512

Volume 15.12 includes standards on:

- Livestock, Meat, and Poultry Evaluation Systems—equipment design, measurement, device performance, user requirements, and predictive accuracy for electronic devices that evaluate composition or quality constituents of livestock, meat, and poultry.
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Designation/ Committee Title

A. FERROUS METALS

- A01** Steel, Stainless Steel and Related Alloys
- A04** Iron Castings
- A05** Metallic-Coated Iron and Steel Products
- A06** Magnetic Properties

B. NONFERROUS METALS

- B01** Electrical Conductors
- B02** Nonferrous Metals and Alloys
- B05** Copper and Copper Alloys
- B07** Light Metals and Alloys
- B08** Metallic and Inorganic Coatings
- B09** Metal Powders and Metal Powder Products
- B10** Reactive and Refractory Metals and Alloys

C. CEMENTITIOUS, CERAMIC, CONCRETE AND MASONRY MATERIALS

- C01** Cement
- C03** Chemical-Resistant Nonmetallic Materials
- C04** Vitrified Clay Pipe
- C07** Lime and Limestone
- C08** Refractories
- C09** Concrete and Concrete Aggregates
- C11** Gypsum and Related Building Materials and Systems
- C12** Mortars and Grouts for Unit Masonry
- C13** Concrete Pipe
- C14** Glass and Glass Products
- C15** Manufactured Masonry Units
- C16** Thermal Insulation
- C17** Fiber-Reinforced Cement Products
- C18** Dimension Stone
- C21** Ceramic Whitewares and Related Products
- C24** Building Seals and Sealants
- C26** Nuclear Fuel Cycle
- C27** Precast Concrete Products
- C28** Advanced Ceramics

D. MISCELLANEOUS MATERIALS

- D01** Paint and Related Coatings, Materials, and Applications
- D02** Petroleum Products and Lubricants
- D03** Gaseous Fuels
- D04** Road and Paving Materials
- D05** Coal and Coke
- D06** Paper and Paper Products
- D07** Wood
- D08** Roofing and Waterproofing
- D09** Electrical and Electronic Insulating Materials
- D10** Packaging
- D11** Rubber
- D12** Soaps and Other Detergents
- D13** Textiles
- D14** Adhesives
- D15** Engine Coolants and Related Fluids
- D16** Aromatic Hydrocarbons and Related Chemicals
- D18** Soil and Rock
- D19** Water
- D20** Plastics
- D21** Polishes

- D22** Air Quality

- D24** Carbon Black

- D26** Halogenated Organic Solvents and Fire Extinguishing Agents

- D27** Electrical Insulating Liquids and Gases

- D28** Activated Carbon

- D30** Composite Materials

- D31** Leather

- D32** Catalysts

- D33** Protective Coating and Lining Work for Power Generation Facilities

- D34** Waste Management

- D35** Geosynthetics

- D37** Cannabis

E. MISCELLANEOUS SUBJECTS

- E01** Analytical Chemistry for Metals, Ores and Related Materials

- E04** Metallography

- E05** Fire Standards

- E06** Performance of Buildings

- E07** Nondestructive Testing

- E08** Fatigue and Fracture

- E10** Nuclear Technology and Applications

- E11** Quality and Statistics

- E12** Color and Appearance

- E13** Molecular Spectroscopy and Separation Science

- E17** Vehicle - Pavement Systems

- E18** Sensory Evaluation

- E20** Temperature Measurement

- E21** Space Simulation and Applications of Space Technology

- E27** Hazard Potential of Chemicals

- E28** Mechanical Testing

- E29** Particle and Spray Characterization

- E30** Forensic Sciences

- E31** Healthcare Informatics

- E33** Building and Environmental Acoustics

- E34** Occupational Health and Safety

- E35** Pesticides, Antimicrobials and Alternative Control Agents

- E36** Accreditation and Certification

- E37** Thermal Measurements

- E41** Laboratory Apparatus

- E42** Surface Analysis

- E43** SI Practice

- E44** Solar, Geothermal and Other Alternative Energy Sources

- E47** Biological Effects and Environmental Fate

- E48** Biotechnology

- E50** Environmental Assessment, Risk Management, and Corrective Action

- E52** Forensic Psychophysiology

- E53** Asset Management

- E54** Homeland Security Applications

- E55** Manufacture of Pharmaceutical Products

- E56** Nanotechnology

- E57** 3D Imaging System

- E58** Forensic Engineering

- E60** Sustainability

- E61** Radiation Processing

- E62** Industrial Biotechnology

- E63** Human Resource Management

- E64** Storm Water Control Measures

F. MATERIALS FOR SPECIFIC APPLICATIONS

- F01** Electronics

- F02** Flexible Barrier Packaging

- F03** Gaskets

- F04** Medical and Surgical Materials and Devices

- F05** Business Imaging Products

- F06** Resilient Floor Coverings

- F07** Aerospace and Aircraft

- F08** Sports Equipment, Playing Surfaces, and Facilities

- F09** Tires

- F10** Livestock, Meat, and Poultry Evaluation Systems

- F11** Vacuum Cleaners

- F12** Security Systems and Equipment

- F13** Pedestrian/Walkway Safety and Footwear

- F14** Fences

- F15** Consumer Products

- F16** Fasteners

- F17** Plastic Piping Systems

- F18** Electrical Protective Equipment for Workers

- F20** Hazardous Substances and Oil Spill Response

- F23** Personal Protective Clothing and Equipment

- F24** Amusement Rides and Devices

- F25** Ships and Marine Technology

- F26** Food Service Equipment

- F27** Snow Skiing

- F29** Anesthetic and Respiratory Equipment

- F30** Emergency Medical Services

- F32** Search and Rescue

- F33** Detention and Correctional Facilities

- F34** Rolling Element Bearings

- F36** Technology and Underground Utilities

- F37** Light Sport Aircraft

- F38** Unmanned Aircraft Systems

- F39** Aircraft Systems

- F40** Declarable Substances in Materials

- F41** Unmanned Maritime Vehicle Systems (UMVS)

- F42** Additive Manufacturing Technologies

- F43** Language Services and Products

- F44** General Aviation Aircraft

- F45** Driverless Automatic Guided Vehicles

- F48** Exoskeletons and Exosuits

G. CORROSION, DETERIORATION, AND DEGRADATION OF MATERIALS

- G01** Corrosion of Metals

- G02** Wear and Erosion

- G03** Weathering and Durability

- G04** Compatibility and Sensitivity of Materials in Oxygen Enriched Atmospheres

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