

## Rubber Processing And Compounding Technology

Rubber materials serve a variety of purposes in our everyday life. This book gives a complete survey of the life cycle of rubber materials starting from the basics and covering everything to recycling of rubber. The important aspects for researchers and engineers in rubber industry such as vulcanization, thermoplastic elastomers, additives and fillers and rubber bonding is covered in one chapter each.

The one-stop resource for rubber-clay nanocomposite information The first comprehensive, single-volume book to compile all the most important data on rubber-clay nanocomposites in one place, *Rubber-Clay Nanocomposites: Science, Technology, and Applications* reviews rubber-clay nanocomposites in an easy-to-reference format designed for R&D professionals. Including contributions from experts from North America, Europe, and Asia, the book explores the properties of compounds with rubber-clay nanocomposites, including their rheology, curing kinetics, mechanical properties, and many others. Rubber-clay nanocomposites are of growing interest to the scientific and technological community, and have been shown to improve rubber compound reinforcement and impermeability. These natural mineral fillers are of potential interest for large-scale applications and are already making an impact in several major fields. Packed with valuable information about the synthesis, processing, and mechanics of these reinforced rubbers, the book covers assorted rubber-clay nanocomposites applications, such as in automotive tires and as polymer fillers. Promoting common knowledge and interpretation of the most important aspects of rubber-clay nanocomposites, and clarifying the main results achieved in the field of rubbers and crosslinked rubbers—something not covered in other books in the field—*Rubber-Clay Nanocomposites* helps scientists understand morphology, vulcanization, permeability, processing methods, and characterization factors quickly and easily.

Despite mature applications, advanced technology, and high volume, rubber compounding has never had a book of its own. Today, emerging applications such as tire reclamation and smoke-resistant cables combine with an industry push into engineering materials to create new kinds of compounds with new quality control problems. *The Mixing of Rubber* has been developed over several years in conjunction with the Farrel Corp./Connecticut Rubber Group course to educate the hands-on compounder and the end user as well. It covers machinery, mixing, process control, quality control, plant operations and mixing advice for specific compounds. Like the course, the book assumes no prior knowledge of rubber compounding but leads the technologist through the process from mix procedure to test.

This revised and expanded single-source reference analyzes all compounding material classes of dry rubber compounds, such as carbon blacks, plasticizers and age resisters, integrating detailed information on how elastomers are built up.

The work provides practical compounding tips on how to avoid oil or antioxidant bloom, how to adjust electrical conductivity and how to meet volume swell requirements.; This second edition: provides material on government regulations regarding rubber waste; presents current insights into the fast-growing polymer technology of thermoplastic elastomers; discusses the ramifications of the commercial availability of epoxidized natural rubber; and offers a comprehensive tabular chart on the properties of polymers.

This is the first volume of a two-volume work which summarizes in an edited format and in a fairly comprehensive manner many of the recent technical research accomplishments in the area of Elastomers. "Advances in Elastomers" discusses the various attempts reported on solving these problems from the point of view of the chemistry and the structure of elastomers, highlighting the drawbacks and advantages of each method. It summarizes the importance of elastomers and their multiphase systems in human life and industry, and covers all the topics related to recent advances in elastomers, their blends, IPNs, composites and nanocomposites. This first volume focuses on advances on the blends and interpenetrating networks (IPNs) of elastomers.

The core content of this book is derived from the author's experience as a Senior Technocrat, associated with the rubber industry in the aspects of Production, R&D and new plant erection and commissioning. This book is dedicated to a variety of Rubber Starting Point Formulations that could be very useful for the rubber industry. The rubber industry is an important resource-based industry in India. Over many decades, the rubber industry has witnessed steady and strong growth. Rubber can be processed in many ways to manufacture a wide range of products. This book provides the starting point formulations that cover the manufacturing processes of rubber products such as calendaring, extrusion and molding. Thus, the book is very useful for new entrepreneurs, existing units, technical institutions and technocrats. These formulations are based on General Compounding Principles and properties such as Tensile Strength, Tear Resistance, The Crescent Tear Test, The Hardness of Rubber, Abrasion Resistance, Flex Cracking Resistance, Resilience, Heat Build-up, and Temperature Resistance. The formulations are aimed at products like Retreading Materials, Conveyor Belting, Transmission Belting and Hose, Footwear, Rubber Roller, Medical Applications, O rings and Seals, Rubber Blends and Manufacture of Latex Products.

Rubber compounding is a very complex endeavor. There are many interactions and many ways to achieve the target properties and economic goals while maintaining an acceptable trade-off for these characteristics. This book is dedicated to providing the reader with various experimental ideas which may guide him or her to developing better compounds and solving technical problems. In a combined effort, 20 reknown industrial experts compiled a large number of diverse experimental suggestions for enhancing a specific compound property. By reviewing the suggestions in this book, the compounder may develop a better

"feel" for how to best achieve a compromise or trade-off with compound properties when developing new or improving tested rubber recipes. Reverse engineering is widely practiced in the rubber industry. Companies routinely analyze competitors' products to gather information about specifications or compositions. In a competitive market, introducing new products with better features and at a faster pace is critical for any manufacturer. Reverse Engineering of Rubber Products: Concepts, Tools, and Techniques explains the principles and science behind rubber formulation development by reverse engineering methods. The book describes the tools and analytical techniques used to discover which materials and processes were used to produce a particular vulcanized rubber compound from a combination of raw rubber, chemicals, and pigments. A Compendium of Chemical, Analytical, and Physical Test Methods Organized into five chapters, the book first reviews the construction of compounding ingredients and formulations, from elastomers, fillers, and protective agents to vulcanizing chemicals and processing aids. It then discusses chemical and analytical methods, including infrared spectroscopy, thermal analysis, chromatography, and microscopy. It also examines physical test methods for visco-elastic behavior, heat aging, hardness, and other features. A chapter presents important reverse engineering concepts. In addition, the book includes a wide variety of case studies of formula reconstruction, covering large products such as tires and belts as well as smaller products like seals and hoses. Get Practical Insights on Reverse Engineering from the Book's Case Studies Combining scientific principles and practical advice, this book brings together helpful insights on reverse engineering in the rubber industry. It is an invaluable reference for scientists, engineers, and researchers who want to produce comparative benchmark information, discover formulations used throughout the industry, improve product performance, and shorten the product development cycle.

Rubber Seals for Fluid and Hydraulic Systems is a comprehensive guide to the manufacturing and applications of rubber seals, with essential coverage for industry sectors including aviation, oil drilling and the automotive industry. Fluid leakage costs industry millions of dollars every year. In addition to wasted money, unattended leaks can result in downtime, affect product quality, pollute the environment, and cause injury. Successful sealing involves containment of fluid within a system while excluding the contaminants; the resilience of rubber enables it to be used to achieve these two objectives and create a tight sealing effect. A sound understanding of the complex factors involved in successful fluid sealing is essential for engineers who specify, design, operate and maintain machinery and mechanical equipment. This book focuses on the characteristics of rubbers as seals, their manufacturing procedures, the implications of their physical and chemical characteristics for the sealing function in the fluid and hydraulic systems, how rubbers seal and prevent leaks, what properties are required for sealing function, and how they change before and after installation.

The chapter on Manufacture of Seals and 'O'Rings includes approximately 25 workable starting point formulations based on different rubbers, with cure and property data of those formulations as guidelines for technologists and engineers. Emphasis on important areas such as applications of rubber as fluid seals in the nuclear, aviation, oil drilling and automotive industries Includes a chapter on Rubber Expansion Joints as the function of such expansion joints as pipe connectors is indirectly linked with leakage and prevention of fluid flow through the pipes The chapter on Manufacture of Seals and 'O'Rings includes approx. 25 workable starting point formulations based on different rubbers, with cure and property data of those formulations as guidelines for technologists and engineers Polymer Latices, Second Edition is a comprehensive update of the previous edition, High Polymer Latices, taking into account the many developments since it was first published in 1966. It is the only publication to provide such an outstanding and extensive review of latex science and technology, from background theory and principles, to modern day applications. It will prove an invaluable reference source for all those working in the area of latex science and technology, such as colloid chemists, polymer scientists, and materials processors.

Provides authoritative coverage of compounding, mixing, calendering, extrusion, vulcanization, rubber bonding, computer-aided design and manufacturing, automation and control using microprocessors, just-in-time technology and rubber plant waste disposal.

Rubber compounding is a very complex endeavor. There are many interactions and many ways to achieve the target properties and economic goals while maintaining an acceptable trade-off for these characteristics. This book is dedicated to providing the reader with various experimental ideas which may guide him or her to developing better compounds and solving technical problems. In a combined effort, 20 reknown industrial esperts compiled a large number of diverse experimental suggestions for enhancing a specific compound property. By reviewing the suggestions in this book, the compounder may develop a better "feel" for how to best achieve a compromise or trade-off with compound properties when developing new or improving tested rubber recipes. Contents: - Introduction - Optimizing Cured Physical Properties - Improving Degradation Resistance for Cured Rubber Compounds - Optimizing Measurable Processability Properties - Minimizing Adverse Processing Attributes - How to Obtain Better Property Trade-Offs - Compatibility for Blends of Elastomers as Part of Vulcanizable Compounds - Typical Cure Packages for Compounds Based on Different Elastomer Base

Rubber Compounding: Chemistry and Applications describes the production, processing, and characteristics of a wide range of materials utilized in the modern tire and rubber industry, from natural to butyl rubber, carbon black, silica, silanes, and beyond. Containing contributions from leading specialists in the field, the text investigates the chem



Rubber Technology: Compounding and Testing for Performance is a practical guide to cost-effective formulating of rubber compounds to achieve optimal processing and performance. It provides a thorough discussion of the principles of rubber compounding, rubber testing, and how various compound changes affect different properties and test measurements. Rubber compounding is discussed as a series of interdependent systems, such as the elastomer system, the filler-oil system, the cure system, among others. A holistic approach is used to show how changes in these different systems will affect specific compound properties. Much attention is given to tradeoffs in properties and emphasis is placed on finding the best balance for compound cost, processing properties, and product performance. New in this third edition is the updated and extended section on silicone elastomers as well as the significantly expanded and newly written chapters on recycled rubber and precipitated silica and non-black fillers. This book presents selected papers on various aspects of rubber engineering, technology, and exploitation. The contributions range from new methods of the modification of filler surface and crosslinks structure of rubber vulcanizates, through modern functional elastomer composites, to aspects of their thermal stability, flammability, and ozone degradation. Each chapter contains a brief introduction to a particular topic, a description of the experimental techniques, and a discussion on the results obtained, followed by conclusions. The book will help to broaden the knowledge of researchers in the field of rubber compounding, crosslinking, and behavior under various exploitation conditions. The research and development presented in this book has potential for industrial applications as well as for new materials and technologies. The book also details theoretical background to a number of experimental techniques, which should make it interesting to research students and professionals.

The objectives of rubber compounding may be essentially defined as providing optimised performance and processability, generally at minimum cost, by the incorporation of non-rubber ingredients. Optimised performance in this context refers not only to mechanical properties but also, for example, resistance to bacteria or particular chemicals. In some applications a rubber may also need to be coloured, or bonded to another material, and further ingredients may be required. For many years, rubber compounding was largely empirical and frequently described as a black art. Today it is practised predominantly on the basis of scientific principles elucidated over years of study and is still the subject of intensive research. In this new report Claude Hepburn reviews the following range of compounding ingredients, considering the range of materials available, their particular actions and recent interesting advances: Process and extender oils; Process aids and surfactants; Coupling agents and adhesion promoters; Fire retardants, bactericides and blowing agents, colourants and odourants. An additional indexed section containing several hundred abstracts from the Polymer Library provides many more examples of novel materials and their applications. The Complete Book on Rubber Processing and Compounding Technology (with

Machinery Details) 2nd Revised Edition How to Start Rubber Processing Industry in India, Manufacture of Rubber Products, Modern small and cottage scale industries, Most Profitable Rubber Processing Business Ideas, Natural Rubber Processing Line, Natural rubber processing method, Natural Rubber Processing, New small scale ideas in Rubber processing industry, Opportunities in Rubber industries for new business ASIA PACIFIC BUSINESS PRESS Inc.

Highlighting more than a decade of research, this one-of-a-kind reference reviews the production, processing, and characteristics of a wide range of materials utilized in the modern tire and rubber industry. Rubber Compounding investigates the chemistry and modification of raw materials, elastomers, and material compounds for optimal formulation and

This book skillfully blends and integrates polymer science, plastic technology and rubber technology. The fundamentals of polymerization, polymer characteristics, rheology and morphology, as well as the composition, technology, testing and evaluation of various plastics, rubbers, fibres, adhesives, coatings and composites are comprehensively presented. New to this Edition Extensive discussion of dendritic polymers, dendrimers and useful inorganic polymers Lucid description of the use of power polymers in developing solar photovoltaic devices In-depth coverage of the applications of nanotechnology to polymers Detailed explanation of the use of polymers in waste disposal and recycling The book is highly suitable for all entrepreneurs and professionals engaged in production of as well as research and development in polymers. It will also be found immensely useful by advanced level students of physics, chemistry, materials science, and electronics specializing in polymers, as well as students of electronics, chemical and metallurgical engineering having courses in polymer technology/materials science and technology.

The production of rubber and rubber products is a large and diverse industry. The rubber product manufacturing industry is basically divided into two major sectors: tyre and non-tyre. The tyre sector produces all types of automotive and nonautomotive tyres whereas the non-tyre sector produces high technology and sophisticated products like conveyor belts, rubber seals etc. The wide range of rubber products manufactured by the rubber industry comprises all types of heavy duty earth moving tyres, auto tyres, tubes, automobile parts, footwear, beltings etc. The rubber industry has been growing tremendously over the years. The future of the rubber industry is tied to the global economy. Rapidly growing automotive sector in developing economies and increased demand for high-performance tyres are expected to contribute to the growth of the global industrial rubber market. The current scenario reveals that there is a tremendous scope for the development of rubber processing industries. The global market for industrial rubber products is projected to increase 5.8 % per year. Investment in rubber industry is expected to offer significant opportunities in the near future and realizing returns to investors willing to explore this sector. This book deals with all aspects of rubber processing; mixing, milling, extrusion and molding, reclaiming

and manufacturing process of rubber products. The major contents of the book are rubbers materials and processing, mixing technology of rubber, techniques of vulcanization, rubber vulcanization, rubber compounding, rubber reclaiming, manufacture of rubber products, latex and foam rubber, silicone rubber, polybutadiene and polyisoprene, styrene butadiene rubber, rubber natural etc. The book contains addresses of plant & machinery suppliers with their Photographs. It will be a standard reference book for professionals, entrepreneurs, those studying and researching in this important area and others interested in the field of rubber processing technology. TAGS Basic compounding and processing of rubber, Best small and cottage scale industries, Business guidance for rubber processing, Business guidance for rubber compounding, Business guidance to clients, Business Plan for a Startup Business, Business plan on Rubber, Business start-up, How is rubber made?, How to Start a Rubber business?, How to Start a Rubber Production Business, How to start a successful Rubber Processing business, How to Start Rubber processing Business, How to Start Rubber Processing Industry in India, Manufacture of Rubber Products, Modern small and cottage scale industries, Most Profitable Rubber Processing Business Ideas, Natural Rubber Processing Line, Natural rubber processing method, Natural Rubber Processing, New small scale ideas in Rubber processing industry, Opportunities in Rubber industries for new business, Processing and Profiting from Rubber, Processing methods for rubber materials, Profitable Rubber Business Ideas Small Scale Manufacturing, Profitable small and cottage scale industries, Profitable Small Scale Rubber Manufacturing, Rubber and Rubber Products, Rubber based Industries processing, Rubber Based Small Scale Industries Projects, Rubber business plan, Rubber Chemistry, Rubber compounding, Rubber Compounding & Mixing, Rubber compounding ingredients, Rubber compounding method, Rubber compounding process, Rubber compounding technology, Rubber Extrusion, Rubber Materials, Rubber mixing process, Rubber Mixing, Rubber Principles, Rubber processing, Rubber Processing & Rubber Based Profitable Projects, Rubber Processing and Profiting, Rubber Processing Business, Rubber Processing Industry in India, Rubber processing methods, Rubber Processing Projects, Rubber processing technology, Rubber Products manufacturing, Rubber Products, Rubber Reclaiming, Rubber technology, Rubber Technology and Manufacturing Process of Rubber Products, Rubber Vulcanization, Rubbers: materials and processing technology, Setting up of Rubber Processing Units, Small scale manufacturing business in rubber industry, Small Scale Rubber Processing Projects, Small scale Rubber production line, Small Start-up Business Project, Start up India, Stand up India, Starting a Rubber Processing Business, Startup, Start-up Business Plan for Rubber Processing, Startup ideas, Startup Project, Startup Project for Rubber processing and compounding, Startup project plan, Steps in processing of rubber, Vulcanization of rubber, Vulcanization of rubber compounds, Vulcanized rubber properties, Rubber processing and compounding

Rubber Technology: Compounding and Testing for Performance is a practical guide to cost-effective formulating of rubber compounds to achieve optimal processing and performance. It provides a thorough discussion of the principles of rubber compounding, rubber testing, and how various compound changes will effect different properties and test measurements.

The 3rd edition of The Science and Technology of Rubber provides a broad survey of elastomers with special emphasis on materials with a rubber-like elasticity. As in the 2nd edition, the emphasis remains on a unified treatment of the material; exploring topics from the chemical aspects such as elastomer synthesis and curing, through recent theoretical developments and characterization of equilibrium and dynamic properties, to the final applications of rubber, including tire engineering and manufacturing. Many advances have been made in polymer and elastomers research over the past ten years since the 2nd edition was published. Updated material stresses the continuous relationship between the ongoing research in synthesis, physics, structure and mechanics of rubber technology and industrial applications. Special attention is paid to recent advances in rubber-like elasticity theory and new processing techniques for elastomers. This new edition is comprised of 20% new material, including a new chapter on environmental issues and tire recycling. - Explores new applications of rubber within the tire industry, from new filler materials to "green tires (a tire that has yet to undergo curing and vulcanization). - 30% of the material has been revised from the previous edition with the addition of 20% new material, including a chapter on the environment. - A mixture of theory, experiments, and practical procedures will offer value to students, practitioners, and research & development departments in industry.

History; Am pitçome pf ribber technology; The physics of raw and vulcanised rubbers; Raw polymeric materials; The chemistry and technology of vulcanisation; Materials for compounding and reinforcement; Reinforcement by fillers; Processing technology; Principles of compounding; Manufacturing techniques; Testing procedures and standards; Professional, trade, research, and standards organizations; Bibliography; References; Subject Index.

Elastomers and Rubber Compounding Materials reviews the properties of elastomers and particular groups of ingredients and chemicals mixed into the basic elastomer to form a rubber compound. After introducing the history of rubber industry and the general properties of rubber, the book discusses the properties, classification, concentration, stabilization, modification, application, transport, and storage of latex. It presents as well the methods of production, composition, physical properties, and chemical reactions of dry rubber. The book then focuses on the production and classification of different synthetic rubbers, such as styrene-butadiene, isoprene, butadiene, ethylene-propylene, and chloroprene. It also discusses the production, properties, and applications of elastomers, vulcanization chemicals, fillers, stabilizers, plasticizers, blowing agents, and textile reinforcing materials used in formulating rubber compounds. This book will be of great value not only to those who are in the rubber industry, but also to students of polymer science and rubber technology.

Rapra Technology is the leading independent international organisation with over 80 years of experience providing technology, information and consultancy on all aspects of rubbers and plastics.



Rubber products industry is an important resource based industry sector in India. Over the last decade the rubber industry has witnessed a steady and strong growth. Rubber can be deformed to a high degree of strain in a reversible manner and this special property finds use in fields as diverse as transportation, material handling, health care, and sport and leisure activities. The book covers manufacturing processes of rubber products, compounding of rubber, quality assurance, applications etc. Thus book is very useful for new entrepreneurs, existing units, technical institutions, technocrats etc. Rubber Chemicals are essential additives for the manufacture and quality improvement of rubber products such as automobile tires, rubber hoses, and quake absorbing rubbers. For rubber processing and compounding certain chemicals are required which are known as rubber chemicals. The primary requirement of adding different compounding ingredients to develop the different grades of rubber compounds to meet various service needs at an economic price and to provide certain desired physical properties to a considerable extent. Some of the examples of rubber chemicals are waxes, amines, thiazoles, silicone resins, alcohol, sulphuric acids, dithiocarbamates, phosphoric acid etc. They are mostly applicable for white and coloured rubber. They are generally used in rubber tubing, conveyor belt cover balloons, hot water bottles injection bottle caps, footwear related items etc. Indian rubber chemical industry has high growth potential triggered by increased consumption and steady growth in tyre and rubber industries. The speciality chemicals industry in India is projected to grow at 15-17 % per year to reach \$ 80-100 billion by 2020. The demand for rubber chemicals is on the rise. All major manufacturers have raised the prices of their products substantially. Massive investment is expected to flow into the rubber chemicals manufacturing sector in India in the coming years from both domestic and global players. The book covers different types, physical and chemical properties, applications of different rubber chemicals like waxes, synthetic organic chemicals, amines, silicones resins, releasing agents, stabilizers, solvents and many more. Some of the fundamentals of the book are synthetic hydrocarbon waxes, uses of amines in polymers, synthetic organic chemicals, analysis of specific anti-degradants, stabilization of halogenated polymers, anaerobic fermentations, the manufacture of sulfuric acid, analysis of dithiocarbamate esters, sodium hyposulfite (hydrosulfite), citric acid, gluconic acid, acetic acid, itaconic acid, kojic acid etc. Rubber chemicals have a huge potential growth in future and considering the importance of the chemical we have brought out this book which will be an invaluable resource to rubber chemical manufacturers, technocrats, researchers, consultants and new entrepreneurs. The book covers the major aspects of rubber compounding. For the first time, the reader will find all relevant issues, whether it is machine design, process technology, or material parameters, covered in one comprehensive volume. - Compounding (System Description) - The Mixer - Process Technology in Compounding - Correlation between Material Parameters and the Compounding Process - Correlation between Processing and Properties for Technical Parts Made from Rubber - Properties of Synthetic Polymers during Compounding - Production of Silica Compounds - Physical Phenomena in the Manufacture of Rubber Compounds

The rubber industry is a vital part of the world economy. In this age of constantly changing economics and raw material "shortages of the week," this book should help the reader understand the overall technical and economic problems that are emerging

which are beginning to affect the overall availability of many raw materials, chemical intermediates and final rubber products on the world scene. This book is truly unique in that it is the only one that traces all the important organic and inorganic synthesis routes for the manufacture of synthetic rubbers, various fillers, plasticizers, oils, curatives, antidegradants, adhesion promoters, flame retardants, tackifiers, and blowing agents through their respective intermediates to the base raw materials from earth extractions and agriculture.

Science and Technology of Rubber covers the most important aspects of rubber science and technology, from synthesis and structure to elasticity and flow, blending, filling, and cross-linking. Polymerization and copolymerization, the rheological behavior of unvulcanized rubber, vulcanization, reinforcement of elastomers by particulate fillers, and the chemical modification of polymers are also discussed. This book is comprised of 14 chapters; the first ten of which take the reader from an introduction through synthesis characterization, mechanical behavior, and flow to the major processing steps of filling, compounding, and vulcanization and to the theories and measurement of elastomeric performance, leaning strongly on the "materials" approach. The next three chapters deal with blended, modified, and thermoplastic elastomers, touching on topics such as polymer esterification, etherification, hydrolysis, and hydrogenation as well as the influence of blending on the properties of elastomer/plastic blends, especially impact strength and crack resistance. The book concludes with a chapter on tire manufacture and engineering, with emphasis on the geometric, structural, and chemical aspects of tire. This book will be of vital interest to students, practitioners, and research and development managers, as well as to anyone interested in the unusual chemistry and physics and the outstanding properties and usefulness of elastomers. About ten years after the publication of the Second Edition (1973), it became apparent that it was time for an up-date of this book. This was especially true in this case, since the subject matter has traditionally dealt mainly with the structure, properties, and technology of the various elastomers used in industry, and these are bound to undergo significant changes over the period of a decade. In revising the contents of this volume, it was thought best to keep the original format. Hence the first five chapters discuss the same general subject matter as before. The chapters dealing with natural rubber and the synthetic elastomers are up-dated, and an entirely new chapter has been added on the thermoplastic elastomers, which have, of course, grown tremendously in importance. Another innovation is the addition of a new chapter, "Miscellaneous Elastomers," to take care of "old" elastomers, e.g., polysulfides, which have decreased somewhat in importance, as well as to introduce some of the newly-developed synthetic rubbers which have not yet reached high production levels. The editor wishes to express his sincere appreciation to all the contributors, without whose close cooperation this task would have been impossible. He would especially like to acknowledge the invaluable assistance of Dr. Howard Stephens in the planning of this book, and for his suggestion of suitable authors.

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