



ANSI/CEMA 350-2015
Revision of
ANSI/CEMA 350-2009
Approved: January 28, 2015

CEMA STANDARD NO. 350
Fifth Edition

SCREW CONVEYORS for Bulk Materials



CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION

ISBN: 978-1-891171-64-2



CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION (CEMA)

DISCLAIMER

The information provided herein is advisory only.

These recommendations provided by CEMA are general in nature and are not intended as a substitute for professional advice. Users should seek the advice, supervision and/or consultation of qualified engineers, safety consultants, and other qualified professionals.

Any use of this publication, or any information contained herein, or any other CEMA publication is made with the agreement and understanding that the user and the user's company assume full responsibility for the designs, safety, specifications, suitability and adequacy of any conveyor system, system component, mechanical or electrical device designed or manufactured using this information.

The user and the user's company understand and agree that CEMA, its member companies, its officers, agents and employees are not and shall not be liable in any manner under any theory of liability to anyone for reliance on or use of these recommendations. The user and the user's companies agree to release, hold harmless and indemnify and defend CEMA, its member companies, successors, assigns, officers, agents and employees from any and all claims of liability, costs, fees (including attorney's fees), or damages arising in any way out of the use of this information.

CEMA and its member companies, successors, assigns, officers, agents and employees make no representations or warranties whatsoever, either expressed or implied, about the information contained herein, including, but not limited to, representations or warranties that the information and recommendations contained herein conform to any federal, state or local laws, regulations, guidelines or ordinances.



*Prepared by the Screw Conveyor Engineering Committee of the
Engineering Conference*

Conveyor Equipment Manufacturers Association

Screw Conveyors for Bulk Materials

CEMA Standard No. 350

Fifth Edition

Summary of Changes in Fifth Edition

Dimensions for 30" and 36" Screws were added in the following Tables:

Chapter 2, Tables 2-3, 2-5, 2-7, 2-8, and 2-9

Chapter 3, Tables 3-2 and 3-5

Most drawings and figures were updated with color CAD drawings.

Fifth Edition - 2015

Fourth Edition - 2009

Third Edition - 2000

Second Edition - 1980, 1983, 1990

First Edition - 1971, 1975

Published by the Conveyor Equipment Manufacturers Association

5672 Strand Ct, Suite 2

Naples, Florida 34110

USA

239.514.3441

FAX 239.514.3470

www.cemanet.org

Copyright © 2015 by the Conveyor Equipment Manufacturers Association. All rights reserved.
This book may not be reproduced in any form without written permission from CEMA.

ISBN 978-1-891171-64-2

Safety Notice

The Conveyor Equipment Manufacturers Association (CEMA) has developed industry ***Standard Safety Labels*** for use on the conveying equipment of its member companies. The purpose of the labels is to identify common and uncommon hazards, conditions, and unsafe practices that can injure, or cause the death of, the unwary or inattentive person who is working at or around conveying equipment. The labels are available for sale to member companies and nonmember companies.

A full description of the labels, their purpose, and guidelines on where to place the labels on typical equipment, has been published in CEMA's **Safety Label Brochure (No. 201)**. The brochure is available for purchase by members and nonmembers of the Association.

PLEASE NOTE: Should any of the safety labels supplied by the equipment manufacturer become unreadable for any reason, the equipment USER is then responsible for replacement and location of these safety labels.

Replacement labels and placement guidelines can be obtained by contacting your equipment supplier or CEMA.

A CEMA DVD safety instruction video, A/V 6, entitled Screw Conveyor, Drag Conveyor, and Bucket Elevator Safety Video, has also been developed by the CEMA Screw Conveyor Section. It describes key safety practices people should adhere to when working with and around these different conveyors. It is available for purchase from CEMA.

Note: Some pictures and diagrams of screw conveyors in this book are without covers or have exposed screws or shafting and are for illustration purposes only. Conveyors should never be used without covers, guards, or protective equipment.

Contents

CHAPTER 1	<i>Screw Conveyor History and General Application</i>	1
	Screw conveyor history. Discussion of application of screw conveyors. Data needed in preparation of screw conveyor design. Illustrations of screw conveyor installations.	
CHAPTER 2	<i>Bulk Material Characteristics, Material Code, Conveyor Size and Speed, Component Groups</i>	9
	Discussion and codification of bulk material characteristics. Tables of bulk materials. Screw conveyor sizes, speeds and capacities. Lump size limitations. Enumeration and description of screw conveyor components. Component specifications for normal, heavy and extra heavy service.	
CHAPTER 3	<i>Horsepower Requirements, Torsional Ratings for Conveyor Screws, End Thrust, Typical Horizontal Screw Conveyor Problem</i>	37
	Formula for horsepowers of horizontal screw conveyors. Torsional rating of conveyor screws and all screw parts. Horsepower limitation charts for conveyor screws based on bolted couplings. Screw conveyor end thrust. Deflections of conveyor screws. Detailed solution of typical horizontal screw conveyor problem.	
CHAPTER 4	<i>Screw Conveyor Layout, Screw Conveyor Components</i>	53
	Instructions for layout of screw conveyors with dimensional data. Discharge arrangements described and illustrated. Detail data on screw conveyor components such as screws, flighting, modifications to flighting, troughs, discharge spouts and gates, trough ends, trough end bearings, trough end seals, trough covers, hangers and hanger bearings, shafting, bolts and trough supports.	
CHAPTER 5	<i>Materials of Construction, Classes of Enclosure, Weld Finish, Special Features and Modifications, Installation, Operation, Maintenance, Expansion</i>	75
	Discussion of materials of construction. Codification of classes of enclosure. Description and codification of weld finishes. Description and illustration of special features of conveyor components for various purposes. Directions for installing screw conveyors, operating them and preventive maintenance. Calculation of the expansion of screw conveyors handling hot materials.	

CHAPTER 6	<i>Screw Feeders, Single and Multiple</i>	105
	Description of single and multiple screw feeders, their uses and limitations, speeds, capacities, arrangements with extension conveyors, horsepower required. Bin bottom type multiple screw feeders. Also included is guidance on Variable Frequency Drive (VFD) selection for screw feeders.	
CHAPTER 7	<i>Inclined and Vertical Screw Conveyors</i>	118
	Discussion of capacity versus angle of incline and other factors concerning inclined screw conveyors, including horsepower. Description of vertical screw conveyors, their speeds, capacities, components and horsepower required.	
CHAPTER 8	<i>Screw Conveyor Drives, Drive Efficiencies and Drive Service Factors</i>	129
	Discussion and illustration of horizontal, inclined and vertical screw conveyor drives. Table of drive efficiencies. Service factor references.	
APPENDIX	<i>Derivation of Horsepower Formula for Horizontal Screw Conveyors, Individual Torsional Ratings of Conveyor Screw Parts, Metric Practice in Screw Conveyor Calculations</i>	139
INDEX		

Foreword

While the screw conveyor as we know it today is the descendant of the oldest form of conveyor in recorded history, utilizing the oldest mechanical device employed by mankind, the inclined plane (wrapped around a core to form a helix), this book is the first attempt to bring together the collective knowledge and experience of leading manufacturers to codify what has come to be acceptable engineering practice for the benefit of user and manufacturer alike.

The Screw Conveyor Engineering Committee of the CEMA (Conveyor Equipment Manufacturers Association) Engineering Conference was assigned the task of bringing together under one cover the accumulated experience of many individuals and their companies in an effort to provide a common basis for the selection and installation of screw conveyors of sizes and capacities to handle the most commonly encountered bulk materials of commerce and industry.

This book is not intended as the final word on all screw conveyor engineering, but rather to serve as an engineering guide. Those who have contributed so generously of time and effort to its compilation strongly recommend that help from conveyor manufacturers be enlisted to check selection of sizes, capacities and types of conveyors where there is the least element of doubt, and always when materials of unknown, unusual or changeable character are involved. Today's rapidly changing technology and the continuous introduction of new materials—or old materials with new characteristics—emphasizes this recommendation as a means to the satisfactory performance of a conveyor or conveyor system.

The Conveyor Equipment Manufacturers Association believes that this publication represents a milestone in the long historical development of the screw conveyor as a vital machine for the transport of a wide variety of materials.

NOTE: *Environmental as well as many other conditions vary with each installation. As a result, this engineering manual is intended merely as a guide to conveyor selection. Neither the Conveyor Equipment Manufacturers Association nor its member companies warrant that adherence to the guidelines set forth in this brochure will necessarily result in proper selection, manufacture, installation or maintenance of conveyor equipment and/or a conveyor system. Unless there are specific written specifications or recommendations pursuant to a written contractual commitment, the Conveyor Equipment Manufacturers Association and its member companies hereby disclaim all responsibility for any equipment and/or system malfunction, any violations of law, property damage, personal injury or any other damages resulting from equipment and/or system selection, design, installation, maintenance, or operation carried out by the contractor or user.*