



REHVA GUIDEBOOK

Electrostatic precipitators

for industrial applications

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rehva

Federation of European Heating and Air-conditioning Associations

Cost G3

Industrial Ventilation



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Rehva – Federation of European Heating and Air-conditioning Associations

REHVA is a 40 year old organisation of European professionals in the field of building services (heating, ventilating and air-conditioning). REHVA represents more than 100 000 experts from 30 European countries.

Rehva's main activity is to develop and disseminate economical, energy efficient and healthy technology for mechanical services of buildings and industry. The work is supervised by the board of directors. Each of the members of the board is responsible for work in a specific area of REHVA activities.

Rehva guidebook projects are coordinated by the Technical Committee of REHVA. The objectives of this work are:

- Initiate work for technical guidebooks in the area of building services,
- Establish task forces for such guidebooks
- Develop distribution of REHVA Guidebooks to members and other professionals
- Supervise the quality of REHVA Guidebooks

Several Task Forces are currently working towards REHVA guidebooks such as: commissioning of HVAC-systems for good energy efficiency and indoor climate, control of exposure to environmental tobacco smoke with ventilation, criteria of clean ventilation systems, low temperature heating systems, indoor environment and productivity.

The topic of the guidebook on Electrostatic precipitators is extremely important in respect of indoor and outdoor air quality and material recovery from industrial processes. This guidebook is the first product of REHVA's new activity in the area of industrial ventilation. The guidebook presents theory on the principles of electrostatic precipitators and illustrates their practical applications.

The guidebook on electrostatic precipitators is written by a working group of highly qualified international experts under the leadership of Mr Kjell Porle. The work is done on voluntary

basis with no commercial interest. The work has been done in co-operation with Cost G3 Industrial Ventilation activity supported by European Commission. REHVA has been extremely pleased with this fruitful co-operation. The board would like to express its sincere gratitude to the members of the working group for their invaluable work.

Olli Seppänen

President Elect of REHVA and Chairman of the technical committee

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Preface

It is with great pleasure, and with appreciation of the effort of Mr. Kjell Porle and his co-authors that I take this book in my hand. The authors are experts that have been working within the field of air cleaning and industrial electrostatic precipitators for many years. The work with writing this book has been done on a purely voluntary basis, the motive for writing being to convey the knowledge to younger generations.

This book is the first guidebook in the series “System and Equipment” that was initiated within the EU-activity of Cost G3. The activity of Cost G3 “Industrial Ventilation” was established in 1996, following a 5 year activity in Finland on industrial ventilation. The aim of this activity was to collect the best available knowledge on industrial ventilation, and disseminate it to engineers and scientists in Europe and the rest of the world. The first result of this activity was the “Design Guidebook” which contains fundamental knowledge on industrial ventilation. Following the Design Guidebook, a number of guidebooks on applications and on systems and equipment were initiated.

Cost G3 was terminated in 2003, after having reached the maximum duration determined by the EU. The activity on the dissemination is continuing within Rehva. The preparation of new applications is guided by Håkon Skistad and we hope that there will be a fruitful continuation to COST G3, where most of the work was done on voluntary basis.

Esko Tähti,
former chairman of Cost G3.

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The authors

Kjell Porle, ALSTOM Power, Växjö, Sweden.

Kjell graduated from Chalmers Technical University in Gothenburg, Sweden, 1963 with a Master of Science degree in Electrical Engineering. After a few years with ASEA in Sweden he joined FLAKT in Växjö 1966 and has ever since worked with ESP's. The company FLAKT was integrated in ABB and later on sold to ALSTOM. Development and applications of the ESP technology have been the focus. Kjell is since many years a member of The Board of Directors of the International Society of Electrostatic Precipitation – see www.isesp.org. During 2001-2004 he served as the President for that Society. Kjell has got the International Fellow Award and the Frederic Cottrell Award for outstanding achievements of the ESP Technology. He has authored and co-authored many papers.

Keith Bradburn, ALSTOM Power, Knoxville, Tennessee

Keith has an honors degree in Mechanical Engineering from Aston University in Birmingham England. He began his career with ESPs joining Lodge Cottrell Ltd, Birmingham England in 1961. In 1970 he transferred to the newly formed Lodge Cottrell Inc in the United States and served in a number of ESP engineering and technical positions. In 1981 Keith joined FLAKT in Knoxville, Tennessee, later ABB and ALSTOM and has been ESP Product Manager with responsibilities for ESP sizing, design and performance for power plant applications and is currently ESP Technology Manager.

Keith is a member of the International Society of Electrostatic Precipitation and has authored and co-authored numerous technical papers.

Steve Francis, ALSTOM Power, Knoxville, Tennessee

Steve has an Associates of Arts degree in Electronics Technology from Catonsville Community College in Baltimore, Maryland. Steve first started working on electrostatic precipitators in 1980 while working for Environmental Elements Corporation in Baltimore, Maryland. During his time at Environmental Elements Corporation Steve progressed within the organization to become a Senior Applications Engineer responsible for sizing, arranging and guaranteeing the performance of ESP's applied to both Power and Industrial applications. In 1997 Steve joined ABB in Knoxville, TN that is now ALSTOM Power. Steve was an ESP Product Manager for ALSTOM Power with focus on Industrial ESP applications. Steve has recently become a Strategic Technology Development Manager for ESP's and Fabric Filters used for particulate collection on power generation plants around the world. Since joining ALSTOM Power in 1997, Steve has been an author or co-author on many papers associated with ESP's and fabric filters.

Reviewers

The following persons have reviewed the book,

- Michael Schmidt, Dr.-Ing., professor at Universität Stuttgart, Lehrstuhl für Heiz- und Raumluftechnik, Germany
- Petter Sagen, M.Sc, Norconsult AS, Sandvika, Norway