

Overview

Elastomeric sealants have a relatively short history. The early 1950s saw the introduction of the first elastomeric sealants based on a polysulfide polymer. Since then acrylic, urethane, and silicone polymer based sealants, among others, have been developed. Presently, the range and types of sealant products available is extensive, with many excellently performing products on the market to fulfill the most demanding joint sealing requirements.

Shortly after the introduction of modern sealants, ASTM Committee C-24 on Building Seals and Sealants was organized in 1959 to develop standards for sealants. Since then, C-24 has developed over seventy standards, most of which relate to sealant testing, usage, and performance. Although a considerable amount of work has been performed in developing standards for sealants, there are additional standards that need to be developed. Presently C-24 has about 25 task groups working on new standards that are needed in the sealant industry.

In conjunction with its standards making activities, C-24 initiated a series of symposia in 1986 based on the C-24 scope of interest; the sealant, waterproofing, and pipe gasket and coupling industries. The first symposium held in 1988 resulted in Special Technical Publication (STP) 1054, "Science and Technology of Glazing Systems", the 1989 symposium in STP 1084, "Building Deck Waterproofing" and the 1990 symposium in publication of this book. At least two more symposia are planned, one each in 1991 and 1992.

The purpose of the current series of C-24 symposia is the presentation of the latest developments in the sealant, waterproofing and pipe gasket and coupling industries. Additionally, the identification of areas of concern as evidenced by laboratory testing, field observation, and theoretical study and the presentation of this information in the hopes of stimulating additional research as well as providing a basis for new standard development.

When this book and the symposium upon which it was based was organized, a concerted effort was made to obtain authors from around the world. The intent was to produce a symposium with a range of viewpoints and international concerns. That effort resulted in eight papers being submitted from Australia, Belgium, England, and Sweden, and sixteen from the United States. As evidenced by the submitted papers, the use of sealants for structural sealant glazing, the identification and

2 BUILDING SEALANTS

quantification of the effects of movement on sealants, continuing laboratory investigation of sealant performance under various environmental factors, and the in-service performance of sealants appear to be major concerns of the sealant industry. The following lists the topics of the submitted papers, as well as identifies areas where additional research and standard development could be performed.

STRUCTURAL SEALANT GLAZING

The continuing and timely development of standards for structural sealant glazing must continue if this segment of the sealant industry is to grow while maintaining adequate quality control over the end product. The papers present new information on structural sealants relative to insulating glass edge seal performance, the use of structural glazing techniques to attach stone panels, the effects of long term creep rupture and fatigue loading on structural seals, stresses that occur in structural glazing, testing and qualification of structural sealants, and structural glazing system design and quality control.

There are many other areas of structural sealant glazing that need to be addressed in the future, including the effects of combinations of secondary forces in addition to the primary force of wind loading, such as, thermal movement, dead loading, and seismic forces on the structural seals. This could lead to development of a practical theoretical model for the design professional that will allow calculation of structural glazing seal performance when secondary forces are included.

Presently, quality control procedures are the result of an agreement between the parties involved on a particular project and, therefore, can vary from project-to-project. Uniform-industry wide recommendations for quality control of structural sealant glazing needs to be developed. This would result in a minimum level of inspection and quality control for the structural glazing industry.

MOVEMENT CAPACITY OF SEALANTS

Papers on the ability of sealants to absorb movement, the identification and quantification of sealant stresses during movement, establishing the movement capability of sealants, and designing sealant joints for movement are included.

Additional work needs to be performed in defining the factors that effect the movement capability of a sealant joint. This effort should be multi-disciplinary since it will involve establishment of properties for

materials other than sealants, such as, thermal and moisture movement effects of sealed materials. Also, realistic construction tolerances need to be established for materials and systems that form the sides of a sealant joint and that indirectly effect a joint's ability to perform and remain durable. Combined movements of a sealant joint, such as, compression and extension in conjunction with longitudinal shear should be investigated to establish movement capability for use in sealant joint design.

LABORATORY INVESTIGATION

Laboratory testing includes papers on temperature and moisture effects on sealant performance, adhesion properties of sealants, heat aging effects, the water resistance of sealants, compatibility issues with laminated glass, new materials for sealant formulation and usage, and sealant usage with membrane waterproofing systems.

Other areas that could be investigated are the effects of movement that occur during sealant cure, the development of laboratory test methods that will be predictive of actual in-service performance, better test methods to predict sealant compatibility with other materials, and the staining or dirtying potential of sealants with other materials.

SEALANT JOINT PERFORMANCE

In-service performance is represented by papers on sealant usage with exterior insulation systems, correlation of in-service performance with laboratory testing, and the identification of sealant in-service failure mechanisms, among others. This area should receive increased attention in the future so that better correlation between laboratory testing and prediction and actual in-service performance can be obtained. Periodic assessment of in-service performance will also assist in identifying potential failure mechanisms or workmanship deficiencies so that corrective procedures can be implemented and information provided to the entire sealant industry.

In-service performance is also subject to both design and workmanship deficiencies. Sadly, at least in the United States, there is no recognized nor uniform national training or certification program for the designers of sealant joints or the workmen who install the sealants and related accessories. Sealant joints, which are a small part of a building's total cost, when improperly designed or installed can, among other effects, be the source of leakage and deterioration of materials that can result in very costly correctional

4 BUILDING SEALANTS

action. The development of standards and certification programs that will educate the design professionals and workmen is overdue and would help immensely in decreasing the incidence of premature sealant joint failure.

PRESENT AND FUTURE TRENDS

Lastly, two papers complete the book. The first discusses the present status of the sealant industry and the second is an overview of challenges to the sealing and other related building envelope industries.

The quality and quantity of world-wide research work being performed in the sealant industry today is impressive and this book is evidence of a continuing quest for knowledge of sealant performance. It is hoped that these papers will stimulate further research in the areas described, as well as others, and contribute to the development of new standards that are needed in the industry.

The symposium chairman would like to thank the authors and peer reviewers, who by their timely and well considered contributions, made the symposium a success, and importantly, resulted in timely publication of this book.

Thomas F. O'Connor, AIA, FASTM
Smith, Hinchman & Grylls Associates, Inc.
Detroit, MI 48226
Symposium Chairman and Editor