

VISCOSITY TESTING OF ASPHALT AND EXPERIENCE WITH VISCOSITY GRADED SPECIFICATIONS

STP 532



AMERICAN SOCIETY FOR TESTING AND MATERIALS

VISCOSITY TESTING OF ASPHALT AND EXPERIENCE WITH VISCOSITY GRADED SPECIFICATIONS

A symposium
presented at the
Seventy-fifth Annual Meeting
AMERICAN SOCIETY FOR
TESTING AND MATERIALS
Los Angeles, Calif., 25-30 June 1972

ASTM SPECIAL TECHNICAL PUBLICATION 532
W. G. Gunderman, symposium chairman

04-532000-08



AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race Street, Philadelphia, Pa. 19103

© BY AMERICAN SOCIETY FOR TESTING AND MATERIALS 1973
Library of Congress Catalog Card Number: 72-97872

NOTE

**The Society is not responsible, as a body,
for the statements and opinions
advanced in this publication.**

**Printed in Baltimore, Md.
June 1973**

**Printed in New Carlisle, Ohio
March 1981**

Foreword

The Symposium on Viscosity Testing of Asphalt and Experience with Viscosity Graded Specifications was presented at the Seventy-fifth Annual Meeting of the American Society for Testing and Materials held in Los Angeles, Calif., 25-30 June 1972. Committee D-4 on Road and Paving Materials sponsored the symposium. W. G. Gunderman, Highway Research Board, National Academy of Sciences, presided as symposium chairman.

Related ASTM Publications

**Rapid Test Methods for the Determination of Bitumen
Content in Bituminous Mixtures, STP 461
(1969), \$3.75 (04-461000-08)**

**Fatigue of Compacted Bituminous Aggregate Mix-
tures, STP 508 (1972), \$13.75 (04-508000-08)**

Contents

Introduction	1
Rheology of Asphalt Cements at 60 C (140 F)—H. E. SCHWEYER, J. P. MOORE, AND J. K. LING	3
Temperature Susceptibility	4
Experimental	7
Results	9
Discussion	12
Conclusions	14
Study of Asphalt Viscosity Testing at 60 F—J. V. EVANS AND J. W. GORMAN	16
Experimental	17
Data and Analysis	18
Conclusions and Recommendations	25
Problems in Determining Viscosity of Asphalts at Low Temperatures with Shell Sliding Plate Microviscometer—E. O. BUSBY AND L. F. RADER	28
Range of Microviscometer	29
Need for Low-Temperature Viscosities	29
Summary	30
Florida Studies with the Puzinauskas Field Viscosity Cup for Asphalt Cements— C. F. POTTS	31
Base Chart	32
Puzinauskas-Asphalt Institute Field Viscosity Cup (P-AI)	34
Calculations	35
Experimental Data	36
Acceptability Diagram	37
Viscosity Characterization of Asphalt Cement—L. W. CORBETT and H. E. SCHWEYER	40
Examination of Typical Asphalt Sources	41
Viscosity at 140 F Versus Penetration at 77 F	41
Identifying Grade While Defining Character	45
Viscosity at 275 F as Dependent Upon Viscosity at 140 F	49
Summary	50
The Rolling Thin-Film Circulating Oven—An Improved Rolling Thin-Film Oven Test—R. J. SCHMIDT	52
Present Situation	53
Description of Oven	58
Comparison of Temperature Control	58
Test Procedure	58
Comparison of Results	58
Collaborative Test Program	61
Comparison of RTF-C and TFO Exposure by Using Collaborative Test Results	63
Conclusions and Recommendations	63

Asphalt Viscosity-Related Properties of In-Service Pavements in Pennsylvania—P. S. KANDHAL, L. D. SANDVIG, W. C. KOEHLER, AND M. E. WENGER	66
Design and Construction of Test Pavements	67
Performance of Test Sections	67
Rheological Properties of Asphalts	69
Discussion of Results	73
Conclusions	77
Laboratory Measurement of the Durability of Paving Asphalts—R. J. SCHMIDT	79
Laboratory-Hardened AC Specimens	80
Rolling Microfilm Oven Test (RMFO)	82
Influence of Mineral Filler and Temperature	84
Extra High Air Circulation During RMFO Exposure	85
Capillary Venting of RMFO Exposure Bottle—Preliminary RMF-C Procedure	86
Effect of Simulating Hot-Mix Hardening Prior to Simulating Long-Term Durability	87
Effect of Increasing Exposure Time—Final RMF-C Procedure	88
Comparison of Hardening Obtained by Laboratory Aging of AC Specimens with RMF-C Aging of a Variety of Asphalts	89
Comparison of RMF-C Exposure Hardening with Life of Zaca-Wigmore Test Pavement Project	89
Comparison of RMF-C Exposure with Hardening in Recent California Division of Highways Field Tests	90
Precision of RMF-C Test	94
Labor Required to Perform RMF-C Test	94
Summary and Conclusions	94
Asphalt Durability Tests and Their Relationship to Field Hardening—G. R. KEMP	100
Field Test Sections	101
Laboratory Test Procedures	104
Laboratory Test Results	106
Analysis of Test Section Data	106
Correlation of Laboratory and Field Test Results	115
Findings to Date	117
Conclusions	121