SYMPOSIUM ON SOLDER

Presented at the
FIFTY-NINTH ANNUAL MEETING
AMERICAN SOCIETY FOR TESTING MATERIALS
Atlantic City, N. J., June 19–20, 1956



ASTM Special Technical Publication No. 189

Published by the
AMERICAN SOCIETY FOR TESTING MATERIALS
1916 Race St., Philadelphia 3, Pa.

SYMPOSIUM ON SOLDER

Presented at the FIFTY-NINTH ANNUAL MEETING AMERICAN SOCIETY FOR TESTING MATERIALS Atlantic City, N. J., June 19-20, 1956



Reg. U. S. Pat. Off.

ASTM Special Technical Publication No. 189

Price \$3.00; to Members, \$2.25

Published by the AMERICAN SOCIETY FOR TESTING MATERIALS 1916 Race St., Philadelphia 3, Pa. COPYRIGHT, 1957 BY THE

AMERICAN SOCIETY FOR TESTING MATERIALS

Printed in Baltimore, Md. December, 1956

FOREWORD

The papers and discussions in this Symposium on Solder were presented at the Fifth, Ninth, Fourteenth, and Fifteenth Sessions of the Fifty-ninth Annual Meeting of the American Society for Testing Materials, held in Atlantic City, N. J., June 19–20, 1956. The Symposium was sponsored by Subcommittee III on White Metal Alloys of Committee B-2 on Non-Ferrous Metals and Alloys with Mr. G. H. Harnden of General Electric Co., Schenectady, N. Y., serving as symposium committee chairman.

Mr. G. H. Clamer, Ajax Metal Division of H. Kramer Co., Philadelphia, Pa., acted as Honorary Chairman for the Symposium, while Mr. G. O. Hiers, National Lead Co., Baldwin, N. Y., Mr. G. H. Harnden, Mr. L. L. Wyman, National Bureau of Standards, Washington, D. C., and Mr. R. M. MacIntosh, Tin Research Institute Inc., Columbus, Ohio, presided over the Fifth, Ninth, Fourteenth, and Fifteenth Sessions, respectively.

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

CONTENTS

Introduction—Bruce W. Gonser	PAGE 1
Introduction—Bruce w. Gonser	1
Solders	
Solder, Fluxes, and Techniques for Soldering Aluminum—J. D. Dowd	13 15
Discussion Dip Soldering Printed Circuits—E. S. Miller and A. A. Johns, Jr.	30
Discussion	41
Industrial Survey of Paste Solder Alloys—H. R. Williams	
Soldering Fluxes	
Corrosive Fluxes—Their Role in Soldering—Robert M. MacIntosh Discussion The Use of Rosin and Activated Rosin Fluxes—Frederick C. Disque, Jr. Discussion Soldering Fluxes and Flux Principles—A. Z. Mample Discussion Non-Corrosive Fluxes, Evaluation of Spread and Corrosion Properties—H. C. Sohl Discussion	62 64 69 71 80 81
Joint Strength Characteristics	
A Method for Testing and Evaluating the Joint Properties of a Copper Liner Soldered in an Aluminum Casting—M. V. Davis	89 101
H. E. Pattee and R. M. Evans Discussion	103 114
Dip-Solder Printed Circuit Joint Characteristics—Alfred A. Johns, Jr. and E. S. Miller	115 127
"Tin Disease" in Solder Type Alloys—Alfred Bornemann Discussion	147
Gray Tin Formation in Soldered Joints Stored at Low Temperature—W. Lee Williams Discussion Proposed Numerical Evaluation System for Soft Solders, Solder Fluxes, and Solder	158
ability—L. Pessel	159
Controlling Quality on Soldered Electrical Connections-W. H. Rombach	175
Symposium Summation—G. H. Harnden	184

THIS PUBLICATION is one of many issued by the American Society for Testing Materials in connection with its work of promoting knowledge of the properties of materials and developing standard specifications and tests for materials. Much of the data result from the voluntary contributions of many of the country's leading technical authorities from industry, scientific agencies, and government.

Over the years the Society has published many technical symposiums, reports, and special books. These may consist of a series of technical papers, reports by the ASTM technical committees, or compilations of data developed in special Society groups with many organizations cooperating. A list of ASTM publications and information on the work of the Society will be furnished on request.