

STAINLESS STEEL CASTINGS

Behal/Melilli, *editors*



STAINLESS STEEL CASTINGS

A symposium
sponsored by ASTM
Committee A-1 on Steel,
Stainless Steel, and
Related Alloys
Bal Harbour, Fla., 12-13 Nov. 1980

ASTM SPECIAL TECHNICAL PUBLICATION 756
V. G. Behal, Dominion Foundries
and Steel, Ltd., and
A. S. Melilli, General Electric
Company, editors

ASTM Publication Code Number (PCN)
04-756000-01



1916 Race Street, Philadelphia, Pa. 19103

Copyright © by AMERICAN SOCIETY FOR TESTING AND MATERIALS 1982
Library of Congress Catalog Card Number: 81-68330

NOTE

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

Printed in Baltimore, Md.
March 1982

Foreword

The symposium on Stainless Steel Castings was presented at Bal Harbour, Florida, 12-13 Nov. 1980. The symposium was sponsored by ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and organized by ASTM Subcommittee A01.18 on Steel Castings. V. G. Behal, Dominion Foundries and Steel, Ltd., and A. S. Melilli, General Electric Company, presided as symposium cochairmen and editors of the publication.

Related ASTM Publications

Properties of Austenitic Stainless Steels and Their Weld Metals (Influence of Slight Chemistry Variations), STP 679 (1979), 04-679000-02

Intergranular Corrosion of Stainless Alloys, STP 656 (1978), 04-656000-27

Atmospheric Factors Affecting the Corrosion of Engineering Metals, STP 646 (1978), 04-646000-27

Structures, Constitution, and General Characteristics of Wrought Ferritic Stainless Steels, STP 619 (1976), 04-619000-02

Compilation and Index of Trade Names, Specifications, and Producers of Stainless Alloys and Superalloys, DS 45A (1972), 05-045010-02

A Note of Appreciation to Reviewers

This publication is made possible by the authors and, also, the unheralded efforts of the reviewers. This body of technical experts whose dedication, sacrifice of time and effort, and collective wisdom in reviewing the papers must be acknowledged. The quality level of ASTM publications is a direct function of their respected opinions. On behalf of ASTM we acknowledge with appreciation their contribution.

ASTM Committee on Publications

Editorial Staff

Jane B. Wheeler, *Managing Editor*
Helen M. Hoersch, *Senior Associate Editor*
Helen P. Mahy, *Senior Assistant Editor*
Allan S. Kleinberg, *Assistant Editor*
Virginia M. Barishek, *Assistant Editor*

Contents

| | |
|--|-----|
| Introduction | 1 |
| Seventy-Five Years of Cast High Alloys—E. A. SCHOEFER | 3 |
| CORROSION-RESISTANT CASTINGS | |
| Stainless Steel Castings in New York City Water Tunnel No. 3— G. A. ANDERSEN AND S. GOLDSPIEL | 13 |
| Intergranular Stress-Corrosion Cracking Resistance of Austenitic Stainless Steel Castings—N. R. HUGHES, W. L. CLARKE, AND D. E. DELWICHE | 26 |
| Austeno-Ferritic Stainless Steel Castings—A Future Solution to Many Corrosion Problems—ALAIN JÖLY | 48 |
| Electroslag Casting of Stainless Steel Valve Bodies—A. MITCHELL, G. SIDLA, AND D. GUPTA | 60 |
| Stainless Steel Investment Castings—G. D. CHANDLEY | 78 |
| Production and Properties of Valve Bodies Made of Stabilized Chromium-Nickel Steel Castings for the Charge in Nuclear Power Stations—K. ACHELK | 92 |
| Predicting and Evaluating Ferrite Content in Austenitic Stainless Steel Castings—M. T. LEGER | 105 |
| Ferrite Measurement and Control in Cast Duplex Stainless Steels— L. S. AUBREY, P. F. WIESER, W. J. POLLARD, AND E. A. SCHOEFER | 126 |
| Influence of Long-Time Aging of CF8 and CF8M Cast Steel at Temperatures Between 300 and 500°C on Impact Toughness and Structural Properties—A. TRAUTWEIN AND W. GYSEL | 165 |
| Effect of Residual Tin Levels on Mechanical Properties of 12.5Cr Stainless Steel Castings—STEVE MORYKWA | 190 |

- Recent Results Concerning Properties of High-Performance Cast Martensitic Stainless Steels: The 17Cr-4Ni Low-Carbon Steels—**
C. PICHARD AND G. NECTOUX 201

HEAT-RESISTANT CASTINGS

- An Analysis of Two Casting Defects in Parts Made from ACI Type HF Heat-Resistant Stainless Steel—**E. M. BOSAK AND R. ELMENDORF 225
- Weldability Testing of Cast Corrosion-Resistant and Heat-Resistant Steels—**M. J. CIESLAK AND W. F. SAVAGE 241
- Effect of Nitrogen in Cast Heat-Resistant Alloys for Service in Atmospheres Containing High Sulfur at High Temperature—**L. E. FINCH 259
- Comparison of the Properties of the HK-40 and HP-45 Cast Heat-Resistant Alloys—**D. B. ROACH AND J. A. VANECHO 275

CA6NM CASTINGS

- Effects of Carbon Content and Tempering Treatment on the Mechanical Properties and Sulfide Stress-Corrosion Cracking Resistance of AOD-Refined CA6NM—**C. S. NALBONE 315
- Metallurgical Characteristics of a Large Hydraulic Runner Casting of Type 13Cr-Ni Stainless Steel—**Y. IWABUCHI AND S. SAWADA 332
- High-Strength Cast Stainless Steels with Enhanced Corrosion Resistance—**J. D. CRAWFORD, K. ROHRIG, AND S. BECHET 355
- Manufacturing and Properties of Large Castings in 13Cr-1Ni Low-Carbon Steel (ASTM A217)—**C. SANTAFÈ, M. PRIANTE, G. AMICI, AND M. FINOCCHIO 369
- A New Low-Carbon 16Cr-5Ni Stainless Martensitic Cast Steel—**H. J. NIEDERAU 382
- Weld Procedure, Filler Metal, and Post-Weld Heat Treatment—Their Effect on the Hardness and Quality of Welds in CA6NM Alloy—**R. W. LOVELESS, W. C. SMITH, AND H. C. TEMPLETON 394

| | |
|--|-----|
| CA6NM: New Developments Based on 20 Years' Experience— W. GYSEL, E. GERBER, AND A. TRAUTWEIN | 403 |
|--|-----|

SUMMARY

| | |
|----------------|-----|
| Summary | 439 |
| Index | 441 |

