Performance Test Code on Overall Plant Performance
CONTENTS

Foreword ...................................................... iii
Standards Committee Roster ........................................ v

Section
0 Introduction.................................................... 1
1 Object and Scope ........................................... 3
2 Definitions and Description of Terms ....................... 5
3 Guiding Principles........................................... 7
4 Instruments and Methods of Measurement .................... 23
5 Calculations and Results .................................. 47
6 Report of Results .......................................... 65

Figures
3.1 Generic Test Boundary ...................................... 8
3.2 Typical Steam Plant Test Boundary ......................... 8
3.3 Typical Combined Cycle Plant Test Boundary ............. 9
3.4 Three Post-Test Cases ...................................... 20
4.1 Five-Way Manifold ......................................... 28
4.2 Four-Wire RTDs ............................................ 30
4.3 Three-Wire RTDs ........................................... 30
4.4 Flow-Through Well ......................................... 32
4.5 Duct Measurement Points .................................. 33
4.6 Three-Wire Open Delta Connected Metering System .... 40
4.7 Four-Wire Metering System ................................ 41
4.8 Typical Correction Curve ................................... 44
5.1 Typical Test Boundary for a Power Plant Requiring Application of Heat Sink Correction factor $\Delta S_A$ or $\omega S_A$ .... 54
5.2 Typical Test Boundary for a Power Plant Requiring Application of Heat Sink Correction Factor $\Delta S_B$ or $\omega S_B$ .... 55
5.3 Typical Test Boundary for a Power Plant or Thermal Island Requiring Application of Heat Sink Correction Factor $\Delta S_C$ or $\omega S_C$ .... 56
5.4 Output Versus Throttle Steam Flow ....................... 62
5.5 Steam Turbine Plant Test Boundary ....................... 63

Tables
1.1 Largest Expected Test Uncertainties ...................... 4
3.1 Design, Construction, and Start-up Considerations .... 12
3.2 Guidance for Establishing Permissible Deviations From Design .... 17
3.3 Typical Pretest Stabilization Periods .................... 19
3.4 Recommended Minimum Test Run Durations ............ 19
# 5.1 Summary of Additive Correction Factors in Fundamental Performance Equations

# 5.2 Summary of Multiplicative Correction Factors in Fundamental Performance Equations

# 5.3 Examples of Typical Cycles and Test Objectives — Corresponding Specific Performance Equations

# 5.4 Change in Compressor Inlet Temperature over a 30% Range in Evaporator Cooler Effectiveness on a 80°F Day, with 80% Relative Humidity

# 5.5 Required Test Series for Phased Construction Combined Cycle Plants

## Nonmandatory Appendices

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
</tr>
</thead>
</table>
| A        | Sample Calculations  
Combined Cycle Cogeneration Plant Without Duct Firing  
Heat Sink: Completely Internal to Test the Boundary  
Test Goal: Specified Measurement Power — Fire to Desired Power Level by Duct Firing. | 67 |
| B        | Sample Calculations  
Combined Cycle Cogeneration Plant With Duct Firing  
Heat Sink: External to the Test Boundary  
Test Goal: Specified Measurement Power — Fire to Desired Power Level by Duct Firing. | 81 |
| C        | Sample Calculations  
Combined Cycle Cogeneration Plant Without Duct Firing  
Heat Sink: Cooling Tower External to the Test Boundary  
Test Goal: Specified Disposition is Gas Turbine Base Loaded (Power Floats) | 101 |
| D        | Representation of Correction for Different Heat Sink Temperature than Gas Turbine Air Inlet Temperature ($\Delta T$ or $\omega T$) if Necessary, for a Typical Combined Cycle Plant | 121 |
| E        | Sample Calculations  
Steam Power Cogeneration Plant  
Heat Sink: River Cooling Water Flow within Test Boundary  
Test Goal: Two Test Runs are Made with Different Goals  
Test Run 1: Specified Corrected Power — Fire to Desired Corrected Power  
Test Run 2: Specified Disposition by Firing to Desired Throttle Flow (Power Floats) | 125 |
| F        | Uncertainty Analysis | 177 |
| G        | Entering Air Conditions | 181 |
| H        | Energy Balance Method | 183 |
| I        | Solid Fuel and Ash Sampling | 185 |