

CONTENTS

PREFACE TO THE THIRD EDITION	v
PREFACE TO THE FIRST EDITION	ix
INDEX TO PRINCIPAL RELATIONS FOR CONVECTION	xiv
1. INTRODUCTION TO HEAT TRANSMISSION	1
2. STEADY CONDUCTION	7
3. TRANSIENT CONDUCTION	31
4. RADIANT-HEAT TRANSMISSION	55
5. DIMENSIONAL ANALYSIS	126
6. FLOW OF FLUIDS	140
7. NATURAL CONVECTION	165
8. INTRODUCTION TO FORCED CONVECTION	184
9. HEATING AND COOLING INSIDE TUBES	202
10. HEATING AND COOLING OUTSIDE TUBES	252
11. COMPACT EXCHANGERS, PACKED AND FLUIDIZED SYSTEMS	282
12. HIGH-VELOCITY FLOW; RAREFIED GASES	309
13. CONDENSING VAPORS	325
14. BOILING LIQUIDS.	368
15. APPLICATIONS TO DESIGN	410
APPENDIX (TABLES AND CHARTS OF DATA)	443
BIBLIOGRAPHY AND AUTHOR INDEX.	491
SUBJECT INDEX	521

INDEX TO PRINCIPAL RELATIONS FOR CONVECTION

Relation between over-all and individual coefficients	187
Allowance for scale deposits; fouling factors	188-189, 376
Mean temperature difference	190-198
FORCED CONVECTION PARALLEL TO AXIS	
Turbulent flow in tubes, usual case	219
Simplified equations; gases, water	226-228
Low Prandtl number; liquid metals	215-216, 218
Streamline flow in tubes with natural convection	233-236
Streamline flow in tubes without natural convection	237
Transition flow in tubes	239-241
Annular sections	242
Gravity flow in layer form	244-247
Rectangular sections	248
Flow parallel to plane	249
High velocities; supersonic flow	311-316
FORCED CONVECTION NORMAL TO AXIS	
Air normal to single cylinders	260-261
Air normal to other shapes; spheres	265
Liquids normal to single cylinders	267
Finned surfaces	268-271
Gases normal to banks of tubes	271-275
Liquids normal to banks of tubes	276
Cross-baffled exchangers	277
Compact exchangers, comparison of types	287-289
High velocities; rarefied gases	311-316, 321
NATURAL CONVECTION	
Vertical surfaces	172-173
Horizontal cylinders	177
Horizontal plates	180
Enclosed spaces	181-182
PACKED AND FLUIDIZED SYSTEMS	
Coefficients between packed solids and flowing fluid	295
Fluidized beds	303-307
CONDENSING VAPORS	
Film-type condensation on vertical tubes	331-334
Film-type condensation on horizontal tubes	338
Dropwise condensation	348
Mixtures of vapors	353-354
Mixture of vapor and non-condensable gas	355
Direct contact of air and water; cooling towers	356-365
BOILING LIQUIDS	
Peak heat flux and critical temperature difference	383-387
Film boiling outside tubes	387-388
Surface or local boiling	391-393
Vaporization inside tubes	408