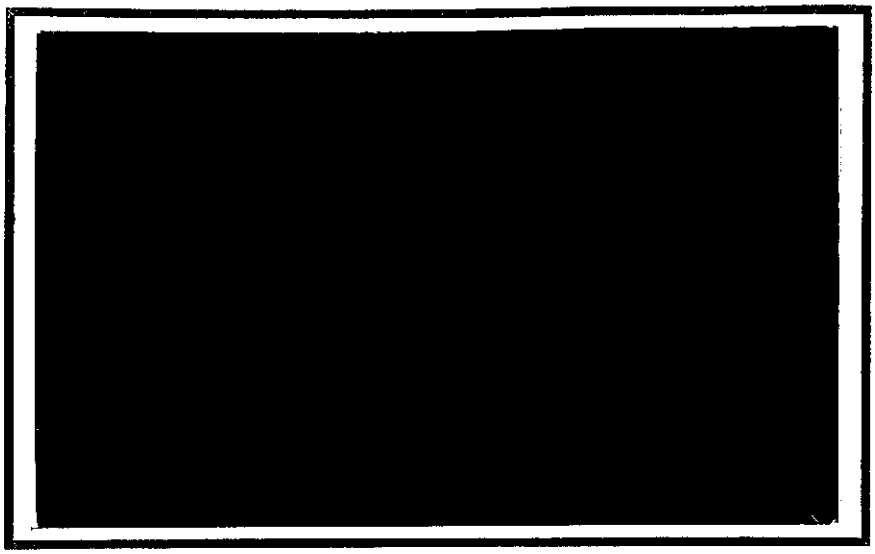

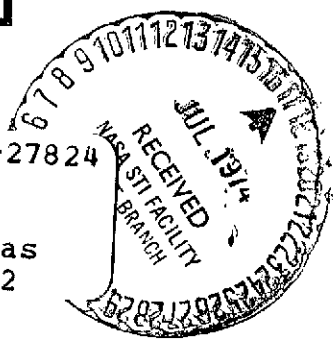

DEPARTMENT OF ELECTRICAL ENGINEERING

UNIVERSITY OF UTAH

SALT LAKE CITY, UTAH

THERMOMETRIC CONVECTION COEFFICIENTS FOR ROCKET METEOROLOGICAL SENSORS (TABLES)

Interim Report Under
NASA Grant NGL 45-003-025

June 1974

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INTRODUCTION

The rather extensive work under the grant devoted to rocket meteorological thermometry has required knowledge of the values of the convective heat transfer coefficient h, and recovery factor r, for miniature beads, fine wires, and films in rarefied air flow. In the course of the research, the project has developed an algorithm for this purpose. A reference handbook is being prepared, which will make the information generally available, in the form of mathematical expressions, computer subroutines, and tabulated values. Additional related information about sensor behavior will be included as well in supplementary graphs and tables. Such a handbook should prove useful as a standard reference in computing consistent operational corrections to rocket meteorological measurements, as well as in special studies to analyze and predict the performance of existing and proposed sensor systems. This interim report contains an initial version of the basic tables.

Documentation and discussion of the bases for the algorithm are contained in a preceding report.[1] It is also noted that a brief paper presenting preliminary material was given at the Sixth Inter-

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[1] S. Chung and F. L. Staffanson, "Survey of Literature on Convective Heat Transfer Coefficients and Recovery Factors for High Atmospheric Thermometry", University of Utah Report UTEC MR 73-136, Electrical Engineering Department Progress Report under NASA Grant NGL 45-003-025, July 1973.

national Symposium on Rarefied Gas Dynamics in Boston in July 1968.[2]

The tables cover in altitude the mesophere (50-80 km) and below (to 20 km) to overlap radiosonde balloon ceilings. Air speed in the tables ranges from 25 to 400 meters per second to bracket the expected performance of rocketsonde decelerators. Sensor characteristic lengths are chosen to correspond to typical bead, wire, and loop diameters, and film lengths (along the flow). The smaller size sensors at higher altitudes are found in free molecule flow, while the larger sizes at low altitude exchange heat with the air in the continuum flow regime. Depending on size, altitude, and air speed, any of the shapes may be in any of these or one of the intervening slip or transition flow regimes, as indicated in the figure. The flow regime boundaries are those suggested by Schaaf and Chambre[3] where the rarefaction parameter Kn is taken as M/Re or $M/\sqrt{Re}$ when $Re < 1$ or > 1, respectively. The flow regime is indicated at each point of the tables, making apparent the approximate boundaries within each table. The rows and columns of the tables are arranged to coincide with the commonly oriented axes of an altitude profile of air speed so that one can imagine, for a given sounding, its trajectory through the table.

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[2] F. L. Staffanson and S. J. Alsaji, "Thermometric Convection Coefficients for Parachutesondes in the Mesosphere", *Rarefied Gas Dynamics, Sixth International Symposium*, Leon Trilling, editor, Academic Press, New York, 1969, pp. 1559-1562.

[3] S. A. Schaaf and P. L. Chambre, "Flow of Rarefied Gases", *High Speed Aerodynamics and Jet Propulsion Series*, Vol. IV, Part G, Princeton University Press, 1956.

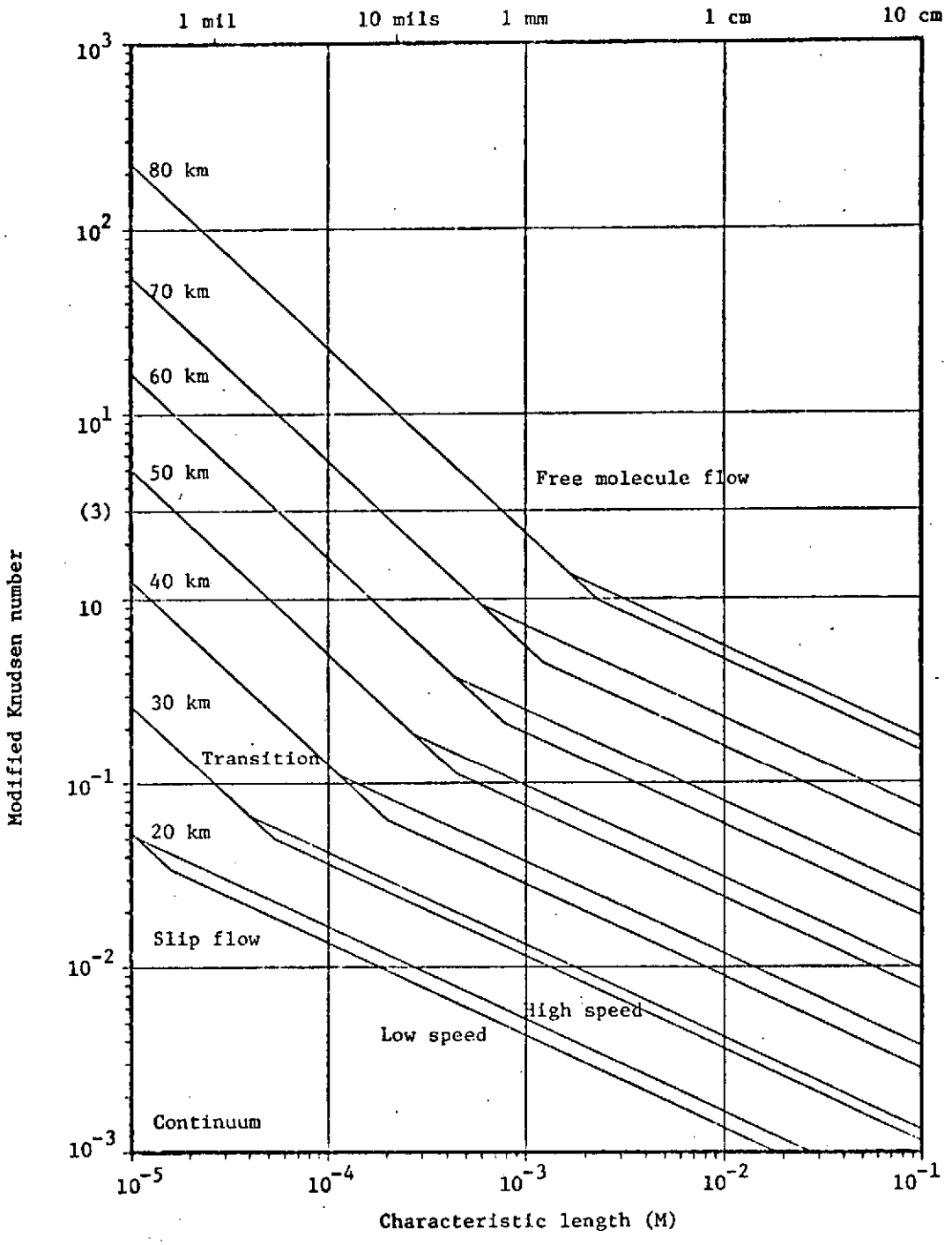

Fig. 1. Graphical relation between flow regime, as represented by the modified Knudsen number Kn, and sensor size, altitude, and air speed.

The user of these tables is cautioned that a sensor is often not an isolated element such as a sphere or cylinder, but rather more a conductively coupled combination of such elements. Therefore, particularly at higher altitudes where h decreases, allowing conductive coupling to increase, the tabulated coefficients of, say, the bead alone do not represent the effective values for the sensor. Rather the coefficients for the lead wires and even those of the film mount may dominate or at least be of significant influence. Similarly at higher altitudes the parts played by h and r in sensor response speed and in its equilibrium temperature are increasingly modified by the attending radiative heat transfer parameters. Valid use of values from the tables then requires at least an awareness of these factors, if not employment of an adequate mathematical model[4] of the sensor to which they are applied.

In case of the planar film, the thermal conductivity within the film (together with the integrated effect of the local convective coefficient h_x) will determine the effective characteristic length, i.e. the length of the plate along the stream which is conductively coupled to the locality of interest on the plate.[5]

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[4] F. L. Staffanson, "Mathematical Model of the Film-Mounted Rocketsonde Thermistor", *Journal of Applied Meteorology*, Vol. 10, No. 4, August 1971, pp. 825-832.

[5] F. L. Staffanson, "Mathematical Model of Meteorological Thermometers in the Mesosphere", University of Utah Report UTEC MR 70-150, Electrical Engineering Department progress report, August 1970, pp. 90-95.

TABLE 1

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A SPHERE OF .1270 MILLIMETERS IN DIAMETER

SHAPE: BEAD

SIZE: 5.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.132+01	.133+01	.134+01	.136+01	.141+01	.148+01	.157+01	.167+01	.179+01	.191+01
	R	.155+01	.154+01	.154+01	.153+01	.151+01	.148+01	.145+01	.142+01	.140+01	.137+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.300+01	.302+01	.305+01	.308+01	.319+01	.333+01	.351+01	.372+01	.396+01	.422+01
	R	.154+01	.154+01	.153+01	.152+01	.150+01	.148+01	.145+01	.143+01	.140+01	.137+01
	FLOW	F	F	F	F	F	F	F	F	F	F
70	H	.629+01	.633+01	.638+01	.645+01	.665+01	.692+01	.726+01	.766+01	.811+01	.861+01
	R	.153+01	.152+01	.152+01	.151+01	.149+01	.147+01	.145+01	.142+01	.140+01	.137+01
	FLOW	F	F	F	F	F	F	F	F	F	F
65	H	.123+02	.124+02	.125+02	.126+02	.129+02	.134+02	.140+02	.147+02	.156+02	.164+02
	R	.150+01	.150+01	.150+01	.149+01	.147+01	.145+01	.143+01	.141+01	.138+01	.136+01
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.227+02	.228+02	.230+02	.232+02	.238+02	.247+02	.257+02	.269+02	.283+02	.298+02
	R	.146+01	.146+01	.146+01	.145+01	.144+01	.142+01	.140+01	.138+01	.136+01	.134+01
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.405+02	.407+02	.410+02	.414+02	.425+02	.440+02	.457+02	.476+02	.501+02	.526+02
	R	.141+01	.140+01	.140+01	.140+01	.138+01	.137+01	.135+01	.133+01	.131+01	.129+01
	FLOW	T	T	T	T	T	T	T	T	T	T
50	H	.692+02	.697+02	.704+02	.712+02	.731+02	.755+02	.785+02	.819+02	.857+02	.899+02
	R	.132+01	.132+01	.132+01	.132+01	.131+01	.129+01	.128+01	.126+01	.124+01	.123+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.114+03	.115+03	.117+03	.119+03	.122+03	.127+03	.132+03	.138+03	.144+03	.151+03
	R	.121+01	.121+01	.121+01	.121+01	.120+01	.119+01	.118+01	.116+01	.115+01	.114+01
	FLOW	T	T	T	T	T	T	T	T	T	T
40	H	.176+03	.181+03	.186+03	.190+03	.198+03	.207+03	.217+03	.227+03	.238+03	.249+03
	R	.109+01	.109+01	.109+01	.109+01	.108+01	.107+01	.107+01	.106+01	.105+01	.104+01
	FLOW	S	T	T	T	T	T	T	T	T	T
35	H	.251+03	.266+03	.278+03	.288+03	.307+03	.325+03	.344+03	.362+03	.381+03	.401+03
	R	.988+00	.987+00	.987+00	.985+00	.982+00	.977+00	.972+00	.967+00	.962+00	.957+00
	FLOW	S	S	T	T	T	T	T	T	T	T
30	H	.334+03	.370+03	.397+03	.420+03	.461+03	.498+03	.533+03	.568+03	.602+03	.636+03
	R	.919+00	.918+00	.918+00	.917+00	.915+00	.913+00	.910+00	.908+00	.905+00	.902+00
	FLOW	S	S	S	S	T	T	T	T	T	T
25	H	.432+03	.503+03	.558+03	.605+03	.685+03	.755+03	.820+03	.882+03	.943+03	.100+04
	R	.881+00	.881+00	.880+00	.880+00	.879+00	.878+00	.877+00	.875+00	.874+00	.873+00
	FLOW	S	S	S	S	S	S	S	S	T	T
20	H	.562+03	.692+03	.793+03	.880+03	.103+04	.116+04	.127+04	.138+04	.149+04	.159+04
	R	.862+00	.862+00	.861+00	.861+00	.861+00	.860+00	.860+00	.859+00	.858+00	.858+00
	FLOW	S	S	S	S	S	S	S	S	S	S

TABLE 2

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A SPHERE OF .2540 MILLIMETERS IN DIAMETER

SHAPE: BEAD

SIZE: 10.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.132+01	.132+01	.134+01	.136+01	.141+01	.148+01	.156+01	.166+01	.177+01	.190+01
	R	.154+01	.154+01	.153+01	.152+01	.150+01	.148+01	.145+01	.142+01	.139+01	.136+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.297+01	.299+01	.302+01	.305+01	.316+01	.330+01	.347+01	.368+01	.391+01	.416+01
	R	.153+01	.152+01	.152+01	.151+01	.149+01	.147+01	.144+01	.141+01	.139+01	.136+01
	FLOW	F	F	F	F	F	F	F	F	F	F
70	H	.617+01	.621+01	.626+01	.633+01	.652+01	.678+01	.711+01	.750+01	.793+01	.841+01
	R	.150+01	.150+01	.149+01	.149+01	.147+01	.145+01	.142+01	.140+01	.138+01	.135+01
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.119+02	.120+02	.120+02	.122+02	.125+02	.130+02	.136+02	.142+02	.150+02	.158+02
	R	.146+01	.146+01	.145+01	.145+01	.143+01	.141+01	.139+01	.137+01	.135+01	.133+01
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.214+02	.216+02	.218+02	.220+02	.226+02	.234+02	.243+02	.254+02	.267+02	.281+02
	R	.140+01	.139+01	.139+01	.139+01	.137+01	.136+01	.134+01	.132+01	.130+01	.128+01
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.368+02	.371+02	.375+02	.379+02	.390+02	.403+02	.419+02	.438+02	.458+02	.480+02
	R	.131+01	.131+01	.131+01	.130+01	.129+01	.128+01	.126+01	.125+01	.123+01	.122+01
	FLOW	T	T	T	T	T	T	T	T	T	T
50	H	.595+02	.604+02	.612+02	.621+02	.641+02	.664+02	.691+02	.720+02	.753+02	.788+02
	R	.121+01	.120+01	.120+01	.120+01	.119+01	.118+01	.117+01	.116+01	.115+01	.113+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.902+02	.928+02	.950+02	.970+02	.101+03	.105+03	.110+03	.115+03	.121+03	.126+03
	R	.109+01	.109+01	.109+01	.109+01	.108+01	.108+01	.107+01	.106+01	.105+01	.104+01
	FLOW	T	T	T	T	T	T	T	T	T	T
40	H	.127+03	.134+03	.140+03	.145+03	.154+03	.162+03	.171+03	.180+03	.189+03	.198+03
	R	.994+00	.994+00	.993+00	.992+00	.988+00	.984+00	.979+00	.974+00	.968+00	.963+00
	FLOW	S	S	T	T	T	T	T	T	T	T
35	H	.167+03	.183+03	.196+03	.207+03	.226+03	.243+03	.260+03	.276+03	.292+03	.308+03
	R	.924+00	.924+00	.924+00	.923+00	.921+00	.918+00	.916+00	.913+00	.910+00	.907+00
	FLOW	S	S	S	S	T	T	T	T	T	T
30	H	.213+03	.246+03	.272+03	.294+03	.332+03	.365+03	.395+03	.425+03	.453+03	.481+03
	R	.884+00	.884+00	.883+00	.883+00	.882+00	.881+00	.879+00	.878+00	.877+00	.875+00
	FLOW	S	S	S	S	S	S	S	T	T	T
25	H	.275+03	.335+03	.383+03	.423+03	.492+03	.552+03	.607+03	.658+03	.707+03	.755+03
	R	.863+00	.863+00	.863+00	.863+00	.863+00	.862+00	.861+00	.861+00	.860+00	.859+00
	FLOW	S	S	S	S	S	S	S	S	S	S
20	H	.365+03	.471+03	.554+03	.625+03	.746+03	.851+03	.946+03	.103+04	.112+04	.120+04
	R	.853+00	.853+00	.853+00	.853+00	.853+00	.853+00	.852+00	.852+00	.852+00	.851+00
	FLOW	S	S	S	S	S	S	S	S	S	S

TABLE 3

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A SPHERE OF .3810 MILLIMETERS IN DIAMETER

SHAPE: BEAD

SIZE: 15.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.131+01	.917+01	.133+01	.135+01	.140+01	.147+01	.155+01	.165+01	.176+01	.189+01
	R	.153+01	.153+01	.153+01	.152+01	.150+01	.147+01	.144+01	.141+01	.139+01	.136+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.294+01	.296+01	.299+01	.302+01	.312+01	.326+01	.343+01	.363+01	.386+01	.411+01
	R	.151+01	.151+01	.151+01	.150+01	.140+01	.146+01	.143+01	.140+01	.138+01	.135+01
	FLOW	T	T	T	T	T	T	T	T	T	T
70	H	.606+01	.609+01	.614+01	.621+01	.640+01	.666+01	.698+01	.735+01	.777+01	.823+01
	R	.148+01	.147+01	.147+01	.146+01	.145+01	.143+01	.140+01	.138+01	.136+01	.133+01
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.115+02	.116+02	.117+02	.118+02	.121+02	.126+02	.131+02	.138+02	.145+02	.153+02
	R	.142+01	.142+01	.142+01	.141+01	.140+01	.138+01	.136+01	.134+01	.132+01	.130+01
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.203+02	.205+02	.207+02	.209+02	.215+02	.222+02	.232+02	.242+02	.254+02	.267+02
	R	.134+01	.134+01	.134+01	.133+01	.132+01	.131+01	.129+01	.127+01	.126+01	.124+01
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.338+02	.342+02	.347+02	.351+02	.362+02	.375+02	.390+02	.407+02	.426+02	.446+02
	R	.124+01	.124+01	.124+01	.123+01	.123+01	.121+01	.120+01	.119+01	.118+01	.116+01
	FLOW	T	T	T	T	T	T	T	T	T	T
50	H	.524+02	.536+02	.546+02	.556+02	.577+02	.599+02	.624+02	.652+02	.682+02	.713+02
	R	.113+01	.113+01	.113+01	.113+01	.112+01	.112+01	.111+01	.110+01	.109+01	.108+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.756+02	.787+02	.812+02	.835+02	.878+02	.921+02	.965+02	.101+03	.106+03	.111+03
	R	.103+01	.103+01	.103+01	.103+01	.103+01	.102+01	.101+01	.101+01	.100+01	.995+00
	FLOW	S	T	T	T	T	T	T	T	T	T
40	H	.101+03	.109+03	.115+03	.120+03	.129+03	.138+03	.146+03	.154+03	.162+03	.171+03
	R	.952+00	.952+00	.951+00	.950+00	.948+00	.945+00	.941+00	.937+00	.933+00	.930+00
	FLOW	S	S	S	T	T	T	T	T	T	T
35	H	.129+03	.145+03	.158+03	.168+03	.187+03	.203+03	.219+03	.233+03	.248+03	.262+03
	R	.900+00	.900+00	.900+00	.899+00	.898+00	.896+00	.894+00	.892+00	.890+00	.888+00
	FLOW	S	S	S	S	S	S	T	T	T	T
30	H	.163+03	.194+03	.218+03	.238+03	.273+03	.303+03	.346+03	.358+03	.383+03	.408+03
	R	.871+00	.871+00	.871+00	.871+00	.870+00	.869+00	.868+00	.867+00	.866+00	.865+00
	FLOW	S	S	S	S	S	S	S	S	S	S
25	H	.212+03	.266+03	.309+03	.345+03	.407+03	.461+03	.509+03	.555+03	.598+03	.640+03
	R	.857+00	.857+00	.857+00	.857+00	.857+00	.856+00	.856+00	.855+00	.855+00	.855+00
	FLOW	S	S	S	S	S	S	S	S	S	S
20	H	.287+03	.380+03	.452+03	.515+03	.622+03	.714+03	.797+03	.875+03	.948+03	.102+04
	R	.851+00	.851+00	.851+00	.851+00	.850+00	.850+00	.850+00	.850+00	.850+00	.849+00
	FLOW	S	S	S	S	S	S	S	S	S	S

TABLE 4

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A SPHERE OF .7620 MILLIMETERS IN DIAMETER

SHAPE: BEAD

SIZE: 30.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.129+01	.130+01	.131+01	.133+01	.138+01	.145+01	.153+01	.162+01	.173+01	.185+01
	R	.152+01	.151+01	.151+01	.150+01	.148+01	.145+01	.143+01	.140+01	.137+01	.135+01
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.286+01	.288+01	.290+01	.294+01	.304+01	.317+01	.333+01	.352+01	.374+01	.397+01
	R	.148+01	.147+01	.147+01	.146+01	.144+01	.142+01	.140+01	.137+01	.135+01	.132+01
	FLOW	T	T	T	T	T	T	T	T	T	T
70	H	.574+01	.576+01	.583+01	.590+01	.608+01	.633+01	.662+01	.696+01	.735+01	.777+01
	R	.141+01	.141+01	.141+01	.140+01	.139+01	.137+01	.135+01	.133+01	.131+01	.128+01
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.105+02	.106+02	.107+02	.109+02	.112+02	.116+02	.121+02	.127+02	.133+02	.140+02
	R	.133+01	.133+01	.132+01	.132+01	.131+01	.129+01	.128+01	.126+01	.124+01	.122+01
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.176+02	.179+02	.181+02	.184+02	.190+02	.197+02	.205+02	.214+02	.224+02	.235+02
	R	.123+01	.122+01	.122+01	.122+01	.121+01	.120+01	.119+01	.117+01	.116+01	.115+01
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.274+02	.281+02	.287+02	.292+02	.304+02	.316+02	.330+02	.344+02	.360+02	.377+02
	R	.112+01	.112+01	.112+01	.112+01	.111+01	.110+01	.109+01	.108+01	.107+01	.106+01
	FLOW	T	T	T	T	T	T	T	T	T	T
50	H	.393+02	.410+02	.720+02	.435+02	.458+02	.480+02	.503+02	.527+02	.552+02	.578+02
	R	.103+01	.103+01	.103+01	.102+01	.102+01	.102+01	.101+01	.100+01	.997+00	.991+00
	FLOW	S	T	T	T	T	T	T	T	T	T
45	H	.522+02	.560+02	.590+02	.615+02	.661+02	.703+02	.743+02	.784+02	.826+02	.868+02
	R	.954+00	.953+00	.953+00	.952+00	.949+00	.946+00	.943+00	.939+00	.935+00	.932+00
	FLOW	S	S	S	T	T	T	T	T	T	T
40	H	.658+02	.736+02	.796+02	.848+02	.937+02	.102+03	.109+03	.116+03	.123+03	.130+03
	R	.903+00	.903+00	.903+00	.902+00	.901+00	.899+00	.897+00	.895+00	.893+00	.891+00
	FLOW	S	S	S	S	S	T	T	T	T	T
35	H	.817+02	.963+02	.108+03	.117+03	.134+03	.148+03	.161+03	.174+03	.186+03	.199+03
	R	.874+00	.873+00	.873+00	.873+00	.872+00	.871+00	.870+00	.869+00	.868+00	.867+00
	FLOW	S	S	S	S	S	S	S	S	S	S
30	H	.104+03	.130+03	.150+03	.167+03	.197+03	.222+03	.245+03	.267+03	.287+03	.307+03
	R	.856+00	.856+00	.858+00	.858+00	.858+00	.857+00	.857+00	.856+00	.856+00	.855+00
	FLOW	S	S	S	S	S	S	S	S	S	S
25	H	.139+03	.183+03	.217+03	.246+03	.297+03	.340+03	.379+03	.416+03	.450+03	.483+03
	R	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.850+00	.850+00	.850+00
	FLOW	S	S	S	S	S	S	S	S	S	S
20	H	.195+03	.266+03	.325+03	.374+03	.459+03	.532+03	.598+03	.659+03	.717+03	.772+03
	R	.848+00	.848+00	.848+00	.848+00	.848+00	.848+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	S	S	S	S	S	S	S	S	S

TABLE 5

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A SPHERE OF 1.2700 MILLIMETERS IN DIAMETER

SHAPE: BEAD
SIZE: 50.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.127+01	.128+01	.129+01	.131+01	.135+01	.142+01	.150+01	.159+01	.169+01	.181+01
	R	.149+01	.149+01	.149+01	.148+01	.146+01	.143+01	.141+01	.138+01	.135+01	.133+01
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.275+01	.277+01	.280+01	.284+01	.293+01	.306+01	.321+01	.339+01	.359+01	.381+01
	R	.143+01	.143+01	.143+01	.142+01	.140+01	.138+01	.136+01	.134+01	.131+01	.129+01
	FLOW	T	T	T	T	T	T	T	T	T	T
70	H	.538+01	.543+01	.548+01	.555+01	.573+01	.596+01	.623+01	.655+01	.690+01	.728+01
	R	.135+01	.135+01	.134+01	.134+01	.132+01	.131+01	.129+01	.127+01	.125+01	.123+01
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.946+01	.959+01	.972+01	.987+01	.102+02	.106+02	.110+02	.116+02	.121+02	.127+02
	R	.124+01	.124+01	.124+01	.124+01	.123+01	.121+01	.120+01	.119+01	.117+01	.116+01
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.151+02	.155+02	.158+02	.161+02	.167+02	.174+02	.181+02	.189+02	.198+02	.208+02
	R	.114+01	.114+01	.113+01	.113+01	.112+01	.112+01	.111+01	.110+01	.109+01	.108+01
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.222+02	.230+02	.237+02	.244+02	.256+02	.268+02	.281+02	.294+02	.309+02	.323+02
	R	.104+01	.104+01	.104+01	.104+01	.103+01	.103+01	.102+01	.101+01	.101+01	.100+01
	FLOW	S	T	T	T	T	T	T	T	T	T
50	H	.301+02	.320+02	.335+02	.348+02	.372+02	.394+02	.416+02	.529+02	.460+02	.483+02
	R	.967+00	.967+00	.966+00	.965+00	.962+00	.959+00	.955+00	.951+00	.947+00	.943+00
	FLOW	S	S	S	T	T	T	T	T	T	T
45	H	.382+02	.421+02	.452+02	.478+02	.523+02	.563+02	.601+02	.638+02	.675+02	.711+02
	R	.914+00	.914+00	.914+00	.913+00	.912+00	.910+00	.908+00	.905+00	.903+00	.900+00
	FLOW	S	S	S	S	S	T	T	T	T	T
40	H	.470+02	.543+02	.601+02	.649+02	.732+02	.805+02	.872+02	.935+02	.997+02	.106+03
	R	.881+00	.881+00	.881+00	.880+00	.879+00	.878+00	.877+00	.876+00	.875+00	.873+00
	FLOW	S	S	S	S	S	S	S	S	T	T
35	H	.585+02	.714+02	.815+02	.902+02	.105+03	.118+03	.129+03	.140+03	.150+03	.160+03
	R	.862+00	.862+00	.862+00	.862+00	.862+00	.861+00	.861+00	.860+00	.859+00	.859+00
	FLOW	S	S	S	S	S	S	S	S	S	S
30	H	.761+02	.980+02	.115+03	.130+03	.155+03	.177+03	.197+03	.215+03	.233+03	.250+03
	R	.853+00	.853+00	.853+00	.853+00	.853+00	.852+00	.852+00	.852+00	.852+00	.851+00
	FLOW	S	S	S	S	S	S	S	S	S	S
25	H	.104+03	.141+03	.169+03	.194+03	.237+03	.273+03	.306+03	.337+03	.366+03	.394+03
	R	.849+00	.849+00	.849+00	.849+00	.849+00	.848+00	.848+00	.848+00	.848+00	.848+00
	FLOW	C	S	S	S	S	S	S	S	S	S
20	H	.150+03	.209+03	.257+03	.298+03	.369+03	.430+03	.485+03	.536+03	.584+03	.630+03
	R	.847+00	.847+00	.847+00	.847+00	.847+00	.847+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	S	S	S	S	S	S	S	S

TABLE 6

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A CYLINDER .0178 MILLIMETERS IN DIAMETER

SHAPE: WIRE

SIZE: .70 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.133+01	.134+01	.136+01	.139+01	.146+01	.157+01	.169+01	.184+01	.201+01	.218+01
	R	.174+01	.173+01	.172+01	.171+01	.166+01	.161+01	.156+01	.151+01	.146+01	.142+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.302+01	.304+01	.308+01	.314+01	.330+01	.351+01	.378+01	.408+01	.443+01	.480+01
	R	.174+01	.173+01	.172+01	.171+01	.167+01	.162+01	.157+01	.152+01	.148+01	.144+01
	FLOW	F	F	F	F	F	F	F	F	F	F
70	H	.635+01	.639+01	.647+01	.658+01	.688+01	.729+01	.780+01	.839+01	.906+01	.978+01
	R	.173+01	.173+01	.172+01	.170+01	.167+01	.163+01	.158+01	.153+01	.149+01	.145+01
	FLOW	F	F	F	F	F	F	F	F	F	F
65	H	.125+02	.126+02	.127+02	.129+02	.135+02	.142+02	.151+02	.162+02	.174+02	.187+02
	R	.173+01	.172+01	.171+01	.170+01	.167+01	.163+01	.158+01	.154+01	.149+01	.145+01
	FLOW	F	F	F	F	F	F	F	F	F	F
60	H	.233+02	.235+02	.237+02	.241+02	.250+02	.263+02	.280+02	.298+02	.319+02	.343+02
	R	.171+01	.170+01	.170+01	.169+01	.166+01	.162+01	.158+01	.153+01	.149+01	.145+01
	FLOW	F	F	F	F	F	F	F	F	F	F
55	H	.423+02	.427+02	.432+02	.438+02	.455+02	.478+02	.506+02	.539+02	.576+02	.616+02
	R	.168+01	.168+01	.167+01	.166+01	.163+01	.160+01	.156+01	.152+01	.148+01	.144+01
	FLOW	F	F	F	F	F	F	F	F	F	F
50	H	.745+02	.754+02	.765+02	.777+02	.808+02	.848+02	.897+02	.954+02	.102+03	.109+03
	R	.164+01	.163+01	.163+01	.162+01	.159+01	.156+01	.152+01	.148+01	.145+01	.141+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.129+03	.132+03	.134+03	.137+03	.143+03	.151+03	.159+03	.170+03	.131+03	.193+03
	R	.156+01	.156+01	.155+01	.154+01	.152+01	.149+01	.145+01	.142+01	.138+01	.135+01
	FLOW	T	T	T	T	T	T	T	T	T	T
40	H	.220+03	.226+03	.234+03	.241+03	.254+03	.268+03	.285+03	.304+03	.324+03	.346+03
	R	.143+01	.143+01	.143+01	.142+01	.140+01	.137+01	.134+01	.131+01	.128+01	.126+01
	FLOW	T	T	T	T	T	T	T	T	T	T
35	H	.356+03	.379+03	.397+03	.412+03	.441+03	.471+03	.503+03	.538+03	.575+03	.613+03
	R	.127+01	.127+01	.127+01	.126+01	.124+01	.122+01	.120+01	.118+01	.116+01	.114+01
	FLOW	T	T	T	T	T	T	T	T	T	T
30	H	.544+03	.603+03	.646+03	.682+03	.745+03	.805+03	.866+03	.646+03	.992+03	.106+04
	R	.111+01	.111+01	.110+01	.110+01	.109+01	.108+01	.106+01	.105+01	.104+01	.102+01
	FLOW	T	T	T	T	T	T	T	T	T	T
25	H	.790+03	.917+03	.101+04	.108+04	.121+04	.132+04	.143+04	.154+04	.165+04	.176+04
	R	.989+00	.988+00	.986+00	.984+00	.978+00	.971+00	.964+00	.956+00	.949+00	.942+00
	FLOW	S	T	T	T	T	T	T	T	T	T
20	H	.112+04	.136+04	.153+04	.167+04	.191+04	.212+04	.231+04	.250+04	.268+04	.286+04
	R	.916+00	.915+00	.915+00	.914+00	.911+00	.907+00	.903+00	.900+00	.896+00	.893+00
	FLOW	S	S	S	T	T	T	T	T	T	T

TABLE 7

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A CYLINDER .0254 MILLIMETERS IN DIAMETER

SHAPE: WIRE
SIZE: 1.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.133+01	.134+01	.136+01	.138+01	.146+01	.156+01	.169+01	.184+01	.200+01	.218+01
	R	.174+01	.173+01	.172+01	.170+01	.166+01	.161+01	.156+01	.151+01	.146+01	.142+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.301+01	.304+01	.308+01	.313+01	.329+01	.350+01	.376+01	.407+01	.441+01	.478+01
	R	.174+01	.173+01	.172+01	.170+01	.167+01	.162+01	.157+01	.152+01	.148+01	.143+01
	FLOW	F	F	F	F	F	F	F	F	F	F
70	H	.631+01	.636+01	.644+01	.655+01	.685+01	.726+01	.776+01	.835+01	.901+01	.972+01
	R	.173+01	.172+01	.172+01	.170+01	.167+01	.162+01	.158+01	.153+01	.148+01	.144+01
	FLOW	F	F	F	F	F	F	F	F	F	F
65	H	.124+02	.125+02	.126+02	.128+02	.133+02	.141+02	.150+02	.160+02	.172+02	.185+02
	R	.172+01	.171+01	.171+01	.169+01	.166+01	.162+01	.157+01	.153+01	.149+01	.145+01
	FLOW	F	F	F	F	F	F	F	F	F	F
60	H	.229+02	.231+02	.234+02	.238+02	.247+02	.260+02	.276+02	.294+02	.315+02	.337+02
	R	.170+01	.169+01	.169+01	.167+01	.164+01	.160+01	.156+01	.152+01	.148+01	.144+01
	FLOW	F	F	F	F	F	F	F	F	F	F
55	H	.412+02	.417+02	.422+02	.428+02	.446+02	.468+02	.495+02	.527+02	.563+02	.602+02
	R	.166+01	.165+01	.165+01	.164+01	.161+01	.157+01	.154+01	.150+01	.146+01	.142+01
	FLOW	F	F	F	F	F	F	F	F	F	F
50	H	.715+02	.726+02	.738+02	.751+02	.782+02	.821+02	.869+02	.923+02	.984+02	.105+03
	R	.160+01	.159+01	.159+01	.158+01	.155+01	.152+01	.149+01	.145+01	.142+01	.138+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.121+03	.124+03	.127+03	.130+03	.136+03	.144+03	.152+03	.162+03	.172+03	.184+03
	R	.150+01	.150+01	.149+01	.148+01	.146+01	.143+01	.140+01	.137+01	.134+01	.131+01
	FLOW	T	T	T	T	T	T	T	T	T	T
40	H	.199+03	.208+03	.216+03	.222+03	.236+03	.250+03	.266+03	.284+03	.303+03	.323+03
	R	.136+01	.136+01	.135+01	.134+01	.133+01	.130+01	.128+01	.125+01	.123+01	.120+01
	FLOW	T	T	T	T	T	T	T	T	T	T
35	H	.310+03	.335+03	.354+03	.370+03	.400+03	.429+03	.459+03	.491+03	.524+03	.559+03
	R	.119+01	.119+01	.119+01	.118+01	.117+01	.115+01	.114+01	.112+01	.110+01	.108+01
	FLOW	T	T	T	T	T	T	T	T	T	T
30	H	.458+03	.518+03	.561+03	.597+03	.658+03	.715+03	.771+03	.828+03	.886+03	.944+03
	R	.105+01	.105+01	.104+01	.104+01	.103+01	.102+01	.101+01	.100+01	.992+00	.983+00
	FLOW	T	T	T	T	T	T	T	T	T	T
25	H	.652+03	.773+03	.859+03	.930+03	.105+04	.115+04	.125+04	.135+04	.145+04	.154+04
	R	.951+00	.950+00	.949+00	.947+00	.943+00	.938+00	.932+00	.927+00	.921+00	.917+00
	FLOW	S	S	T	T	T	T	T	T	T	T
20	H	.915+03	.113+04	.129+04	.142+04	.164+04	.182+04	.199+04	.216+04	.231+04	.247+04
	R	.896+00	.896+00	.895+00	.894+00	.892+00	.890+00	.887+00	.884+00	.882+00	.879+00
	FLOW	S	S	S	S	T	T	T	T	T	T

TABLE 8

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A CYLINDER .0508 MILLIMETERS IN DIAMETER

SHAPE: WIRE
SIZE: 2.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.132+01	.133+01	.135+01	.138+01	.145+01	.156+01	.168+01	.183+01	.199+01	.217+01
	R	.174+01	.173+01	.172+01	.170+01	.166+01	.161+01	.156+01	.151+01	.146+01	.142+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.298+01	.301+01	.305+01	.311+01	.326+01	.347+01	.373+01	.403+01	.436+01	.473+01
	R	.173+01	.172+01	.171+01	.170+01	.166+01	.161+01	.156+01	.152+01	.147+01	.143+01
	FLOW	F	F	F	F	F	F	F	F	F	F
70	H	.621+01	.626+01	.634+01	.645+01	.674+01	.714+01	.763+01	.821+01	.885+01	.954+01
	R	.172+01	.171+01	.170+01	.169+01	.165+01	.161+01	.156+01	.152+01	.147+01	.143+01
	FLOW	F	F	F	F	F	F	F	F	F	F
65	H	.120+02	.121+02	.123+02	.125+02	.130+02	.137+02	.146+02	.156+02	.168+02	.180+02
	R	.169+01	.169+01	.168+01	.167+01	.164+01	.160+01	.155+01	.151+01	.147+01	.143+01
	FLOW	F	F	F	F	F	F	F	F	F	F
60	H	.219+02	.221+02	.224+02	.228+02	.237+02	.250+02	.265+02	.282+02	.302+02	.323+02
	R	.165+01	.165+01	.164+01	.163+01	.160+01	.157+01	.153+01	.149+01	.145+01	.141+01
	FLOW	F	F	F	F	F	F	F	F	F	F
55	H	.382+02	.388+02	.395+02	.402+02	.419+02	.441+02	.467+02	.496+02	.529+02	.565+02
	R	.159+01	.158+01	.158+01	.157+01	.154+01	.151+01	.148+01	.144+01	.141+01	.137+01
	FLOW	T	T	T	T	T	T	T	T	T	T
50	H	.636+02	.653+02	.668+02	.682+02	.715+02	.753+02	.797+02	.847+02	.901+02	.476+02
	R	.149+01	.149+01	.149+01	.148+01	.146+01	.143+01	.140+01	.137+01	.134+01	.131+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.102+03	.106+03	.110+03	.113+03	.120+03	.127+03	.135+03	.143+03	.153+03	.162+03
	R	.136+01	.136+01	.136+01	.135+01	.133+01	.131+01	.128+01	.126+01	.124+01	.121+01
	FLOW	T	T	T	T	T	T	T	T	T	T
40	H	.155+03	.167+03	.176+03	.184+03	.198+03	.212+03	.226+03	.241+03	.257+03	.274+03
	R	.120+01	.120+01	.120+01	.119+01	.118+01	.117+01	.115+01	.113+01	.111+01	.110+01
	FLOW	T	T	T	T	T	T	T	T	T	T
35	H	.226+03	.254+03	.274+03	.290+03	.319+03	.346+03	.372+03	.399+03	.427+03	.454+03
	R	.106+01	.106+01	.106+01	.105+01	.105+01	.104+01	.102+01	.101+01	.100+01	.994+00
	FLOW	T	T	T	T	T	T	T	T	T	T
30	H	.318+03	.375+03	.416+03	.449+03	.505+03	.554+03	.602+03	.648+03	.694+03	.739+03
	R	.959+00	.958+00	.957+00	.955+00	.951+00	.945+00	.939+00	.933+00	.928+00	.923+00
	FLOW	S	S	T	T	T	T	T	T	T	T
25	H	.443+03	.545+03	.620+03	.680+03	.781+03	.868+03	.949+03	.103+04	.110+04	.117+04
	R	.901+00	.901+00	.900+00	.899+00	.897+00	.894+00	.891+00	.888+00	.886+00	.883+00
	FLOW	S	S	S	S	T	T	T	T	T	T
20	H	.619+03	.791+03	.917+03	.102+04	.119+04	.134+04	.147+04	.160+04	.172+04	.184+04
	R	.871+00	.871+00	.871+00	.870+00	.869+00	.868+00	.867+00	.865+00	.864+00	.863+00
	FLOW	S	S	S	S	S	S	S	T	T	T

TABLE 9

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME FOR A CYLINDER .1270 MILLIMETERS IN DIAMETER

SHAPE: WIRE

SIZE: 5.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.130+01	.132+01	.133+01	.136+01	.144+01	.154+01	.166+01	.180+01	.196+01	.213+01
	R	.173+01	.172+01	.171+01	.169+01	.165+01	.160+01	.155+01	.150+01	.145+01	.141+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.291+01	.294+01	.298+01	.303+01	.319+01	.339+01	.364+01	.393+01	.425+01	.459+01
	R	.171+01	.170+01	.169+01	.168+01	.164+01	.160+01	.155+01	.150+01	.146+01	.142+01
	FLOW	F	F	F	F	F	F	F	F	F	F
70	H	.593+01	.600+01	.608+01	.619+01	.648+01	.686+01	.733+01	.787+01	.847+01	.911+01
	R	.168+01	.167+01	.166+01	.165+01	.162+01	.157+01	.153+01	.149+01	.145+01	.141+01
	FLOW	F	F	F	F	F	F	F	F	F	F
65	H	.111+02	.113+02	.115+02	.117+02	.122+02	.129+02	.137+02	.146+02	.157+02	.168+02
	R	.162+01	.162+01	.161+01	.160+01	.157+01	.153+01	.150+01	.146+01	.142+01	.138+01
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.194+02	.198+02	.202+02	.195+02	.216+02	.228+02	.242+02	.257+02	.275+02	.293+02
	R	.154+01	.154+01	.154+01	.152+01	.150+01	.147+01	.144+01	.140+01	.137+01	.134+01
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.320+02	.331+02	.340+02	.348+02	.367+02	.387+02	.410+02	.436+02	.465+02	.495+02
	R	.143+01	.143+01	.143+01	.142+01	.140+01	.137+01	.135+01	.132+01	.129+01	.126+01
	FLOW	T	T	T	T	T	T	T	T	T	T
50	H	.494+02	.521+02	.542+02	.560+02	.595+02	.632+02	.671+02	.714+02	.759+02	.807+02
	R	.130+01	.130+01	.130+01	.129+01	.128+01	.126+01	.124+01	.121+01	.119+01	.117+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.724+02	.786+02	.834+02	.872+02	.942+02	.101+03	.108+03	.115+03	.122+03	.130+03
	R	.116+01	.116+01	.116+01	.115+01	.114+01	.113+01	.111+01	.110+01	.108+01	.107+01
	FLOW	T	T	T	T	T	T	T	T	T	T
40	H	.102+03	.115+03	.125+03	.133+03	.146+03	.159+03	.171+03	.183+03	.196+03	.208+03
	R	.103+01	.103+01	.103+01	.103+01	.102+01	.101+01	.100+01	.995+00	.986+00	.978+00
	FLOW	S	T	T	T	T	T	T	T	T	T
35	H	.139+03	.165+03	.184+03	.199+03	.225+03	.247+03	.268+03	.288+03	.309+03	.329+03
	R	.946+00	.945+00	.944+00	.943+00	.939+00	.934+00	.929+00	.924+00	.919+00	.914+00
	FLOW	S	S	T	T	T	T	T	T	T	T
30	H	.191+03	.236+03	.270+03	.297+03	.342+03	.380+03	.416+03	.450+03	.483+03	.515+03
	R	.894+00	.894+00	.894+00	.893+00	.891+00	.888+00	.886+00	.883+00	.881+00	.879+00
	FLOW	S	S	S	S	T	T	T	T	T	T
25	H	.265+03	.339+03	.395+03	.440+03	.515+03	.580+03	.638+03	.692+03	.744+03	.793+03
	R	.868+00	.868+00	.868+00	.868+00	.867+00	.865+00	.864+00	.863+00	.862+00	.861+00
	FLOW	S	S	S	S	S	S	S	S	T	T
20	H	.372+03	.491+03	.580+03	.653+03	.775+03	.879+03	.971+03	.106+04	.114+04	.121+04
	R	.856+00	.856+00	.855+00	.855+00	.855+00	.854+00	.854+00	.853+00	.853+00	.852+00
	FLOW	S	S	S	S	S	S	S	S	S	S

TABLE 10

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A CYLINDER .2540 MILLIMETERS IN DIAMETER

SHAPE: WIRE

SIZE: 10.00 MILS

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.126+01	.129+01	.131+01	.134+01	.141+01	.151+01	.163+01	.177+01	.192+01	.208+01
	R	.171+01	.170+01	.169+01	.168+01	.164+01	.159+01	.154+01	.149+01	.144+01	.140+01
	FLOW	F	F	F	F	F	F	F	F	F	F
75	H	.280+01	.283+01	.288+01	.293+01	.308+01	.328+01	.351+01	.379+01	.409+01	.442+01
	R	.168+01	.167+01	.166+01	.165+01	.161+01	.157+01	.152+01	.148+01	.143+01	.139+01
	FLOW	F	F	F	F	F	F	F	F	F	F
70	H	.555+01	.564+01	.574+01	.585+01	.614+01	.650+01	.694+01	.744+01	.800+01	.859+01
	R	.162+01	.161+01	.161+01	.159+01	.156+01	.152+01	.148+01	.144+01	.140+01	.137+01
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.100+02	.103+02	.105+02	.107+02	.113+02	.119+02	.127+02	.135+02	.145+02	.155+02
	R	.153+01	.153+01	.152+01	.151+01	.149+01	.145+01	.142+01	.138+01	.135+01	.132+01
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.167+02	.173+02	.178+02	.183+02	.193+02	.204+02	.217+02	.231+02	.246+02	.262+02
	R	.142+01	.141+01	.141+01	.140+01	.138+01	.136+01	.133+01	.130+01	.127+01	.125+01
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.259+02	.274+02	.286+02	.296+02	.315+02	.335+02	.356+02	.379+02	.403+02	.429+02
	R	.128+01	.128+01	.128+01	.127+01	.126+01	.124+01	.122+01	.120+01	.118+01	.116+01
	FLOW	T	T	T	T	T	T	T	T	T	T
50	H	.377+02	.410+02	.435+02	.455+02	.492+02	.526+02	.562+02	.599+02	.637+02	.677+02
	R	.115+01	.115+01	.115+01	.114+01	.113+01	.112+01	.111+01	.109+01	.108+01	.106+01
	FLOW	T	T	T	T	T	T	T	T	T	T
45	H	.522+02	.590+02	.639+02	.679+02	.746+02	.808+02	.868+02	.929+02	.990+02	.105+03
	R	.104+01	.104+01	.103+01	.103+01	.103+01	.102+01	.101+01	.999+00	.990+00	.981+00
	FLOW	T	T	T	T	T	T	T	T	T	T
40	H	.704+02	.831+02	.922+02	.996+02	.112+03	.123+03	.133+03	.143+03	.153+03	.163+03
	R	.951+00	.950+00	.950+00	.948+00	.944+00	.939+00	.934+00	.929+00	.924+00	.919+00
	FLOW	S	S	T	T	T	T	T	T	T	T
35	H	.946+02	.116+03	.132+03	.145+03	.167+03	.185+03	.202+03	.219+03	.235+03	.250+03
	R	.898+00	.898+00	.898+00	.897+00	.895+00	.892+00	.890+00	.887+00	.884+00	.882+00
	FLOW	S	S	S	S	T	T	T	T	T	T
30	H	.129+03	.165+03	.191+03	.213+03	.249+03	.280+03	.308+03	.334+03	.359+03	.382+03
	R	.870+00	.870+00	.870+00	.869+00	.869+00	.867+00	.866+00	.865+00	.863+00	.862+00
	FLOW	S	S	S	S	S	S	S	T	T	T
25	H	.180+03	.237+03	.279+03	.314+03	.372+03	.421+03	.465+03	.506+03	.544+03	.581+03
	R	.857+00	.857+00	.857+00	.856+00	.856+00	.855+00	.855+00	.854+00	.854+00	.853+00
	FLOW	S	S	S	S	S	S	S	S	S	S
20	H	.255+03	.343+03	.409+03	.464+03	.555+03	.632+03	.701+03	.764+03	.823+03	.879+03
	R	.850+00	.850+00	.850+00	.850+00	.850+00	.850+00	.849+00	.849+00	.849+00	.849+00
	FLOW	S	S	S	S	S	S	S	S	S	S

TABLE 11

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A PLATE 1.0000 MILLIMETERS IN LENGTH

SHAPE: FILM
SIZE: .04 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.797+00	.902+00	.958+00	.995+00	.104+01	.107+01	.109+01	.111+01	.112+01	.114+01
	R	.934+00	.958+00	.973+00	.984+00	.100+01	.101+01	.102+01	.103+01	.103+01	.104+01
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.153+01	.179+01	.193+01	.203+01	.216+01	.225+01	.231+01	.236+01	.240+01	.243+01
	R	.909+00	.929+00	.942+00	.952+00	.967+00	.978+00	.986+00	.994+00	.100+01	.101+01
	FLOW	T	T	T	T	T	T	T	T	T	T
70	H	.266+01	.323+01	.355+01	.377+01	.408+01	.429+01	.444+01	.456+01	.466+01	.475+01
	R	.891+00	.907+00	.917+00	.926+00	.939+00	.949+00	.957+00	.963+00	.969+00	.974+00
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.436+01	.539+01	.603+01	.649+01	.713+01	.757+01	.791+01	.818+01	.840+01	.859+01
	R	.879+00	.891+00	.899+00	.906+00	.917+00	.925+00	.932+00	.938+00	.943+00	.948+00
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.670+01	.849+01	.964+01	.105+02	.117+02	.126+02	.132+02	.138+02	.142+02	.146+02
	R	.870+00	.879+00	.886+00	.891+00	.900+00	.907+00	.913+00	.918+00	.922+00	.926+00
	FLOW	T	T	T	T	T	T	T	T	T	T
55	H	.995+01	.129+02	.148+02	.163+02	.185+02	.200+02	.213+02	.223+02	.232+02	.239+02
	R	.864+00	.871+00	.876+00	.880+00	.887+00	.893+00	.897+00	.901+00	.905+00	.908+00
	FLOW	S	T	T	T	T	T	T	T	T	T
50	H	.144+02	.190+02	.222+02	.246+02	.282+02	.310+02	.332+02	.350+02	.366+02	.380+02
	R	.859+00	.864+00	.868+00	.872+00	.877+00	.881+00	.885+00	.888+00	.891+00	.894+00
	FLOW	S	S	T	T	T	T	T	T	T	T
45	H	.207+02	.276+02	.327+02	.366+02	.426+02	.473+02	.510+02	.542+02	.570+02	.594+02
	R	.855+00	.859+00	.862+00	.865+00	.869+00	.872+00	.875+00	.878+00	.880+00	.882+00
	FLOW	S	S	S	S	T	T	T	T	T	T
40	H	.300+02	.408+02	.485+02	.547+02	.644+02	.721+02	.785+02	.839+02	.887+02	.930+02
	R	.852+00	.855+00	.858+00	.859+00	.863+00	.865+00	.867+00	.869+00	.871+00	.873+00
	FLOW	S	S	S	S	S	S	S	T	T	T
35	H	.438+02	.602+02	.722+02	.820+02	.976+02	.110+03	.121+03	.130+03	.138+03	.145+03
	R	.850+00	.852+00	.854+00	.855+00	.858+00	.859+00	.861+00	.862+00	.864+00	.865+00
	FLOW	S	S	S	S	S	S	S	S	S	S
30	H	.647+02	.897+02	.108+03	.123+03	.148+03	.168+03	.185+03	.201+03	.214+03	.226+03
	R	.849+00	.850+00	.851+00	.852+00	.854+00	.855+00	.856+00	.857+00	.858+00	.859+00
	FLOW	S	S	S	S	S	S	S	S	S	S
25	H	.959+02	.134+03	.162+03	.186+03	.224+03	.256+03	.283+03	.307+03	.329+03	.349+03
	R	.847+00	.849+00	.849+00	.850+00	.851+00	.852+00	.853+00	.853+00	.854+00	.855+00
	FLOW	S	S	S	S	S	S	S	S	S	S
20	H	.143+03	.200+03	.243+03	.279+03	.339+03	.388+03	.431+03	.469+03	.504+03	.535+03
	R	.847+00	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.851+00	.852+00
	FLOW	C	C	S	S	S	S	S	S	S	S

TABLE 12

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A PLATE 2.0000 MILLIMETERS IN LENGTH

SHAPE: FILM
SIZE: .08 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.684+00	.797+00	.860+00	.902+00	.958+00	.995+00	.102+01	.104+01	.106+01	.107+01
	R	.913+00	.934+00	.948+00	.958+00	.973+00	.984+00	.993+00	.100+01	.101+01	.101+01
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.127+01	.153+01	.168+01	.179+01	.193+01	.203+01	.210+01	.216+01	.221+01	.225+01
	R	.893+00	.909+00	.920+00	.929+00	.942+00	.952+00	.960+00	.967+00	.972+00	.978+00
	FLOW	T	T	T	T	T	T	T	T	T	T
70	H	.216+01	.268+01	.300+01	.323+01	.355+01	.377+01	.395+01	.408+01	.419+01	.429+01
	R	.879+00	.891+00	.900+00	.907+00	.917+00	.926+00	.933+00	.939+00	.944+00	.949+00
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.342+01	.436+01	.495+01	.539+01	.603+01	.649+01	.684+01	.713+01	.737+01	.757+01
	R	.870+00	.879+00	.885+00	.891+00	.899+00	.906+00	.912+00	.917+00	.921+00	.925+00
	FLOW	T	T	T	T	T	T	T	T	T	T
60	H	.515+01	.670+01	.772+01	.849+01	.964+01	.105+02	.111+02	.117+02	.122+02	.126+02
	R	.863+00	.870+00	.875+00	.879+00	.886+00	.891+00	.896+00	.900+00	.904+00	.907+00
	FLOW	S	T	T	T	T	T	T	T	T	T
55	H	.753+01	.995+01	.116+02	.129+02	.148+02	.163+02	.175+02	.185+02	.193+02	.200+02
	R	.850+00	.864+00	.867+00	.871+00	.876+00	.880+00	.884+00	.887+00	.890+00	.893+00
	FLOW	S	S	T	T	T	T	T	T	T	T
50	H	.107+02	.144+02	.170+02	.190+02	.222+02	.246+02	.266+02	.282+02	.297+02	.310+02
	R	.855+00	.859+00	.862+00	.864+00	.868+00	.872+00	.874+00	.877+00	.879+00	.881+00
	FLOW	S	S	S	S	T	T	T	T	T	T
45	H	.152+02	.207+02	.247+02	.278+02	.327+02	.366+02	.399+02	.426+02	.451+02	.473+02
	R	.852+00	.855+00	.857+00	.859+00	.862+00	.865+00	.867+00	.869+00	.871+00	.872+00
	FLOW	S	S	S	S	S	S	T	T	T	T
40	H	.218+02	.300+02	.359+02	.408+02	.485+02	.547+02	.599+02	.644+02	.685+02	.721+02
	R	.850+00	.852+00	.854+00	.855+00	.858+00	.859+00	.861+00	.863+00	.864+00	.865+00
	FLOW	S	S	S	S	S	S	S	S	S	S
35	H	.316+02	.438+02	.528+02	.602+02	.722+02	.820+02	.903+02	.976+02	.104+03	.110+03
	R	.849+00	.850+00	.851+00	.852+00	.854+00	.855+00	.856+00	.858+00	.858+00	.859+00
	FLOW	S	S	S	S	S	S	S	S	S	S
30	H	.464+02	.647+02	.784+02	.897+02	.108+03	.123+03	.137+03	.148+03	.159+03	.168+03
	R	.848+00	.849+00	.849+00	.850+00	.851+00	.852+00	.853+00	.854+00	.854+00	.855+00
	FLOW	S	S	S	S	S	S	S	S	S	S
25	H	.684+02	.959+02	.117+03	.134+03	.162+03	.186+03	.206+03	.224+03	.241+03	.256+03
	R	.847+00	.847+00	.848+00	.849+00	.849+00	.850+00	.851+00	.851+00	.852+00	.852+00
	FLOW	C	S	S	S	S	S	S	S	S	S
20	H	.102+03	.143+03	.174+03	.200+03	.243+03	.279+03	.311+03	.339+03	.364+03	.388+03
	R	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.849+00	.850+00
	FLOW	C	C	C	C	S	S	S	S	S	S

TABLE 13

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A PLATE 5.0000 MILLIMETERS IN LENGTH

SHAPE: FILM
SIZE: .20 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.534+00	.647+00	.714+00	.761+00	.825+00	.869+00	.902+00	.928+00	.949+00	.966+00
	R	.892+00	.908+00	.918+00	.927+00	.940+00	.950+00	.958+00	.965+00	.970+00	.976+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.951+00	.119+01	.134+01	.145+01	.160+01	.171+01	.179+01	.185+01	.191+01	.196+01
	R	.877+00	.889+00	.897+00	.903+00	.914+00	.922+00	.929+00	.934+00	.939+00	.944+00
	FLOW	T	T	T	T	T	T	T	T	T	T
70	H	.156+01	.200+01	.229+01	.251+01	.282+01	.305+01	.323+01	.337+01	.350+01	.360+01
	R	.867+00	.876+00	.882+00	.887+00	.895+00	.901+00	.907+00	.911+00	.916+00	.919+00
	FLOW	T	T	T	T	T	T	T	T	T	T
65	H	.240+01	.315+01	.366+01	.404+01	.462+01	.505+01	.539+01	.568+01	.592+01	.613+01
	R	.861+00	.867+00	.872+00	.876+00	.882+00	.887+00	.891+00	.895+00	.898+00	.901+00
	FLOW	S	S	T	T	T	T	T	T	T	T
60	H	.354+01	.472+01	.553+01	.617+01	.715+01	.789+01	.849+01	.900+01	.944+01	.982+01
	R	.857+00	.861+00	.865+00	.868+00	.872+00	.876+00	.879+00	.882+00	.885+00	.887+00
	FLOW	S	S	S	T	T	T	T	T	T	T
55	H	.507+01	.685+01	.812+01	.912+01	.107+02	.119+02	.129+02	.138+02	.145+02	.152+02
	R	.854+00	.857+00	.860+00	.862+00	.865+00	.868+00	.671+00	.873+00	.875+00	.877+00
	FLOW	S	S	S	S	S	T	T	T	T	T
50	H	.714+01	.974+01	.116+02	.131+02	.155+02	.174+02	.190+02	.204+02	.216+02	.227+02
	R	.851+00	.854+00	.856+00	.657+00	.860+00	.862+00	.864+00	.866+00	.868+00	.869+00
	FLOW	S	S	S	S	S	S	S	S	T	T
45	H	.100+02	.138+02	.165+02	.188+02	.224+02	.253+02	.278+02	.299+02	.319+02	.336+02
	R	.850+00	.852+00	.853+00	.854+00	.856+00	.858+00	.859+00	.861+00	.862+00	.863+00
	FLOW	S	S	S	S	S	S	S	S	S	S
40	H	.142+02	.197+02	.237+02	.271+02	.325+02	.370+02	.408+02	.441+02	.471+02	.498+02
	R	.848+00	.850+00	.851+00	.852+00	.853+00	.854+00	.855+00	.856+00	.857+00	.858+00
	FLOW	S	S	S	S	S	S	S	S	S	S
35	H	.203+02	.284+02	.344+02	.394+02	.476+02	.544+02	.602+02	.654+02	.700+02	.743+02
	R	.847+00	.848+00	.849+00	.850+00	.851+00	.852+00	.852+00	.853+00	.854+00	.854+00
	FLOW	C	S	S	S	S	S	S	S	S	S
30	H	.297+02	.416+02	.506+02	.581+02	.705+02	.808+02	.897+02	.976+02	.105+03	.112+03
	R	.847+00	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.851+00	.851+00
	FLOW	C	C	S	S	S	S	S	S	S	S
25	H	.437+02	.614+02	.748+02	.860+02	.105+03	.120+03	.134+03	.146+03	.157+03	.167+03
	R	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.849+00	.849+00
	FLOW	C	C	C	C	S	S	S	S	S	S
20	H	.646+02	.910+02	.111+03	.128+03	.156+03	.180+03	.200+03	.219+03	.235+03	.251+03
	R	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00
	FLOW	C	C	C	C	C	C	C	S	S	S

TABLE 14

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A PLATE 10.0000 MILLIMETERS IN LENGTH

SHAPE: FILM
SIZE: .39 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.428+00	.534+00	.600+00	.647+00	.714+00	.761+00	.797+00	.625+00	.849+00	.869+00
	R	.880+00	.892+00	.901+00	.908+00	.918+00	.927+00	.934+00	.940+00	.945+00	.950+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.740+00	.951+00	.109+01	.119+01	.134+01	.145+01	.153+01	.160+01	.166+01	.171+01
	R	.868+00	.877+00	.883+00	.889+00	.897+00	.903+00	.909+00	.914+00	.918+00	.922+00
	FLOW	T	T	T	T	T	T	T	T	T	T
70	H	.119+01	.156+01	.181+01	.200+01	.229+01	.251+01	.268+01	.282+01	.294+01	.305+01
	R	.861+00	.867+00	.872+00	.876+00	.882+00	.887+00	.891+00	.895+00	.898+00	.901+00
	FLOW	S	S	T	T	T	T	T	T	T	T
65	H	.180+01	.240+01	.282+01	.315+01	.366+01	.404+01	.436+01	.462+01	.485+01	.505+01
	R	.857+00	.861+00	.864+00	.867+00	.872+00	.876+00	.879+00	.882+00	.884+00	.887+00
	FLOW	S	S	S	S	T	T	T	T	T	T
60	H	.261+01	.354+01	.420+01	.472+01	.553+01	.617+01	.670+01	.715+01	.754+01	.789+01
	R	.853+00	.857+00	.859+00	.861+00	.865+00	.868+00	.870+00	.872+00	.874+00	.876+00
	FLOW	S	S	S	S	S	T	T	T	T	T
55	H	.371+01	.507+01	.606+01	.685+01	.812+01	.912+01	.995+01	.107+02	.113+02	.119+02
	R	.851+00	.854+00	.855+00	.857+00	.860+00	.862+00	.864+00	.865+00	.867+00	.868+00
	FLOW	S	S	S	S	S	S	S	S	S	T
50	H	.518+01	.714+01	.857+01	.974+01	.116+02	.131+02	.144+02	.155+02	.165+02	.174+02
	R	.850+00	.851+00	.853+00	.854+00	.856+00	.857+00	.859+00	.860+00	.861+00	.862+00
	FLOW	S	S	S	S	S	S	S	S	S	S
45	H	.720+01	.100+02	.121+02	.138+02	.165+02	.188+02	.207+02	.224+02	.239+02	.253+02
	R	.848+00	.850+00	.851+00	.852+00	.853+00	.854+00	.855+00	.856+00	.857+00	.858+00
	FLOW	S	S	S	S	S	S	S	S	S	S
40	H	.101+02	.142+02	.172+02	.197+02	.237+02	.271+02	.300+02	.325+02	.349+02	.370+02
	R	.847+00	.848+00	.849+00	.850+00	.851+00	.852+00	.852+00	.853+00	.854+00	.854+00
	FLOW	C	S	S	S	S	S	S	S	S	S
35	H	.145+02	.203+02	.247+02	.284+02	.344+02	.394+02	.438+02	.476+02	.512+02	.544+02
	R	.847+00	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.851+00	.852+00
	FLOW	C	C	S	S	S	S	S	S	S	S
30	H	.211+02	.297+02	.362+02	.416+02	.506+02	.581+02	.647+02	.705+02	.758+02	.808+02
	R	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.849+00	.850+00
	FLOW	C	C	C	C	S	S	S	S	S	S
25	H	.310+02	.437+02	.533+02	.614+02	.748+02	.860+02	.959+02	.105+03	.113+03	.120+03
	R	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00
	FLOW	C	C	C	C	C	C	S	S	S	S
20	H	.458+02	.646+02	.790+02	.910+02	.111+03	.128+03	.143+03	.156+03	.168+03	.180+03
	R	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 15

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME FOR A PLATE 20.0000 MILLIMETERS IN LENGTH

SHAPE: FILM
SIZE: .79 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.335+00	.428+00	.489+00	.534+00	.600+00	.647+00	.684+00	.714+00	.739+00	.761+00
	R	.870+00	.880+00	.886+00	.892+00	.901+00	.908+00	.913+00	.918+00	.923+00	.927+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.564+00	.740+00	.860+00	.951+00	.109+01	.119+01	.127+01	.134+01	.140+01	.145+01
	R	.852+00	.868+00	.873+00	.877+00	.883+00	.889+00	.893+00	.897+00	.900+00	.903+00
	FLOW	S	S	T	T	T	T	T	T	T	T
70	H	.888+00	.119+01	.140+01	.156+01	.181+01	.200+01	.216+01	.229+01	.241+01	.251+01
	R	.857+00	.861+00	.865+00	.867+00	.872+00	.876+00	.879+00	.882+00	.885+00	.887+00
	FLOW	S	S	S	S	T	T	T	T	T	T
65	H	.133+01	.180+01	.214+01	.240+01	.282+01	.315+01	.342+01	.366+01	.386+01	.404+01
	R	.853+00	.857+00	.859+00	.861+00	.864+00	.867+00	.870+00	.872+00	.874+00	.876+00
	FLOW	S	S	S	S	S	S	T	T	T	T
60	H	.191+01	.261+01	.313+01	.354+01	.420+01	.472+01	.515+01	.553+01	.587+01	.617+01
	R	.851+00	.853+00	.855+00	.857+00	.859+00	.861+00	.863+00	.865+00	.866+00	.868+00
	FLOW	S	S	S	S	S	S	S	S	S	T
55	H	.269+01	.371+01	.446+01	.507+01	.606+01	.685+01	.753+01	.812+01	.864+01	.912+01
	R	.849+00	.851+00	.852+00	.854+00	.855+00	.857+00	.858+00	.860+00	.861+00	.862+00
	FLOW	S	S	S	S	S	S	S	S	S	S
50	H	.373+01	.518+01	.625+01	.714+01	.857+01	.974+01	.107+02	.116+02	.124+02	.131+02
	R	.846+00	.850+00	.851+00	.851+00	.853+00	.854+00	.855+00	.856+00	.857+00	.857+00
	FLOW	S	S	S	S	S	S	S	S	S	S
45	H	.516+01	.720+01	.873+01	.100+02	.121+02	.138+02	.152+02	.165+02	.177+02	.188+02
	R	.847+00	.848+00	.849+00	.850+00	.851+00	.852+00	.852+00	.853+00	.854+00	.854+00
	FLOW	S	S	S	S	S	S	S	S	S	S
40	H	.725+01	.101+02	.123+02	.142+02	.172+02	.197+02	.218+02	.237+02	.255+02	.271+02
	R	.847+00	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.851+00	.852+00
	FLOW	C	C	S	S	S	S	S	S	S	S
35	H	.103+02	.145+02	.177+02	.203+02	.247+02	.284+02	.316+02	.344+02	.370+02	.394+02
	R	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.849+00	.850+00
	FLOW	C	C	C	C	S	S	S	S	S	S
30	H	.150+02	.211+02	.258+02	.297+02	.362+02	.416+02	.464+02	.506+02	.545+02	.581+02
	R	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00	.848+00
	FLOW	C	C	C	C	C	C	S	S	S	S
25	H	.220+02	.310+02	.379+02	.437+02	.533+02	.614+02	.684+02	.748+02	.806+02	.860+02
	R	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	C	C	C	C	C	C
20	H	.325+02	.458+02	.561+02	.646+02	.790+02	.910+02	.102+03	.111+03	.120+03	.128+03
	R	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 16

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A PLATE 50.0000 MILLIMETERS IN LENGTH

SHAPE: FILM
SIZE: 1.97 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.233+00	.306+00	.358+00	.397+00	.455+00	.499+00	.534+00	.563+00	.589+00	.610+00
	R	.861+00	.868+00	.873+00	.876+00	.883+00	.888+00	.892+00	.896+00	.899+00	.902+00
	FLOW	S	S	T	T	T	T	T	T	T	T
75	H	.383+00	.515+00	.607+00	.680+00	.793+00	.880+00	.951+00	.101+01	.106+01	.111+01
	R	.856+00	.860+00	.863+00	.866+00	.870+00	.874+00	.877+00	.880+00	.882+00	.885+00
	FLOW	S	S	S	S	T	T	T	T	T	T
70	H	.592+00	.806+00	.960+00	.108+01	.128+01	.143+01	.156+01	.167+01	.177+01	.185+01
	R	.852+00	.855+00	.858+00	.860+00	.863+00	.865+00	.867+00	.869+00	.871+00	.873+00
	FLOW	S	S	S	S	S	S	S	T	T	T
65	H	.873+00	.120+01	.144+01	.163+01	.194+01	.219+01	.240+01	.259+01	.275+01	.290+01
	R	.850+00	.852+00	.854+00	.855+00	.858+00	.859+00	.861+00	.862+00	.864+00	.865+00
	FLOW	S	S	S	S	S	S	S	S	S	S
60	H	.124+01	.172+01	.208+01	.237+01	.283+01	.321+01	.354+01	.382+01	.408+01	.431+01
	R	.849+00	.850+00	.852+00	.852+00	.854+00	.855+00	.857+00	.858+00	.859+00	.860+00
	FLOW	S	S	S	S	S	S	S	S	S	S
55	H	.174+01	.242+01	.293+01	.335+01	.403+01	.459+01	.507+01	.550+01	.588+01	.623+01
	R	.848+00	.849+00	.850+00	.850+00	.852+00	.853+00	.854+00	.854+00	.855+00	.856+00
	FLOW	S	S	S	S	S	S	S	S	S	S
50	H	.240+01	.335+01	.407+01	.466+01	.564+01	.644+01	.714+01	.775+01	.831+01	.882+01
	R	.847+00	.848+00	.849+00	.849+00	.850+00	.851+00	.851+00	.852+00	.852+00	.853+00
	FLOW	C	S	S	S	S	S	S	S	S	S
45	H	.331+01	.463+01	.564+01	.647+01	.786+01	.900+01	.100+02	.109+02	.117+02	.124+02
	R	.846+00	.847+00	.848+00	.848+00	.849+00	.849+00	.850+00	.850+00	.850+00	.851+00
	FLOW	C	C	S	S	S	S	S	S	S	S
40	H	.462+01	.650+01	.792+01	.911+01	.111+02	.127+02	.142+02	.154+02	.166+02	.177+02
	R	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00	.849+00	.849+00	.849+00
	FLOW	C	C	C	C	S	S	S	S	S	S
35	H	.656+01	.926+01	.113+02	.130+02	.159+02	.183+02	.203+02	.222+02	.239+02	.255+02
	R	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00
	FLOW	C	C	C	C	C	C	C	S	S	S
30	H	.953+01	.134+02	.164+02	.189+02	.231+02	.266+02	.297+02	.325+02	.350+02	.373+02
	R	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	C	C	C	C	C	C
25	H	.139+02	.197+02	.241+02	.278+02	.339+02	.391+02	.437+02	.478+02	.515+02	.550+02
	R	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
20	H	.206+02	.291+02	.356+02	.410+02	.502+02	.579+02	.646+02	.707+02	.763+02	.815+02
	R	.845+00	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 17

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME FOR A PLATE 100.0000 MILLIMETERS IN LENGTH

SHAPE: FILM

SIZE: 3.94 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.174+00	.233+00	.275+00	.308+00	.358+00	.397+00	.428+00	.455+00	.479+00	.499+00
	R	.857+00	.861+00	.865+00	.868+00	.873+00	.876+00	.880+00	.883+00	.885+00	.888+00
	FLOW	S	S	S	S	T	T	T	T	T	T
75	H	.241+00	.383+00	.456+00	.515+00	.607+00	.680+00	.740+00	.793+00	.838+00	.880+00
	R	.853+00	.856+00	.858+00	.860+00	.863+00	.866+00	.868+00	.870+00	.872+00	.874+00
	FLOW	S	S	S	S	S	S	S	T	T	T
70	H	.430+00	.592+00	.710+00	.806+00	.960+00	.108+01	.119+01	.128+01	.136+01	.143+01
	R	.850+00	.852+00	.854+00	.855+00	.858+00	.860+00	.861+00	.863+00	.864+00	.865+00
	FLOW	S	S	S	S	S	S	S	S	S	S
65	H	.630+00	.873+00	.105+01	.120+01	.144+01	.163+01	.180+01	.194+01	.208+01	.219+01
	R	.849+00	.850+00	.851+00	.852+00	.854+00	.855+00	.857+00	.858+00	.859+00	.859+00
	FLOW	S	S	S	S	S	S	S	S	S	S
60	H	.893+00	.124+01	.151+01	.172+01	.208+01	.237+01	.261+01	.283+01	.303+01	.321+01
	R	.848+00	.849+00	.850+00	.850+00	.852+00	.852+00	.853+00	.854+00	.855+00	.855+00
	FLOW	S	S	S	S	S	S	S	S	S	S
55	H	.124+01	.174+01	.211+01	.242+01	.293+01	.335+01	.371+01	.403+01	.432+01	.459+01
	R	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.852+00	.852+00	.853+00
	FLOW	C	S	S	S	S	S	S	S	S	S
50	H	.171+01	.240+01	.292+01	.335+01	.407+01	.466+01	.518+01	.564+01	.605+01	.644+01
	R	.846+00	.847+00	.847+00	.848+00	.849+00	.849+00	.850+00	.850+00	.850+00	.851+00
	FLOW	C	C	S	S	S	S	S	S	S	S
45	H	.235+01	.331+01	.403+01	.463+01	.564+01	.647+01	.720+01	.786+01	.845+01	.900+01
	R	.846+00	.846+00	.847+00	.847+00	.848+00	.848+00	.848+00	.849+00	.849+00	.849+00
	FLOW	C	C	C	C	S	S	S	S	S	S
40	H	.326+01	.462+01	.564+01	.650+01	.792+01	.911+01	.101+02	.111+02	.119+02	.127+02
	R	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00
	FLOW	C	C	C	C	C	C	C	S	S	S
35	H	.466+01	.658+01	.804+01	.926+01	.113+02	.130+02	.145+02	.159+02	.171+02	.183+02
	R	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	C	C	C	C	C	C
30	H	.675+01	.953+01	.117+02	.134+02	.164+02	.189+02	.211+02	.231+02	.249+02	.266+02
	R	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
25	H	.988+01	.139+02	.171+02	.197+02	.241+02	.278+02	.310+02	.339+02	.366+02	.391+02
	R	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
20	H	.146+02	.206+02	.252+02	.291+02	.356+02	.410+02	.458+02	.502+02	.542+02	.579+02
	R	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 18

LOCAL VALUES OF
CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), SHAPE: FILM
RECOVERY FACTOR R, AND FLOW REGIME
AT A DISTANCE OF 1.0000 MILLIMETERS
FROM THE LEADING EDGE OF THE PLATE DISTANCE FROM LEADING EDGE: .000 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	HX	.797+00	.902+00	.958+00	.995+00	.104+01	.107+01	.109+01	.111+01	.112+01	.114+01
	RX	.934+00	.958+00	.973+00	.984+00	.100+01	.101+01	.102+01	.103+01	.103+01	.104+01
	FLOW	T	T	T	T	T	T	T	T	T	T
75	HX	.153+01	.179+01	.193+01	.203+01	.216+01	.225+01	.231+01	.236+01	.240+01	.243+01
	RX	.909+00	.929+00	.942+00	.952+00	.967+00	.978+00	.986+00	.994+00	.100+01	.101+01
	FLOW	T	T	T	T	T	T	T	T	T	T
70	HX	.268+01	.323+01	.355+01	.377+01	.408+01	.429+01	.444+01	.456+01	.466+01	.475+01
	RX	.891+00	.907+00	.917+00	.926+00	.939+00	.949+00	.957+00	.963+00	.969+00	.974+00
	FLOW	T	T	T	T	T	T	T	T	T	T
65	HX	.436+01	.539+01	.603+01	.649+01	.713+01	.757+01	.791+01	.818+01	.840+01	.859+01
	RX	.879+00	.891+00	.899+00	.906+00	.917+00	.925+00	.932+00	.938+00	.943+00	.948+00
	FLOW	T	T	T	T	T	T	T	T	T	T
60	HX	.670+01	.849+01	.964+01	.105+02	.117+02	.126+02	.132+02	.138+02	.142+02	.146+02
	RX	.870+00	.879+00	.886+00	.891+00	.900+00	.907+00	.913+00	.918+00	.922+00	.926+00
	FLOW	T	T	T	T	T	T	T	T	T	T
55	HX	.995+01	.129+02	.148+02	.163+02	.185+02	.200+02	.213+02	.223+02	.232+02	.239+02
	RX	.864+00	.871+00	.876+00	.880+00	.887+00	.893+00	.897+00	.901+00	.905+00	.908+00
	FLOW	S	T	T	T	T	T	T	T	T	T
50	HX	.144+02	.190+02	.222+02	.246+02	.282+02	.310+02	.332+02	.350+02	.366+02	.380+02
	RX	.859+00	.864+00	.868+00	.872+00	.877+00	.881+00	.885+00	.888+00	.891+00	.894+00
	FLOW	S	S	T	T	T	T	T	T	T	T
45	HX	.207+02	.278+02	.327+02	.366+02	.426+02	.473+02	.510+02	.542+02	.570+02	.594+02
	RX	.855+00	.859+00	.862+00	.865+00	.869+00	.872+00	.875+00	.878+00	.880+00	.882+00
	FLOW	S	S	S	S	T	T	T	T	T	T
40	HX	.300+02	.408+02	.485+02	.547+02	.644+02	.721+02	.785+02	.839+02	.887+02	.930+02
	RX	.852+00	.855+00	.858+00	.859+00	.863+00	.865+00	.867+00	.869+00	.871+00	.873+00
	FLOW	S	S	S	S	S	S	S	T	T	T
35	HX	.436+02	.602+02	.722+02	.820+02	.976+02	.110+03	.121+03	.130+03	.138+03	.145+03
	RX	.850+00	.852+00	.854+00	.855+00	.858+00	.859+00	.861+00	.862+00	.864+00	.865+00
	FLOW	S	S	S	S	S	S	S	S	S	S
30	HX	.647+02	.897+02	.108+03	.123+03	.148+03	.168+03	.185+03	.201+03	.214+03	.226+03
	RX	.849+00	.850+00	.851+00	.852+00	.854+00	.855+00	.856+00	.857+00	.858+00	.859+00
	FLOW	S	S	S	S	S	S	S	S	S	S
25	HX	.959+02	.134+03	.162+03	.186+03	.224+03	.256+03	.283+03	.307+03	.329+03	.349+03
	RX	.847+00	.849+00	.849+00	.850+00	.851+00	.852+00	.853+00	.853+00	.854+00	.855+00
	FLOW	S	S	S	S	S	S	S	S	S	S
20	HX	.143+03	.200+03	.243+03	.279+03	.339+03	.388+03	.431+03	.469+03	.504+03	.535+03
	RX	.847+00	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.851+00	.852+00
	FLOW	C	C	S	S	S	S	S	S	S	S

TABLE 18 (CONT.)

LOCAL VALUES OF
CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), SHAPE: FILM
RECOVERY FACTOR R, AND FLOW REGIME
AT A DISTANCE OF 2.0000 MILLIMETERS
FROM THE LEADING EDGE OF THE PLATE DISTANCE FROM LEADING EDGE: .079 IN.

ALT. (KM)		SPEED (M/S) 25	50	75	100	150	200	250	300	350	400
80	HX	.571+00	.692+00	.761+00	.809+00	.874+00	.917+00	.948+00	.973+00	.993+00	.101+01
	RX	.893+00	.910+00	.922+00	.931+00	.946+00	.957+00	.965+00	.973+00	.979+00	.985+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	HX	.101+01	.127+01	.143+01	.155+01	.171+01	.182+01	.190+01	.196+01	.202+01	.206+01
	RX	.877+00	.889+00	.898+00	.905+00	.917+00	.926+00	.933+00	.940+00	.945+00	.950+00
	FLOW	T	T	T	T	T	T	T	T	T	T
70	HX	.164+01	.213+01	.245+01	.268+01	.302+01	.326+01	.345+01	.360+01	.372+01	.383+01
	RX	.867+00	.876+00	.882+00	.888+00	.896+00	.903+00	.909+00	.914+00	.919+00	.923+00
	FLOW	T	T	T	T	T	T	T	T	T	T
65	HX	.249+01	.332+01	.388+01	.430+01	.493+01	.540+01	.577+01	.607+01	.633+01	.656+01
	RX	.861+00	.867+00	.872+00	.875+00	.882+00	.887+00	.892+00	.896+00	.899+00	.903+00
	FLOW	T	T	T	T	T	T	T	T	T	T
60	HX	.361+01	.490+01	.580+01	.650+01	.758+01	.840+01	.906+01	.962+01	.101+02	.105+02
	RX	.856+00	.861+00	.864+00	.867+00	.872+00	.876+00	.879+00	.882+00	.885+00	.888+00
	FLOW	S	T	T	T	T	T	T	T	T	T
55	HX	.510+01	.701+01	.839+01	.949+01	.112+02	.126+02	.137+02	.146+02	.154+02	.162+02
	RX	.853+00	.857+00	.859+00	.861+00	.865+00	.868+00	.870+00	.873+00	.875+00	.877+00
	FLOW	S	S	T	T	T	T	T	T	T	T
50	HX	.707+01	.962+01	.118+02	.135+02	.161+02	.182+02	.199+02	.215+02	.228+02	.240+02
	RX	.851+00	.853+00	.855+00	.857+00	.860+00	.862+00	.864+00	.865+00	.867+00	.969+00
	FLOW	S	S	S	S	T	T	T	T	T	T
45	HX	.976+01	.137+02	.166+02	.190+02	.229+02	.260+02	.287+02	.311+02	.332+02	.351+02
	RX	.849+00	.851+00	.853+00	.854+00	.856+00	.857+00	.859+00	.860+00	.861+00	.862+00
	FLOW	S	S	S	S	S	S	T	T	T	T
40	HX	.136+02	.192+02	.234+02	.269+02	.326+02	.373+02	.413+02	.449+02	.482+02	.512+02
	RX	.848+00	.849+00	.850+00	.851+00	.853+00	.854+00	.855+00	.856+00	.857+00	.857+00
	FLOW	S	S	S	S	S	S	S	S	S	S
35	HX	.194+02	.273+02	.334+02	.385+02	.469+02	.538+02	.599+02	.653+02	.703+02	.748+02
	RX	.847+00	.848+00	.849+00	.849+00	.850+00	.851+00	.852+00	.853+00	.853+00	.854+00
	FLOW	S	S	S	S	S	S	S	S	S	S
30	HX	.281+02	.396+02	.485+02	.559+02	.683+02	.786+02	.877+02	.958+02	.103+03	.110+03
	RX	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.850+00	.850+00	.851+00	.851+00
	FLOW	S	S	S	S	S	S	S	S	S	S
25	HX	.410+02	.580+02	.709+02	.819+02	.100+03	.115+03	.129+03	.141+03	.152+03	.162+03
	RX	.846+00	.846+00	.847+00	.847+00	.848+00	.848+00	.848+00	.849+00	.849+00	.849+00
	FLOW	C	S	S	S	S	S	S	S	S	S
20	HX	.605+02	.855+02	.105+03	.121+03	.148+03	.171+03	.191+03	.209+03	.225+03	.241+03
	RX	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.848+00	.848+00
	FLOW	C	C	C	C	S	S	S	S	S	S

TABLE 18 (CONT.)

LOCAL VALUES OF
CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), SHAPE: FILM
RECOVERY FACTOR R, AND FLOW REGIME
AT A DISTANCE OF 5.0000 MILLIMETERS
FROM THE LEADING EDGE OF THE PLATE DISTANCE FROM LEADING EDGE: .197 IN.

ALT. (KM)		SPEED (M/S) 25	50	75	100	150	200	250	300	350	400
80	HX	.391+00	.500+00	.568+00	.618+00	.689+00	.739+00	.776+00	.807+00	.832+00	.853+00
	RX	.873+00	.884+00	.892+00	.899+00	.909+00	.918+00	.925+00	.931+00	.936+00	.941+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	HX	.654+00	.864+00	.100+01	.111+01	.126+01	.138+01	.147+01	.154+01	.160+01	.165+01
	RX	.864+00	.871+00	.877+00	.881+00	.889+00	.895+00	.900+00	.905+00	.909+00	.913+00
	FLOW	T	T	T	T	T	T	T	T	T	T
70	HX	.102+01	.138+01	.163+01	.182+01	.211+01	.234+01	.252+01	.267+01	.279+01	.291+01
	RX	.858+00	.863+00	.867+00	.870+00	.875+00	.880+00	.884+00	.887+00	.890+00	.893+00
	FLOW	T	T	T	T	T	T	T	T	T	T
65	HX	.150+01	.207+01	.247+01	.279+01	.329+01	.368+01	.400+01	.427+01	.451+01	.472+01
	RX	.854+00	.858+00	.860+00	.863+00	.867+00	.870+00	.873+00	.875+00	.877+00	.879+00
	FLOW	S	S	T	T	T	T	T	T	T	T
60	HX	.214+01	.297+01	.357+01	.407+01	.485+01	.548+01	.600+01	.645+01	.685+01	.720+01
	RX	.851+00	.854+00	.856+00	.858+00	.861+00	.863+00	.865+00	.867+00	.869+00	.870+00
	FLOW	S	S	S	T	T	T	T	T	T	T
55	HX	.298+01	.416+01	.504+01	.576+01	.694+01	.789+01	.869+01	.940+01	.100+02	.106+02
	RX	.850+00	.852+00	.853+00	.854+00	.856+00	.858+00	.860+00	.861+00	.862+00	.863+00
	FLOW	S	S	S	S	S	T	T	T	T	T
50	HX	.409+01	.574+01	.698+01	.801+01	.971+01	.111+02	.123+02	.133+02	.143+02	.152+02
	RX	.848+00	.850+00	.851+00	.852+00	.853+00	.855+00	.856+00	.857+00	.858+00	.859+00
	FLOW	S	S	S	S	S	S	S	S	T	T
45	HX	.561+01	.790+01	.964+01	.111+02	.135+02	.155+02	.172+02	.188+02	.201+02	.214+02
	RX	.847+00	.849+00	.849+00	.850+00	.851+00	.852+00	.853+00	.854+00	.854+00	.855+00
	FLOW	S	S	S	S	S	S	S	S	S	S
40	HX	.781+01	.110+02	.135+02	.155+02	.190+02	.218+02	.243+02	.265+02	.286+02	.304+02
	RX	.847+00	.848+00	.848+00	.849+00	.849+00	.850+00	.851+00	.851+00	.852+00	.852+00
	FLOW	S	S	S	S	S	S	S	S	S	S
35	HX	.111+02	.157+02	.192+02	.221+02	.270+02	.311+02	.347+02	.380+02	.410+02	.437+02
	RX	.846+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.849+00	.850+00	.850+00
	FLOW	C	S	S	S	S	S	S	S	S	S
30	HX	.160+02	.226+02	.277+02	.320+02	.391+02	.451+02	.504+02	.552+02	.596+02	.636+02
	RX	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00	.848+00
	FLOW	C	C	S	S	S	S	S	S	S	S
25	HX	.234+02	.331+02	.405+02	.467+02	.572+02	.660+02	.738+02	.808+02	.873+02	.932+02
	RX	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	S	S	S	S	S	S
20	HX	.345+02	.487+02	.597+02	.689+02	.844+02	.974+02	.109+03	.119+03	.129+03	.138+03
	RX	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00
	FLOW	C	C	C	C	C	C	C	S	S	S

TABLE 18 (CONT.)

LOCAL VALUES OF
CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), SHAPE: FILM
RECOVERY FACTOR R, AND FLOW REGIME
AT A DISTANCE OF 10.0000 MILLIMETERS
FROM THE LEADING EDGE OF THE PLATE DISTANCE FROM LEADING EDGE: .394 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	HX	.290+00	.382+00	.444+00	.490+00	.559+00	.608+00	.647+00	.679+00	.706+00	.729+00
	RX	.865+00	.873+00	.878+00	.883+00	.891+00	.898+00	.903+00	.908+00	.912+00	.916+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	HX	.472+00	.639+00	.755+00	.846+00	.984+00	.109+01	.117+01	.124+01	.130+01	.136+01
	RX	.858+00	.863+00	.867+00	.870+00	.876+00	.880+00	.884+00	.888+00	.891+00	.894+00
	FLOW	T	T	T	T	T	T	T	T	T	T
70	HX	.721+00	.993+00	.119+01	.134+01	.159+01	.178+01	.194+01	.207+01	.219+01	.229+01
	RX	.854+00	.857+00	.860+00	.862+00	.866+00	.869+00	.872+00	.875+00	.877+00	.879+00
	FLOW	S	S	T	T	T	T	T	T	T	T
65	HX	.105+01	.146+01	.177+01	.201+01	.241+01	.272+01	.299+01	.322+01	.342+01	.360+01
	RX	.851+00	.854+00	.856+00	.857+00	.860+00	.862+00	.864+00	.866+00	.868+00	.869+00
	FLOW	S	S	S	S	T	T	T	T	T	T
60	HX	.149+01	.208+01	.252+01	.289+01	.348+01	.397+01	.438+01	.474+01	.506+01	.535+01
	RX	.849+00	.851+00	.853+00	.854+00	.856+00	.857+00	.859+00	.860+00	.861+00	.862+00
	FLOW	S	S	S	S	S	T	T	T	T	T
55	HX	.206+01	.289+01	.352+01	.405+01	.491+01	.562+01	.622+01	.676+01	.725+01	.769+01
	RX	.848+00	.850+00	.851+00	.851+00	.853+00	.854+00	.855+00	.856+00	.857+00	.858+00
	FLOW	S	S	S	S	S	S	S	S	S	T
50	HX	.282+01	.397+01	.485+01	.558+01	.680+01	.780+01	.867+01	.945+01	.102+02	.108+02
	RX	.847+00	.848+00	.849+00	.850+00	.851+00	.852+00	.852+00	.853+00	.854+00	.854+00
	FLOW	S	S	S	S	S	S	S	S	S	S
45	HX	.387+01	.546+01	.667+01	.769+01	.938+01	.108+02	.120+02	.131+02	.141+02	.151+02
	RX	.847+00	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.851+00	.852+00
	FLOW	S	S	S	S	S	S	S	S	S	S
40	HX	.538+01	.760+01	.930+01	.107+02	.131+02	.151+02	.169+02	.184+02	.199+02	.212+02
	RX	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.850+00	.850+00
	FLOW	C	S	S	S	S	S	S	S	S	S
35	HX	.762+01	.108+02	.132+02	.152+02	.186+02	.215+02	.240+02	.263+02	.283+02	.303+02
	RX	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00	.848+00
	FLOW	C	C	S	S	S	S	S	S	S	S
30	HX	.110+02	.156+02	.191+02	.220+02	.269+02	.311+02	.348+02	.381+02	.411+02	.439+02
	RX	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	S	S	S	S	S	S
25	HX	.161+02	.227+02	.278+02	.321+02	.394+02	.454+02	.506+02	.556+02	.601+02	.642+02
	RX	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00
	FLOW	C	C	C	C	C	C	S	S	S	S
20	HX	.237+02	.335+02	.410+02	.474+02	.580+02	.670+02	.749+02	.820+02	.886+02	.947+02
	RX	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 18 (CONT.)

LOCAL VALUES OF
CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), SHAPE: FILM
RECOVERY FACTOR R, AND FLOW REGIME
AT A DISTANCE OF 20.0000 MILLIMETERS
FROM THE LEADING EDGE OF THE PLATE DISTANCE FROM LEADING EDGE: .787 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	HX	.215+00	.290+00	.342+00	.382+00	.444+00	.490+00	.528+00	.559+00	.585+00	.608+00
	RX	.859+00	.865+00	.869+00	.873+00	.878+00	.883+00	.887+00	.891+00	.895+00	.898+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	HX	.343+00	.472+00	.565+00	.639+00	.755+00	.846+00	.920+00	.984+00	.104+01	.109+01
	RX	.854+00	.858+00	.861+00	.863+00	.867+00	.870+00	.873+00	.876+00	.878+00	.880+00
	FLOW	S	S	T	T	T	T	T	T	T	T
70	HX	.519+00	.721+00	.871+00	.993+00	.119+01	.134+01	.148+01	.159+01	.169+01	.178+01
	RX	.851+00	.854+00	.856+00	.857+00	.860+00	.862+00	.864+00	.866+00	.868+00	.869+00
	FLOW	S	S	S	S	T	T	T	T	T	T
65	HX	.752+00	.105+01	.128+01	.146+01	.177+01	.201+01	.222+01	.241+01	.257+01	.272+01
	RX	.849+00	.851+00	.852+00	.854+00	.856+00	.857+00	.859+00	.860+00	.861+00	.862+00
	FLOW	S	S	S	S	S	S	T	T	T	T
60	HX	.106+01	.149+01	.181+01	.208+01	.252+01	.289+01	.320+01	.348+01	.374+01	.397+01
	RX	.848+00	.849+00	.850+00	.851+00	.853+00	.854+00	.855+00	.856+00	.857+00	.857+00
	FLOW	S	S	S	S	S	S	S	S	S	T
55	HX	.146+01	.206+01	.251+01	.289+01	.352+01	.405+01	.450+01	.491+01	.528+01	.562+01
	RX	.847+00	.848+00	.849+00	.850+00	.851+00	.851+00	.852+00	.853+00	.853+00	.854+00
	FLOW	S	S	S	S	S	S	S	S	S	S
50	HX	.200+01	.282+01	.345+01	.397+01	.485+01	.556+01	.622+01	.680+01	.732+01	.780+01
	RX	.847+00	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.851+00	.852+00
	FLOW	S	S	S	S	S	S	S	S	S	S
45	HX	.274+01	.387+01	.473+01	.546+01	.667+01	.769+01	.858+01	.938+01	.101+02	.108+02
	RX	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.850+00	.850+00
	FLOW	S	S	S	S	S	S	S	S	S	S
40	HX	.380+01	.538+01	.658+01	.760+01	.930+01	.107+02	.120+02	.131+02	.141+02	.151+02
	RX	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00	.848+00
	FLOW	C	C	S	S	S	S	S	S	S	S
35	HX	.539+01	.762+01	.933+01	.108+02	.132+02	.152+02	.170+02	.186+02	.201+02	.215+02
	RX	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	S	S	S	S	S	S
30	HX	.779+01	.110+02	.135+02	.156+02	.191+02	.220+02	.246+02	.269+02	.291+02	.311+02
	RX	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00
	FLOW	C	C	C	C	C	C	S	S	S	S
25	HX	.114+02	.161+02	.197+02	.227+02	.278+02	.321+02	.359+02	.394+02	.425+02	.454+02
	RX	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
20	HX	.168+02	.237+02	.290+02	.335+02	.410+02	.474+02	.530+02	.580+02	.627+02	.670+02
	RX	.845+00	.845+00	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 18 (CONT.)

LOCAL VALUES OF
CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), SHAPE: FILM
RECOVERY FACTOR R, AND FLOW REGIME
AT A DISTANCE OF 50.0000 MILLIMETERS
FROM THE LEADING EDGE OF THE PLATE DISTANCE FROM LEADING EDGE: 1.969 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	HX	.141+00	.194+00	.233+00	.264+00	.313+00	.351+00	.382+00	.410+00	.433+00	.454+00
	RX	.854+00	.858+00	.860+00	.863+00	.867+00	.870+00	.873+00	.875+00	.877+00	.879+00
	FLOW	S	S	T	T	T	T	T	T	T	T
75	HX	.221+00	.309+00	.374+00	.426+00	.512+00	.581+00	.639+00	.689+00	.734+00	.775+00
	RX	.851+00	.853+00	.855+00	.857+00	.859+00	.861+00	.863+00	.865+00	.866+00	.868+00
	FLOW	S	S	S	S	T	T	T	T	T	T
70	HX	.332+00	.465+00	.566+00	.649+00	.786+00	.897+00	.993+00	.108+01	.115+01	.122+01
	RX	.849+00	.851+00	.852+00	.853+00	.855+00	.856+00	.857+00	.858+00	.860+00	.861+00
	FLOW	S	S	S	S	S	S	S	T	T	T
65	HX	.479+00	.674+00	.822+00	.946+00	.115+01	.132+01	.146+01	.159+01	.171+01	.182+01
	RX	.848+00	.849+00	.850+00	.850+00	.852+00	.853+00	.854+00	.854+00	.855+00	.856+00
	FLOW	S	S	S	S	S	S	S	S	S	S
60	HX	.671+00	.947+00	.116+01	.133+01	.162+01	.187+01	.208+01	.227+01	.244+01	.260+01
	RX	.847+00	.848+00	.848+00	.849+00	.850+00	.851+00	.851+00	.852+00	.852+00	.853+00
	FLOW	S	S	S	S	S	S	S	S	S	S
55	HX	.926+00	.131+01	.160+01	.184+01	.225+01	.260+01	.289+01	.316+01	.341+01	.364+01
	RX	.846+00	.847+00	.847+00	.848+00	.849+00	.849+00	.850+00	.850+00	.850+00	.851+00
	FLOW	S	S	S	S	S	S	S	S	S	S
50	HX	.127+01	.179+01	.219+01	.252+01	.309+01	.356+01	.397+01	.435+01	.469+01	.501+01
	RX	.846+00	.846+00	.847+00	.847+00	.848+00	.848+00	.848+00	.849+00	.849+00	.849+00
	FLOW	C	S	S	S	S	S	S	S	S	S
45	HX	.173+01	.245+01	.300+01	.346+01	.423+01	.488+01	.546+01	.597+01	.645+01	.688+01
	RX	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00
	FLOW	C	C	S	S	S	S	S	S	S	S
40	HX	.241+01	.340+01	.417+01	.481+01	.589+01	.680+01	.760+01	.832+01	.898+01	.960+01
	RX	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	S	S	S	S	S	S
35	HX	.341+01	.482+01	.590+01	.682+01	.835+01	.964+01	.108+02	.118+02	.127+02	.136+02
	RX	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00
	FLOW	C	C	C	C	C	C	C	S	S	S
30	HX	.493+01	.697+01	.853+01	.985+01	.121+02	.139+02	.156+02	.171+02	.184+02	.197+02
	RX	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
25	HX	.719+01	.102+02	.125+02	.144+02	.176+02	.203+02	.227+02	.249+02	.269+02	.288+02
	RX	.845+00	.845+00	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
20	HX	.106+02	.150+02	.184+02	.212+02	.260+02	.300+02	.335+02	.367+02	.396+02	.424+02
	RX	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 18 (CONT.)

LOCAL VALUES OF
CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), SHAPE: FILM
RECOVERY FACTOR R, AND FLOW REGIME
AT A DISTANCE OF 100.0000 MILLIMETERS
FROM THE LEADING EDGE OF THE PLATE DISTANCE FROM LEADING EDGE: 3.937 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	HX	.997-01	.139+00	.168+00	.192+00	.230+00	.261+00	.287+00	.309+00	.329+00	.347+00
	RX	.851+00	.854+00	.856+00	.857+00	.860+00	.862+00	.864+00	.866+00	.868+00	.869+00
	FLOW	S	S	S	S	T	T	T	T	T	T
75	HX	.156+00	.219+00	.266+00	.305+00	.369+00	.421+00	.466+00	.506+00	.542+00	.574+00
	RX	.849+00	.851+00	.852+00	.853+00	.855+00	.856+00	.858+00	.859+00	.860+00	.861+00
	FLOW	S	S	S	S	S	S	S	T	T	T
70	HX	.232+00	.327+00	.399+00	.460+00	.559+00	.641+00	.713+00	.776+00	.834+00	.886+00
	RX	.848+00	.849+00	.850+00	.850+00	.852+00	.853+00	.854+00	.854+00	.855+00	.856+00
	FLOW	S	S	S	S	S	S	S	S	S	S
65	HX	.335+00	.473+00	.577+00	.665+00	.812+00	.934+00	.104+01	.114+01	.122+01	.130+01
	RX	.847+00	.848+00	.848+00	.849+00	.850+00	.850+00	.851+00	.852+00	.852+00	.853+00
	FLOW	S	S	S	S	S	S	S	S	S	S
60	HX	.469+00	.662+00	.810+00	.934+00	.114+01	.132+01	.147+01	.160+01	.173+01	.184+01
	RX	.846+00	.847+00	.847+00	.848+00	.848+00	.849+00	.849+00	.850+00	.850+00	.850+00
	FLOW	S	S	S	S	S	S	S	S	S	S
55	HX	.647+00	.914+00	.112+01	.129+01	.158+01	.182+01	.203+01	.222+01	.240+01	.256+01
	RX	.846+00	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00	.849+00	.849+00
	FLOW	C	S	S	S	S	S	S	S	S	S
50	HX	.883+00	.125+01	.153+01	.176+01	.216+01	.249+01	.278+01	.305+01	.329+01	.351+01
	RX	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.848+00	.848+00	.848+00
	FLOW	C	C	S	S	S	S	S	S	S	S
45	HX	.121+01	.171+01	.209+01	.242+01	.296+01	.341+01	.381+01	.418+01	.451+01	.482+01
	RX	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00	.847+00	.847+00	.847+00	.847+00
	FLOW	C	C	C	C	S	S	S	S	S	S
40	HX	.168+01	.238+01	.291+01	.336+01	.411+01	.475+01	.531+01	.581+01	.628+01	.671+01
	RX	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.847+00
	FLOW	C	C	C	C	C	C	C	S	S	S
35	HX	.238+01	.336+01	.412+01	.476+01	.583+01	.673+01	.752+01	.824+01	.890+01	.951+01
	RX	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
30	HX	.344+01	.486+01	.595+01	.687+01	.842+01	.972+01	.109+02	.119+02	.129+02	.137+02
	RX	.845+00	.845+00	.845+00	.845+00	.845+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
25	HX	.502+01	.710+01	.869+01	.100+02	.123+02	.142+02	.159+02	.174+02	.188+02	.201+02
	RX	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.846+00
	FLOW	C	C	C	C	C	C	C	C	C	C
20	HX	.739+01	.105+02	.128+02	.148+02	.181+02	.209+02	.234+02	.256+02	.277+02	.296+02
	RX	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00
	FLOW	C	C	C	C	C	C	C	C	C	C

TABLE 19

CONVECTIVE COEFFICIENTS H (WATTS/DEGREE KELVIN METER**2), RECOVERY FACTOR R, AND FLOW REGIME
FOR A LOOP, CHARACTERISTIC LENGTH 12.0000 MILLIMETERS

SHAPE: LOOP
SIZE: .47 IN.

SPEED (M/S)

ALT. (KM)		25	50	75	100	150	200	250	300	350	400
80	H	.586+00	.649+00	.697+00	.741+00	.831+00	.926+00	.103+01	.113+01	.124+01	.134+01
	R	.862+00	.862+00	.862+00	.862+00	.862+00	.862+00	.862+00	.862+00	.862+00	.862+00
	FLOW	T	T	T	T	T	T	T	T	T	T
75	H	.943+00	.108+01	.119+01	.128+01	.144+01	.161+01	.178+01	.195+01	.212+01	.228+01
	R	.858+00	.858+00	.858+00	.858+00	.858+00	.858+00	.858+00	.858+00	.858+00	.858+00
	FLOW	S	T	T	T	T	T	T	T	T	T
70	H	.139+01	.166+01	.185+01	.202+01	.231+01	.258+01	.284+01	.311+01	.337+01	.362+01
	R	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00
	FLOW	S	S	T	T	T	T	T	T	T	T
65	H	.196+01	.240+01	.273+01	.300+01	.347+01	.390+01	.430+01	.469+01	.507+01	.544+01
	R	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00
	FLOW	S	S	S	S	T	T	T	T	T	T
60	H	.265+01	.334+01	.386+01	.428+01	.501+01	.564+01	.624+01	.680+01	.734+01	.786+01
	R	.848+00	.848+00	.848+00	.848+00	.848+00	.848+00	.848+00	.848+00	.848+00	.848+00
	FLOW	S	S	S	S	S	S	T	T	T	T
55	H	.353+01	.456+01	.532+01	.596+01	.704+01	.797+01	.882+01	.963+01	.104+02	.111+02
	R	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	S	S	S	S	S	S	S	S	S	S
50	H	.466+01	.614+01	.725+01	.818+01	.973+01	.111+02	.123+02	.134+02	.145+02	.155+02
	R	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00	.845+00
	FLOW	S	S	S	S	S	S	S	S	S	S
45	H	.616+01	.827+01	.985+01	.112+02	.134+02	.153+02	.170+02	.186+02	.201+02	.215+02
	R	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00	.846+00
	FLOW	S	S	S	S	S	S	S	S	S	S
40	H	.830+01	.113+02	.136+02	.155+02	.187+02	.214+02	.238+02	.261+02	.282+02	.301+02
	R	.849+00	.849+00	.849+00	.849+00	.849+00	.849+00	.849+00	.849+00	.849+00	.849+00
	FLOW	C	S	S	S	S	S	S	S	S	S
35	H	.115+02	.158+02	.191+02	.219+02	.265+02	.305+02	.340+02	.372+02	.401+02	.429+02
	R	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00	.851+00
	FLOW	C	C	S	S	S	S	S	S	S	S
30	H	.163+02	.226+02	.275+02	.315+02	.383+02	.441+02	.493+02	.528+02	.580+02	.630+02
	R	.853+00	.853+00	.853+00	.853+00	.853+00	.853+00	.853+00	.853+00	.853+00	.853+00
	FLOW	C	C	C	C	S	S	S	S	S	S
25	H	.235+02	.328+02	.400+02	.460+02	.555+02	.661+02	.757+02	.847+02	.931+02	.101+03
	R	.854+00	.854+00	.854+00	.854+00	.854+00	.854+00	.854+00	.854+00	.854+00	.854+00
	FLOW	C	C	C	C	C	C	C	S	S	S
20	H	.343+02	.482+02	.590+02	.702+02	.899+02	.107+03	.123+03	.137+03	.151+03	.164+03
	R	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00	.855+00
	FLOW	C	C	C	C	C	C	C	C	C	C