

**Table 7.2 Kirby<sup>2</sup> Correlation for Non-Uniformly Heated Round Tubes  
Correlation Equation**

$$q_{\text{CRIT}} = A - B x(z)$$

where  $A = Y_1 G^{Y_2} D^{Y_3}$   
 $B = Y_4 G^{Y_5} D^{Y_6}$

with  $q$  in Btu/h.ft<sup>2</sup>(x10<sup>-6</sup>)       $G$  in lb/h.ft<sup>2</sup>(x10<sup>-6</sup>)  
 $D$  in inches

Range of Data Used in Correlation and Optimized Constants

Range of Pressures psia (bar)	560 (38.6 bar)	1000 (69 bar)	1250 (86 bar)	1500 (103.5 bar)	1600 (110 bar)	1800 (124 bar)	2000 (138 bar)
D (in.)	0.383	0.373 0.446	0.625	0.446 0.625	0.383 1.110	0.625 1.110	0.373 0.446
z (in.)	72.0	60.0 192.0	39.4 39.4	72.0 47.0	47.0 72.0	39.4 47.0	72.0 144.0
G x 10 <sup>-6</sup> lb/h.ft <sup>2</sup>	0.73 3.00	0.50 2.00	1.20 3.50	0.50 3.01	0.27 2.50	0.25 3.50	0.50
Form Factor ff	1.27 1.42	1.27 1.26	1.16 1.92	1.16 1.63	1.30 1.63	1.16 1.92	1.37
Y <sub>1</sub>	2.411	0.7468	0.988	0.7423	0.776	0.616	6.18
Y <sub>2</sub>	-0.271	-0.1285	-0.191	-0.1057	-0.118	-0.155	0.231
Y <sub>3</sub>	0.0*	-0.544	0.0*	-0.2335	-0.452	-0.293	2.907
Y <sub>4</sub>	3.511	1.344	2.918	2.384	2.130	2.086	50.8
Y <sub>5</sub>	0.345	0.526	0.287	0.6910	0.739	0.743	0.827
Y <sub>6</sub>	0.0*	-0.2278	0.0*	0.0903	0.296	-0.695	4.228
No. of Expts.	34	269	22	79	98	80	69
R.M.S. Error %	3.66	5.73	3.37	4.82	3.42	5.95	6.60

\*No diameter variation  
 Overall R.M.S. deviation = 5.30 percent