

# SPECIAL TABLES

**Recommended Expansion of Tubes for Optimum Joint Strength in Heat Exchanger and Condensers**  
 Use expansion listed in the tube expansion column plus clearance between tube O.D. and sheet hole I.D.  
 Recommended expansion may be plus or minus .001 in. (.025mm).

Tube O.D.		Gauge	Tube Expansion		Tube O.D.		Gauge	Tube Expansion		Tube O.D.		Gauge	Tube Expansion	
mm	inch		mm	inch	mm	inch		mm	inch	mm	inch		mm	inch
12.7	1/2	14	.15	.006	15.8	5/8	20	.10	.004	25.4	1	10	.22	.009
12.7	1/2	15	.15	.006	15.8	5/8	21	.10	.004	25.4	1	11	.22	.009
12.7	1/2	16	.15	.006	19.0	3/4	10	.20	.008	25.4	1	12	.22	.009
12.7	1/2	17	.12	.005	19.0	3/4	11	.20	.008	25.4	1	13	.20	.008
12.7	1/2	18	.12	.005	19.0	3/4	12	.20	.008	25.4	1	14	.20	.008
12.7	1/2	19	.10	.004	19.0	3/4	13	.20	.008	25.4	1	15	.17	.007
12.7	1/2	20	.10	.004	19.0	3/4	14	.20	.008	25.4	1	16	.15	.006
12.7	1/2	21	.10	.004	19.0	3/4	15	.17	.007	25.4	1	17	.12	.005
15.8	5/8	12	.15	.006	19.0	3/4	16	.15	.006	25.4	1	18	.12	.005
15.8	5/8	13	.15	.006	19.0	3/4	17	.12	.005	31.7	1.1/4	8	.25	.010
15.8	5/8	14	.15	.006	19.0	3/4	18	.12	.005	31.7	1.1/4	10	.25	.010
15.8	5/8	15	.15	.006	19.0	3/4	19	.12	.005	31.7	1.1/4	12	.22	.009
15.8	5/8	16	.15	.006	19.0	3/4	20	.12	.005	31.7	1.1/4	14	.20	.008
15.8	5/8	17	.12	.005	19.0	3/4	21	.10	.004	31.7	1.1/4	16	.17	.007
15.8	5/8	18	.12	.005	25.4	1	8	.22	.009	31.7	1.1/4	18	.15	.006
15.8	5/8	19	.10	.004	25.4	1	9	.22	.009					

**ADDITIONAL SIZES :**

1/4 in. (6.3 mm) O.D. tube - expand all gauges .003 in. (.07 mm) after contact with tube sheet hole.

3/8 in. (9.5 mm) O.D. tube - expand all gauges .004 in. (.10 mm) after contact with tube sheet hole.

**EXAMPLE :**

3/4 in. (19.0 mm) O.D. x 14 gauge tubes

Recommended expansion .008 in. (.20 mm)  
 Tube sheet hole .760 in. (19.3 mm)

Therefore, expand as follows :

Tube I.D. before expanding .584 in. (14.8 mm)  
 Recommended expansion .008 in. (.20 mm)  
 Clearance between tube and tube sheet hole .010 in. (.25 mm)  
 Finish I.D. .602 in. (15.2 mm)

The above recommendation is based on our experience. However, because of the great variety of materials, tubes, and tube sheets used, some conditions will require experimental rolling to be certain that the rolled joints will be satisfactory.

## TUBE SIZES - BIRMINGHAM WIRE GAUGES

Tube O.D. inch	Birmingham Wire Gauge (Gauge - Inches)																											
	00-380	0-340	1-300	2-284	3-259	4-238	5-220	6-203	7-180	8-165	9-148	10-134	11-120	12-109	13-095	14-083	15-072	16-065	17-058	18-049	19-042	20-035	21-032	22-028	23-025	24-022		
1/4																				.152	.166	.180	.186	.194	.200	.206		
3/8																.209	.231	.245	.259	.277	.291	.305	.311	.319	.325	.331		
1/2															.310	.334	.356	.370	.384	.402	.416	.430	.436	.444	.450	.456		
5/8														.407	.435	.459	.481	.495	.509	.527	.541	.555	.561	.569	.575	.581		
3/4											.482	.510	.532	.560	.584	.606	.620	.634	.652	.666	.680	.686	.694	.700	.706			
7/8										.607	.635	.657	.685	.709	.731	.745	.759	.777	.791	.805	.811	.819	.825	.831				
1								.670	.704	.732	.760	.782	.810	.834	.856	.870	.884	.902	.916	.930	.936	.944	.950	.956				
1.1/4								.920	.954	.982	1.010	1.032	1.060	1.084	1.106	1.120	1.134	1.152	1.166	1.180	1.186	1.194	1.200	1.206				
1.1/2								1.170	1.204	1.232	1.260	1.282	1.310	1.334	1.356	1.370	1.384	1.402	1.416	1.430	1.436	1.444	1.450	1.456				
1.3/4						1.310	1.344	1.390	1.420	1.454	1.482	1.510	1.532	1.560	1.584	1.606	1.620	1.634	1.652	1.666	1.680	1.686	1.694	1.700	1.706			
2				1.524	1.560	1.594	1.640	1.670	1.704	1.732	1.760	1.782	1.810	1.834	1.856	1.870	1.884	1.902	1.916	1.930	1.936	1.944	1.950	1.956				
2.1/4	1.490	1.570	1.650	1.682	1.732	1.774	1.810	1.844	1.890	1.920	1.954	1.982	2.010	2.032	2.060	2.084	2.106	2.210	2.134	2.151								
2.1/2	1.740	1.820	1.900	1.932	1.982	2.024	2.050	2.094	2.140	2.170	2.204	2.232	2.260	2.282	2.310	2.334	2.356	2.370	2.384	2.402								
2.3/4	1.990	2.070	2.150	2.182	2.232	2.274	2.310	2.344	2.390	2.420	2.454	2.482	2.510	2.532	2.560	2.584	2.606	2.620	2.634	2.652								
3	2.240	2.320	2.400	2.432	2.482	2.524	2.560	2.594	2.640	2.670	2.704	2.732	2.760	2.782	2.810	2.834	2.856	2.870	2.884	2.902								
3.1/4	2.490	2.570	2.650	2.682	2.732	2.774	2.810	2.844	2.890	2.920	2.954	2.982	3.010	3.032	3.060	3.084	3.106	3.120	3.134	3.151								
3.1/2	2.740	2.820	2.900	2.932	2.982	3.024	3.060	3.094	3.140	3.170	3.204	3.232	3.260	3.282	3.310	3.334	3.356	3.370	3.384	3.402								
3.3/4	2.990	3.070	3.150	3.182	3.232	3.274	3.310	3.344	3.390	3.420	3.454	3.482	3.510	3.532	3.560	3.584	3.606	3.620	3.634	3.652								
4	3.240	3.320	3.400	3.432	3.482	3.524	3.560	3.594	3.640	3.670	3.704	3.732	3.760	3.782	3.810	3.834	3.856	3.870	3.884	3.902								