

Shell-and-Tube Heat Exchanger Tube Counts

The two-part table reproduced below can be used for determining tube counts in the design project. The number of Passes refers to the Tube Passes. OTL is "Outer Tube Limit."

Shell ID, in.	OTL, † in.	Tube size and pitch, in.	1 Pass	2 Pass	4 Pass	6 Pass	9 Pass
8.07	6.821	$\frac{1}{2}$ $\frac{11}{16}$ Δ	50	46	42	40	34
		$\frac{3}{8}$ $\frac{11}{16}$ Δ	38	32	26	24	18
		$\frac{1}{2}$ 1 \square	32	26	20	20	
		$\frac{3}{8}$ 1 Δ	37	30	24	24	
		1 $1\frac{1}{2}$ \square	21	16	16	14	
		1 $1\frac{1}{2}$ Δ	22	18	16	14	
10.02	8.770	$\frac{1}{2}$ $\frac{11}{16}$ Δ	88	86	74	70	64
		$\frac{3}{8}$ $\frac{11}{16}$ Δ	62	56	47	42	36
		$\frac{1}{2}$ 1 \square	52	52	40	36	
		$\frac{3}{8}$ 1 Δ	61	52	40	36	
		1 $1\frac{1}{2}$ \square	32	32	26	24	
		1 $1\frac{1}{2}$ Δ	37	32	28	28	
12.00	10.75	$\frac{1}{2}$ $\frac{11}{16}$ Δ	137	132	112	110	106
		$\frac{3}{8}$ $\frac{11}{16}$ Δ	109	98	86	82	78
		$\frac{1}{2}$ 1 \square	80	74	68	68	60
		$\frac{3}{8}$ 1 Δ	90	84	76	74	70
		1 $1\frac{1}{2}$ \square	48	44	40	38	36
		1 $1\frac{1}{2}$ Δ	57	52	48	46	44
13 $\frac{1}{2}$	12	$\frac{1}{2}$ $\frac{11}{16}$ Δ	181	166	150	142	134
		$\frac{3}{8}$ $\frac{11}{16}$ Δ	127	114	96	90	86
		$\frac{1}{2}$ 1 \square	95	90	81	77	70
		$\frac{3}{8}$ 1 Δ	110	101	90	82	74
		1 $1\frac{1}{2}$ \square	60	56	51	46	44
		1 $1\frac{1}{2}$ Δ	67	63	56	54	50
15 $\frac{1}{2}$	14	$\frac{1}{2}$ $\frac{11}{16}$ Δ	244	230	216	208	200
		$\frac{3}{8}$ $\frac{11}{16}$ Δ	170	160	140	136	128
		$\frac{1}{2}$ 1 \square	138	132	116	112	108
		$\frac{3}{8}$ 1 Δ	163	152	136	133	110
		1 $1\frac{1}{2}$ \square	88	82	75	70	64
		1 $1\frac{1}{2}$ Δ	96	92	86	80	78
17 $\frac{1}{2}$	16	$\frac{1}{2}$ $\frac{11}{16}$ Δ	339	322	298	288	280
		$\frac{3}{8}$ $\frac{11}{16}$ Δ	239	224	194	188	178
		$\frac{1}{2}$ 1 \square	188	178	168	164	142
		$\frac{3}{8}$ 1 Δ	211	201	181	176	166
		1 $1\frac{1}{2}$ \square	112	110	102	98	82
		1 $1\frac{1}{2}$ Δ	130	124	116	110	94
19 $\frac{1}{2}$	18	$\frac{1}{2}$ $\frac{11}{16}$ Δ	410	394	376	366	344
		$\frac{3}{8}$ $\frac{11}{16}$ Δ	301	282	252	244	234
		$\frac{1}{2}$ 1 \square	236	224	216	208	188
		$\frac{3}{8}$ 1 Δ	273	256	242	236	210
		1 $1\frac{1}{2}$ \square	148	142	136	129	116
		1 $1\frac{1}{2}$ Δ	172	162	152	148	128

Shell ID, in.	OTL, † in.	Tube size and pitch, in.	1 Pass	2 Pass	4 Pass	6 Pass	8 Pass
21½	19½	½ 1½ Δ	478	462	442	426	416
		¾ 1½ Δ	361	342	314	306	290
		¾ 1 □	276	264	246	240	234
		¾ 1 Δ	318	308	279	269	260
		1 1½ □	170	168	157	150	148
		1 1½ Δ	199	188	170	164	160
23½	21½	½ 1½ Δ	578	558	530	518	504
		¾ 1½ Δ	442	420	386	378	364
		¾ 1 □	341	321	308	296	292
		¾ 1 Δ	381	369	349	326	328
		1 1½ □	210	199	197	186	184
		1 1½ Δ	247	230	216	208	202
25	23½	½ 1½ Δ	698	676	640	630	616
		¾ 1½ Δ	532	506	468	446	434
		¾ 1 □	413	391	370	360	343
		¾ 1 Δ	470	452	422	394	382
		1 1½ □	250	248	224	216	217
		1 1½ Δ	294	282	256	252	242
27	25½	½ 1½ Δ	824	800	766	760	746
		¾ 1½ Δ	637	602	550	536	524
		¾ 1 □	465	452	427	418	408
		¾ 1 Δ	559	534	488	474	464
		1 1½ □	286	275	267	257	260
		1 1½ Δ	349	334	302	296	286
29	27½	½ 1½ Δ	966	944	904	890	874
		¾ 1½ Δ	721	692	640	620	594
		¾ 1 □	554	542	525	509	500
		¾ 1 Δ	630	604	556	538	508
		1 1½ □	348	340	322	314	313
		1 1½ Δ	397	376	338	334	316
31	29½	½ 1½ Δ	1,098	1,068	1,032	1,018	1,004
		¾ 1½ Δ	847	822	766	722	720
		¾ 1 □	633	616	590	586	570
		¾ 1 Δ	745	728	678	666	640
		1 1½ □	406	398	380	368	358
		1 1½ Δ	472	454	430	424	400
33	31½	¾ 1½ Δ	974	938	878	852	826
		¾ 1 □	742	713	687	683	672
		¾ 1 Δ	856	830	774	760	732
		1 1½ □	460	453	430	420	414
		1 1½ Δ	538	522	486	470	454
35	33½	¾ 1½ Δ	1,102	1,068	1,004	988	958
		¾ 1 □	827	811	773	762	756
		¾ 1 Δ	970	938	882	864	848
		1 1½ □	517	513	487	486	480
		1 1½ Δ	608	592	562	546	532
37	35½	¾ 1½ Δ	1,242	1,200	1,144	1,104	1,078
		¾ 1 □	929	902	880	870	852
		¾ 1 Δ	1,090	1,042	1,012	986	958
		1 1½ □	588	580	555	544	538
		1 1½ Δ	674	664	632	614	598
39	37½	¾ 1½ Δ	1,377	1,330	1,258	1,248	1,212
		¾ 1 □	1,025	1,012	984	964	952
		¾ 1 Δ	1,206	1,176	1,128	1,100	1,078
		1 1½ □	645	637	618	610	605
		1 1½ Δ	766	736	700	688	672
42	40½	¾ 1½ Δ	1,558	1,544	1,502	1,482	1,464
		¾ 1 □	1,201	1,171	1,144	1,109	1,111
		¾ 1 Δ	1,367	1,350	1,322	1,306	1,288
		1 1½ □	745	728	708	686	685
		1 1½ Δ	872	850	834	824	816