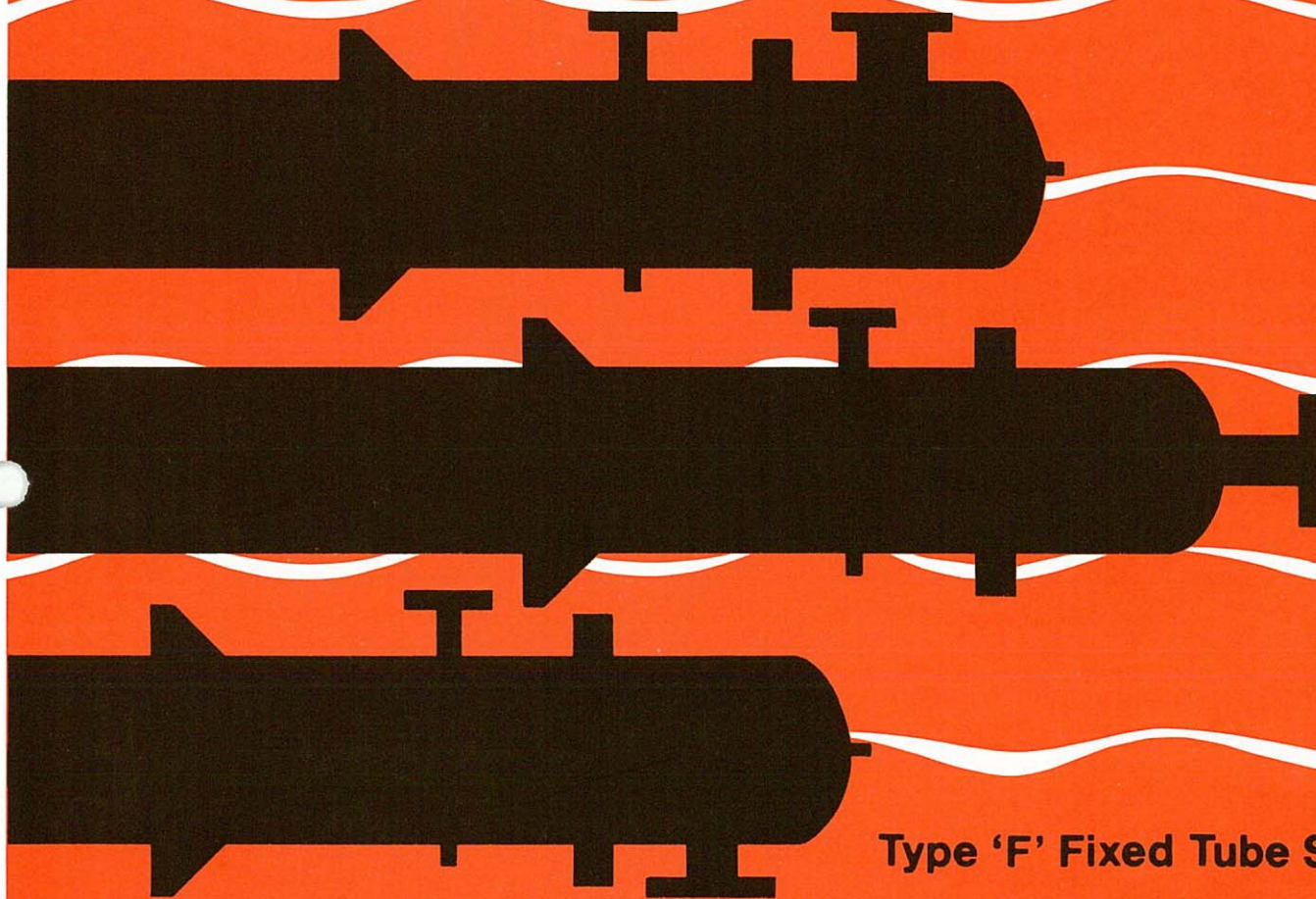
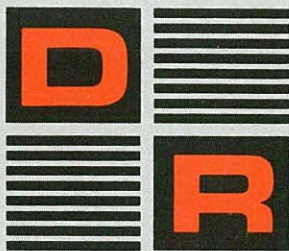


STANDARDIZED

HEAT EXCHANGERS



Type 'F' Fixed Tube Sheet



DOYLE & ROTH
Manufacturing Co., Inc.

26 BROADWAY—SUITE 1275
NEW YORK, N.Y. 10004
(212) 269-7840 • Telex #882094

Pre-Engineered

D & R STANDARD HEAT TRANSFER EQUIPMENT

for Maximum Efficiency . . . Greater Economy!

- **STANDARD units are Sized and Selected by COMPUTER for greater accuracy and fast delivery.**

Deliveries are prompt . . . economies are substantial with the D & R Standardization program. Pre-engineered units (up to 42" diameter) are available to meet every application . . . assembled from Stock Components and constructed of a wide variety of materials:

- **CUSTOM-BUILT Exchangers with Standard Components**

D & R Exchangers can be modified to suit your specific requirements. For example: relocation of components such as shell supports, nozzles, etc. can be made without affecting the economies resulting from our pre-engineered construction standards.

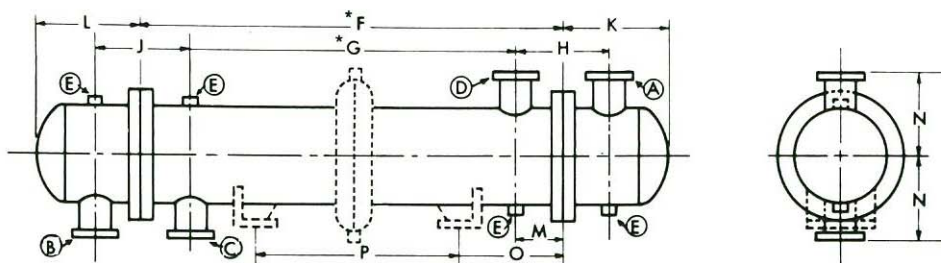
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DOYLE & ROTH MANUFACTURING COMPANY inc.

STANDARD MODEL "VT" CONDENSER — GROUPS 5, 6 & 8

"VT" CONDENSER HORIZONTAL • CONDENSING TUBE SIDE—SINGLE PASS • COOLANT LIQUID SHELL SIDE—BAFFLED



SINGLE PASS

VT CONDENSER HORIZONTAL BAFFLED SHELL SIDE	Shell O. D. (in Inches)	*DIMENSIONS (in Inches)						NOZZLES & FITTINGS (in Inches)				
		H	J	K	L	M	N	A	B	C	D	E
	6 $\frac{5}{8}$	10	8 $\frac{7}{8}$	11 $\frac{1}{4}$	9 $\frac{1}{8}$	5	8 $\frac{5}{16}$	3	1	2	2	3 $\frac{3}{4}$
	8 $\frac{5}{8}$	12	10 $\frac{7}{8}$	13	10 $\frac{7}{8}$	6	9 $\frac{5}{16}$	4	2	3	3	3 $\frac{3}{4}$
	10 $\frac{3}{4}$	14	10 $\frac{7}{8}$	17	11 $\frac{1}{8}$	6	10 $\frac{3}{8}$	6	2	3	3	3 $\frac{3}{4}$
	12 $\frac{3}{4}$	15	11 $\frac{7}{8}$	17 $\frac{1}{2}$	11 $\frac{5}{8}$	7	11 $\frac{3}{8}$	6	2	4	4	3 $\frac{3}{4}$
	14	18	12 $\frac{7}{8}$	22	12 $\frac{3}{4}$	8	12	8	3	6	6	3 $\frac{3}{4}$
	16	18	13 $\frac{7}{8}$	22 $\frac{1}{2}$	14 $\frac{1}{4}$	8	13	8	3	6	6	3 $\frac{3}{4}$
	18	19	13 $\frac{7}{8}$	24 $\frac{1}{4}$	15	8	14	8	3	6	6	3 $\frac{3}{4}$
	20	23	16 $\frac{1}{8}$	29	17 $\frac{1}{8}$	10	15	10	4	8	8	3 $\frac{3}{4}$
	22	23	16 $\frac{7}{8}$	29 $\frac{1}{4}$	17 $\frac{3}{8}$	10	16	10	4	8	8	3 $\frac{3}{4}$
	24	23	16 $\frac{1}{8}$	29 $\frac{5}{8}$	17 $\frac{3}{4}$	10	17	10	4	8	8	3 $\frac{3}{4}$
	26	27	19 $\frac{7}{8}$	35 $\frac{7}{8}$	20 $\frac{7}{8}$	12	18	12	4	8	8	1
	28	27	19 $\frac{7}{8}$	36 $\frac{3}{8}$	21 $\frac{3}{8}$	12	19	12	4	8	8	1
	30	31	22 $\frac{7}{8}$	40	24 $\frac{3}{8}$	14	20	14	6	10	10	1
	32	31	22 $\frac{7}{8}$	40 $\frac{1}{2}$	25 $\frac{1}{8}$	14	21	14	6	10	10	1
	34	35	26	44 $\frac{3}{8}$	26 $\frac{3}{8}$	16	23	16	6	12	12	1
	36	35	26	44 $\frac{7}{8}$	27 $\frac{1}{8}$	16	24	16	6	12	12	1
	38	38	29	49 $\frac{3}{8}$	31 $\frac{5}{8}$	17	25	18	8	14	14	1
	40	38	29	49 $\frac{3}{4}$	32	17	26	18	8	14	14	1
	42	38	29	50 $\frac{3}{8}$	32 $\frac{5}{8}$	17	27	18	8	14	14	1

*Dimension "F" equals tube length minus $\frac{1}{8}$ " which is face to face dimension of tube sheets.

*Dimension "G" equals tube length minus 2 times dimensional "M" in above table.

For physical dimensions of shell supports and dimensions "O" & "P" see standard support drawing (Page 16).

D & R STANDARD "VT"-GROUP 5-ONE PASS TUBE SIDE, 5/8" O.D. TUBES 13/16" Δ PITCH

Model No.	Shell O. D. (in Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH								
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
VT651	6 $\frac{5}{8}$	38	25	37	50	62	75	87	99	112	124
VT851	8 $\frac{5}{8}$	73	48	72	95	119	143	167	191	215	238
VT1051	10 $\frac{3}{4}$	121	79	119	158	198	238	277	317	357	396
VT1251	12 $\frac{3}{4}$	170	111	167	223	278	334	389	445	500	556
VT1451	14	212	139	208	277	346	415	485	554	623	692
VT1651	16	288	189	283	377	472	566	660	755	850	944
VT1851	18	367	240	360	480	600	720	840	960	1080	1200
VT2051	20	460	301	451	602	752	902	1052	1203	1354	1504
VT2251	22	575	376	565	753	941	1130	1318	1506	1694	1882
VT2451	24	684	448	671	895	1119	1342	1566	1790	2014	2238
VT2651	26	811	532	798	1064	1330	1596	1862	2128	2394	2660
VT2851	28	949	623	934	1245	1556	1868	2179	2490	2801	3113
VT3051	30	1096	719	1078	1438	1797	2157	2516	2876	3235	3595
VT3251	32	1251	821	1231	1641	2052	2462	2872	3283	3693	4103
VT3451	34	1424	934	1401	1868	2335	2802	3270	3737	4204	4671
VT3651	36	1617	1061	1591	2122	2652	3182	3713	4243	4773	5304
VT3851	38	1802	1182	1773	2364	2955	3546	4137	4728	5320	5911
VT4051	40	1994	1308	1962	2616	3270	3924	4578	5232	5886	6540
VT4251	42	2195	1440	2160	2880	3600	4320	5040	5760	6480	7200

DIMENSIONAL STANDARDS

STANDARD MODEL "VT" CONDENSER — GROUPS 5, 6 & 8

"VT" CONDENSER HORIZONTAL • CONDENSING TUBE SIDE—SINGLE PASS

• COOLANT LIQUID SHELL SIDE—BAFFLED

SINGLE PASS

D & R STANDARD MODEL "VT" GROUP 6-ONE PASS TUBE SIDE, 3/4" O.D. TUBES 15/16" Δ PITCH

Model No.	Shell O. D. (in Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH								
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
VT661	6 ⁵ / ₈	31	24	37	49	61	73	85	98	110	122
VT861	8 ⁵ / ₈	55	43	65	87	108	130	151	173	195	216
VT1061	10 ³ / ₄	85	67	100	134	167	200	234	267	300	334
VT1261	12 ³ / ₄	126	99	149	198	248	297	346	396	446	495
VT1461	14	154	121	182	242	302	363	423	484	545	605
VT1661	16	212	167	250	334	417	500	584	667	751	834
VT1861	18	268	211	316	422	528	633	739	845	951	1056
VT2061	20	349	274	412	549	686	823	960	1098	1235	1372
VT2261	22	421	331	497	663	829	994	1160	1326	1492	1658
VT2461	24	502	395	592	790	988	1185	1382	1580	1778	1976
VT2661	26	596	468	702	936	1170	1404	1638	1872	2106	2340
VT2861	28	696	546	820	1093	1366	1639	1912	2186	2459	2732
VT3061	30	815	640	960	1280	1600	1920	2240	2560	2880	3200
VT3261	32	929	730	1094	1459	1824	2189	2554	2918	3283	3648
VT3461	34	1054	828	1242	1655	2069	2489	2897	3310	3724	4138
VT3661	36	1181	927	1391	1854	2318	2782	3245	3709	4172	4636
VT3861	38	1337	1050	1575	2100	2625	3149	3674	4199	4724	5249
VT4061	40	1475	1158	1737	2316	2895	3474	4054	4633	5212	5791
VT4261	42	1639	1287	1930	2574	3217	3861	4504	5148	5791	6435

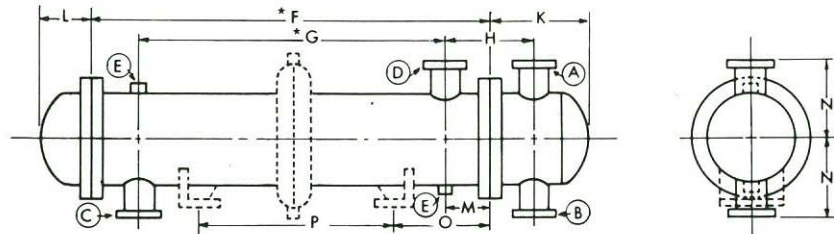
D & R STANDARD MODEL "VT"-GROUP 8-ONE PASS TUBE SIDE, 1" O.D. TUBES 1-1/4" Δ PITCH

Model No.	Shell O. D. (in Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH								
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
VT681	6 ⁵ / ₈	13	14	20	27	34	41	48	54	61	68
VT881	8 ⁵ / ₈	31	32	49	65	81	97	114	130	146	162
VT1081	10 ³ / ₄	48	50	75	101	126	151	176	201	226	252
VT1281	12 ³ / ₄	68	71	107	142	178	214	249	285	321	356
VT1481	14	85	89	134	178	223	267	312	356	400	445
VT1681	16	121	127	190	254	317	380	444	508	571	634
VT1881	18	151	158	237	316	395	474	553	632	711	790
VT2081	20	187	196	294	392	490	588	686	784	882	980
VT2281	22	235	246	369	492	615	738	861	984	1107	1230
VT2481	24	283	296	444	592	740	888	1036	1184	1332	1480
VT2681	26	330	346	519	692	864	1037	1210	1383	1556	1729
VT2881	28	384	402	604	805	1006	1207	1409	1610	1811	2012
VT3081	30	446	467	701	935	1169	1402	1636	1870	2103	2337
VT3281	32	518	543	814	1086	1357	1629	1900	2171	2443	2714
VT3481	34	588	616	924	1232	1541	1849	2157	2465	2773	3081
VT3681	36	664	696	1044	1392	1740	2086	2436	2783	3131	3419
VT3881	38	745	781	1171	1562	1952	2342	2733	3123	3513	3904
VT4081	40	823	863	1284	1725	2156	2588	3019	3450	3881	4313
VT4281	42	917	961	1442	1922	2403	2883	3364	3844	4325	4805

DIMENSIONAL STANDARDS

STANDARD MODEL "LL" GROUPS 5, 6 & 8

"LL" HEAT EXCHANGER HORIZONTAL LIQUID TUBE SIDE — TWO PASS LIQUID SHELL SIDE — BAFFLED
 †"LLS" HEAT EXCHANGER HORIZONTAL, LIQUID TUBE SIDE — TWO PASS, CONDENSING MEDIUM SHELL SIDE — TUBE SUPPORTS.



TWO PASS

	Shell O. D. (in Inches)	DIMENSIONS (in Inches)					NOZZLES & FITTINGS (in Inches)				
		H	K	L	M	N	A	B	† C	† D	E
LL TWO PASS TUBE SIDE BAFFLED SHELL SIDE	6 ⁵ / ₈	10	10 ⁵ / ₈	4 ¹ / ₈	5	8 ⁵ / ₁₆	2	2	2	2	3/4
	8 ⁵ / ₈	11	11 ¹ / ₂	4 ³ / ₈	6	9 ⁵ / ₁₆	3	3	3	3	3/4
	10 ³ / ₄	11	11 ³ / ₄	4 ⁵ / ₈	6	10 ³ / ₈	3	3	3	3	3/4
	12 ³ / ₄	13	13 ³ / ₄	5 ¹ / ₈	7	11 ³ / ₈	4	4	4	4	3/4
	14	16	18	5 ⁵ / ₈	8	12	6	6	6	6	3/4
	16	16	18 ¹ / ₂	6 ¹ / ₈	8	13	6	6	6	6	3/4
	18	17	20 ¹ / ₄	6 ⁷ / ₈	8	14	6	6	6	6	3/4
	20	19	20 ⁷ / ₈	7 ¹ / ₂	10	15	6	6	8	8	3/4
	22	21	25 ¹ / ₈	7 ³ / ₄	10	16	8	8	8	8	3/4
	24	21	25 ¹ / ₂	8 ¹ / ₈	10	17	8	8	8	8	3/4
	26	23	27 ⁵ / ₈	10 ¹ / ₄	12	18	8	8	8	8	1
	28	23	28 ⁵ / ₈	10 ³ / ₄	12	19	8	8	8	8	1
	30	27	32 ³ / ₄	11 ¹ / ₄	14	20	10	10	10	10	1
	32	28	34 ¹ / ₄	11 ³ / ₄	14	21	10	10	10	10	1
	34	30	34 ³ / ₄	12 ¹ / ₄	16	22	10	10	12	12	1
	36	32	39 ³ / ₈	12 ³ / ₄	16	23	12	12	12	12	1
	38	33	39 ⁷ / ₈	13 ³ / ₄	17	24	12	12	14	14	1
	40	34	42 ³ / ₈	13 ⁵ / ₈	17	25	14	14	14	14	1
	42	34	43	14 ¹ / ₄	17	26	14	14	14	14	1

*Dimension "F" equals tube length minus 1/8" which is face to face dimension of tube sheets.

*Dimension "G" equals tube length minus 2 times dimensional "M" in above table.

For physical dimensions of shell supports and dimensions "O" & "P" see standard support drawing (Page 16).

D & R STANDARD MODEL "LL"-GROUP 5-TWO PASS TUBE SIDE, 5/8" O.D. TUBES 13/16" Δ PITCH

Model No.	Shell O. D. (Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH							
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	20'-0"
LL652	6 ⁵ / ₈	32	21	31	42	52	63	73	84	105
LL852	8 ⁵ / ₈	66	43	65	86	108	129	151	172	216
LL1052	10 ³ / ₄	106	69	104	138	173	208	242	277	346
LL1252	12 ³ / ₄	160	105	157	209	261	314	366	418	522
LL1452	14	196	128	192	256	320	384	448	512	640
LL1652	16	270	176	265	353	442	530	618	706	884
LL1852	18	348	228	341	455	569	682	796	910	1138
LL2052	20	440	288	432	576	720	864	1008	1152	1440
LL2252	22	548	358	537	716	895	1074	1253	1432	1790
LL2452	24	646	423	634	845	1056	1268	1479	1690	2112
LL2652	26	782	513	769	1026	1282	1538	1795	2051	2564
LL2852	28	916	601	901	1202	1502	1802	2103	2403	3004
LL3052	30	1062	697	1045	1394	1742	2090	2439	2787	3484
LL3252	32	1214	797	1195	1593	1991	2389	2787	3186	3982
LL3452	34	1386	909	1364	1818	2273	2728	3182	3637	4546
LL3652	36	1576	1034	1551	2068	2585	3102	3618	4135	5169
LL3852	38	1758	1152	1729	2306	2883	3460	4036	4613	5766
LL4052	40	1948	1278	1917	2556	3195	3834	4473	5112	6389
LL4252	42	2146	1408	2112	2816	3519	4223	4927	5631	7039

DIMENSIONAL STANDARDS

STANDARD MODEL "LL" GROUPS 5, 6 & 8

"LL" HEAT EXCHANGER HORIZONTAL LIQUID TUBE SIDE

TWO PASS LIQUID SHELL SIDE — BAFFLED

†"LLS" HEAT EXCHANGER HORIZONTAL, LIQUID TUBE SIDE —

TWO PASS, CONDENSING MEDIUM SHELL SIDE — TUBE SUPPORTS.

TWO PASS

D & R STANDARD MODEL "LL"-GROUP 6-TWO PASS TUBE SIDE, 3/4" O.D. TUBES 15/16" Δ PITCH

Model No.	Shell O. D. (Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH								
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
LL662	6 ⁵ / ₈	26	20	31	41	51	61	71	82	92	102
LL862	8 ⁵ / ₈	48	38	57	76	95	113	132	151	170	189
LL1062	10 ³ / ₄	76	60	90	120	149	179	209	238	268	298
LL1262	12 ³ / ₄	118	93	139	186	232	278	325	372	418	464
LL1462	14	146	115	172	230	287	344	402	460	517	574
LL1662	16	196	154	231	308	385	462	539	616	693	770
LL1862	18	258	203	305	406	508	610	711	812	914	1016
LL2062	20	328	258	387	516	645	774	903	1032	1161	1290
LL2262	22	402	316	474	632	790	948	1106	1264	1422	1580
LL2462	24	484	380	570	760	950	1140	1330	1520	1710	1900
LL2662	26	582	457	686	914	1143	1371	1600	1828	2057	2285
LL2862	28	680	534	801	1068	1335	1602	1869	2136	2403	2670
LL3062	30	792	622	932	1244	1555	1865	2176	2487	2798	3109
LL3262	32	910	715	1072	1429	1787	2144	2501	2858	3216	3573
LL3462	34	1032	810	1215	1620	2026	2431	2836	3241	3646	4051
LL3662	36	1168	917	1376	1834	2293	2752	3210	3669	4127	4586
LL3862	38	1314	1032	1548	2064	2580	3095	3611	4127	4643	5159
LL4062	40	1462	1148	1722	2296	2870	3444	4018	4592	5166	5740
LL4262	42	1612	1266	1899	2532	3165	3797	4430	5063	5696	6329

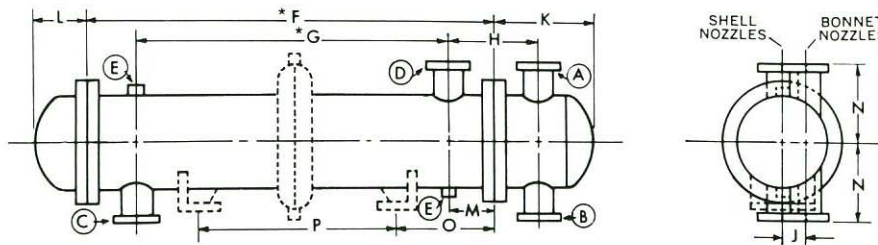
D & R STD. "LL"-GROUP 8-TWO PASS TUBE SIDE, 1" O.D. TUBES 1¹/₄" Δ PITCH

Model No.	Shell O. D. (Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH								
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
LL682	6 ⁵ / ₈	12	13	19	25	31	38	44	50	57	63
LL882	8 ⁵ / ₈	26	27	41	54	68	82	95	109	123	136
LL1082	10 ³ / ₄	44	46	69	92	115	138	161	184	208	231
LL1282	12 ³ / ₄	66	69	104	138	173	208	242	277	311	346
LL1482	14	82	86	129	172	215	258	301	344	387	430
LL1682	16	110	115	173	231	288	346	403	461	519	576
LL1882	18	146	153	230	306	383	459	536	612	689	765
LL2082	20	180	189	283	377	472	566	660	755	849	943
LL2282	22	224	235	352	470	587	704	822	939	1057	1174
LL2482	24	270	283	424	566	707	849	990	1132	1274	1415
LL2682	26	322	337	506	674	843	1012	1180	1349	1517	1686
LL2882	28	382	400	600	800	1000	1200	1400	1600	1800	2000
LL3082	30	442	463	694	926	1157	1389	1620	1851	2083	2314
LL3282	32	502	526	789	1051	1314	1577	1840	2103	2366	2628
LL3482	34	578	605	908	1211	1513	1816	2118	2421	2724	3026
LL3682	36	648	679	1018	1357	1696	2036	2375	2714	3054	3393
LL3882	38	732	767	1150	1533	1916	2300	2683	3066	3450	3833
LL4082	40	808	846	1269	1692	2115	2538	2961	3385	3803	4231
LL4282	42	898	940	1411	1881	2351	2821	3291	3762	4232	4702

DIMENSIONAL STANDARDS

STANDARD MODEL "LL" GROUPS 5, 6 & 8

"LL" HEAT EXCHANGER HORIZONTAL LIQUID TUBE SIDE — FOUR PASS LIQUID SHELL SIDE — BAFFLED
 †"LLS" HEAT EXCHANGER, HORIZONTAL, LIQUID TUBE SIDE — FOUR PASS, CONDENSING MEDIUM SHELL SIDE — TUBE SUPPORTS.



FOUR PASS

LL FOUR PASS TUBE SIDE BAFFLED SHELL SIDE	Shell O. D. (in Inches)	DIMENSIONS (in Inches)						NOZZLES & FITTINGS (in Inches)				
		H	J	K	L	M	N	A	B	† C	† D	E
	6 ⁵ / ₈	9	1 ¹ / ₂	9 ¹ / ₈	4 ¹ / ₈	5	8 ³ / ₁₆	1	1	2	2	3 ³ / ₄
	8 ⁵ / ₈	11	2	10 ⁷ / ₈	4 ³ / ₈	6	9 ⁹ / ₁₆	2	2	3	3	3 ³ / ₄
	10 ³ / ₄	11	2	11 ¹ / ₈	4 ⁵ / ₈	6	10 ³ / ₈	2	2	3	3	3 ³ / ₄
	12 ³ / ₄	12	2 ¹ / ₂	12 ¹ / ₄	5 ⁵ / ₈	7	11 ³ / ₈	3	3	4	4	3 ³ / ₄
	14	14	3	14 ¹ / ₄	5 ⁵ / ₈	8	12	4	4	6	6	3 ³ / ₄
	16	14	3	14 ³ / ₄	6 ¹ / ₈	8	13	4	4	6	6	3 ³ / ₄
	18	15	3	16 ¹ / ₂	6 ³ / ₈	8	14	4	4	6	6	3 ³ / ₄
	20	17	3	17 ¹ / ₄	7 ¹ / ₂	10	15	4	4	8	8	3 ³ / ₄
	22	19	4	21 ¹ / ₈	7 ³ / ₄	10	16	6	6	8	8	3 ³ / ₄
	24	19	4	21 ¹ / ₂	8 ¹ / ₈	10	17	6	6	8	8	3 ³ / ₄
	26	21	4 ¹ / ₂	23 ⁵ / ₈	10 ¹ / ₄	12	18	6	6	8	8	1
	28	21	4 ¹ / ₂	24 ¹ / ₈	10 ³ / ₄	12	19	6	6	8	8	1
	30	25	5 ¹ / ₂	28 ³ / ₈	11 ¹ / ₄	14	20	8	8	10	10	1
	32	25	5 ¹ / ₂	29 ¹ / ₈	11 ³ / ₄	14	21	8	8	10	10	1
	34	28	5 ¹ / ₂	30 ³ / ₈	12 ¹ / ₄	16	22	8	8	12	12	1
	36	30	6 ¹ / ₂	35 ¹ / ₄	12 ³ / ₄	16	23	10	10	12	12	1
	38	31	6 ¹ / ₂	35 ³ / ₄	13 ¹ / ₄	17	24	10	10	14	14	1
	40	33	7 ¹ / ₂	40 ¹ / ₄	13 ³ / ₄	17	25	12	12	14	14	1
	42	33	7 ¹ / ₂	40 ³ / ₈	14 ¹ / ₄	17	26	12	12	14	14	1

*Dimension "F" equals tube length minus 1/8" which is face to face dimension of tube sheets.

*Dimension "G" equals tube length minus 2 times dimensional "M" in above table.

For physical dimensions of shell supports and dimensions "O" & "P" see standard support drawing (Page 16).

D & R STANDARD MODEL "LL" GROUP 5-FOUR PASS TUBE SIDE, 5/8" O.D. TUBES 13/16" Δ PITCH

Model No.	Shell O. D. (Inches)	Tubes No.	SQUARE FEET SURFACE FOR TUBE LENGTH							
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	20'-0"
LL654	6 ⁵ / ₈	28	18	27	37	46	55	64	73	92
LL854	8 ⁵ / ₈	56	37	55	73	91	110	128	146	183
LL1054	10 ³ / ₄	96	63	94	126	157	188	220	251	314
LL1254	12 ³ / ₄	144	94	141	188	235	282	329	376	470
LL1454	14	184	120	180	240	300	360	420	480	600
LL1654	16	252	165	247	330	412	494	577	660	824
LL1854	18	332	217	326	434	543	652	760	868	1086
LL2054	20	424	277	416	554	693	832	970	1108	1386
LL2254	22	524	342	514	685	856	1028	1199	1370	1712
LL2454	24	612	400	600	800	1000	1200	1400	1600	2000
LL2654	26	736	483	724	966	1207	1448	1690	1931	2414
LL2854	28	880	577	866	1155	1443	1732	2020	2309	2886
LL3054	30	1012	664	996	1328	1660	1992	2324	2655	3319
LL3254	32	1176	771	1157	1543	1929	2314	2700	3086	3857
LL3454	34	1336	877	1315	1753	2191	2629	3067	3506	4382
LL3654	36	1512	992	1488	1984	2480	2976	3472	3967	4959
LL3854	38	1704	1118	1677	2236	2795	3353	3912	4471	5589
LL4054	40	1904	1249	1874	2498	3123	3747	4372	4996	6245
LL4254	42	2104	1380	2070	2760	3451	4141	4831	5521	6901

DIMENSIONAL STANDARDS

STANDARD MODEL "LL" GROUPS 5, 6 & 8

"LL" HEAT EXCHANGER HORIZONTAL LIQUID TUBE SIDE

FOUR PASS LIQUID SHELL SIDE — BAFFLED

†"LLS" HEAT EXCHANGER, HORIZONTAL, LIQUID TUBE SIDE

FOUR PASS, CONDENSING MEDIUM SHELL SIDE — TUBE SUPPORTS.

FOUR PASS

D & R STD. "LL" GROUP 6-FOUR PASS TUBE SIDE, $\frac{3}{4}$ " O.D. TUBES $15/16$ " Δ PITCH

Model No.	Shell O. D. (Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH								
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
LL664	$6\frac{5}{8}$	16	13	19	25	31	38	44	50	57	63
LL864	$8\frac{5}{8}$	40	31	47	63	78	94	110	126	142	157
LL1064	$10\frac{3}{4}$	72	57	85	113	142	170	198	226	255	284
LL1264	$12\frac{3}{4}$	104	82	123	164	204	245	286	327	368	408
LL1464	14	136	107	160	214	268	321	374	428	482	536
LL1664	16	180	141	212	283	354	424	495	566	637	708
LL1864	18	244	192	288	384	480	576	672	768	864	960
LL2064	20	308	242	363	484	605	726	847	968	1089	1210
LL2264	22	380	299	448	598	747	896	1046	1196	1345	1494
LL2464	24	464	365	547	730	912	1094	1277	1460	1642	1824
LL2664	26	536	421	631	842	1052	1262	1473	1683	1894	2104
LL2864	28	632	496	745	993	1241	1489	1737	1986	2234	2482
LL3064	30	740	581	872	1162	1453	1744	2034	2325	2615	2906
LL3264	32	860	675	1013	1350	1688	2026	2363	2701	3038	3376
LL3464	34	992	779	1168	1558	1947	2336	2726	3115	3505	3894
LL3664	36	1112	873	1310	1746	2183	2620	3056	3493	3929	4366
LL3864	38	1252	983	1475	1966	2458	2950	3441	3933	4424	4916
LL4064	40	1372	1077	1616	2154	2693	3232	3770	4309	4847	5386
LL4264	42	1536	1206	1809	2412	3015	3618	4221	4824	5427	6030

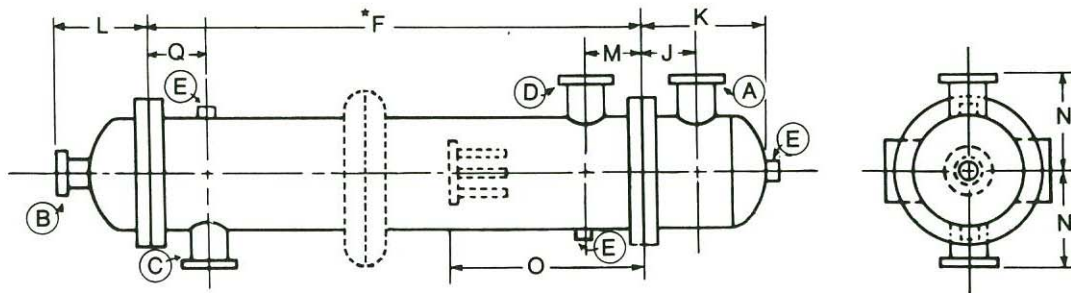
D & R STD. "LL"-GROUP 8-FOUR PASS TUBE SIDE 1" O.D. TUBES $1\frac{1}{4}$ " Δ PITCH.

Model No.	Shell O. D. (Inches)	No. Tubes	SQUARE FEET SURFACE FOR TUBE LENGTH								
			4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
LL684	$6\frac{5}{8}$	8	8	13	17	21	25	29	34	38	42
LL884	$8\frac{5}{8}$	20	21	31	42	52	63	73	84	95	105
LL1084	$10\frac{3}{4}$	36	38	57	75	94	113	132	151	170	189
LL1284	$12\frac{3}{4}$	60	63	94	126	157	189	220	252	283	314
LL1484	14	72	75	113	151	189	226	264	302	339	377
LL1684	16	100	105	157	210	262	314	367	419	472	524
LL1884	18	136	143	214	285	356	428	499	570	642	713
LL2084	20	172	180	270	361	451	541	631	721	811	901
LL2284	22	212	222	333	444	555	667	778	889	1000	1111
LL2484	24	256	268	402	537	671	805	939	1073	1207	1341
LL2684	26	296	310	465	620	775	930	1085	1240	1395	1550
LL2884	28	356	373	559	746	932	1118	1305	1491	1678	1864
LL3084	30	412	431	647	863	1079	1294	1510	1726	1941	2157
LL3284	32	472	494	741	989	1236	1483	1730	1977	2224	2471
LL3484	34	540	565	848	1131	1414	1696	1979	2262	2545	2827
LL3684	36	624	653	980	1307	1634	1960	2287	2614	2941	3267
LL3884	38	696	729	1093	1458	1822	2187	2551	2915	3280	3644
LL4084	40	780	817	1225	1634	2042	2450	2859	3267	3676	4084
LL4284	42	860	901	1351	1801	2251	2702	3152	3602	4053	4503

DIMENSIONAL STANDARDS

STANDARD MODEL "VT" REBOILER • GROUPS 5, 6 & 8

"VT" Reboiler Vertical • Vaporizing Tube Side — Single Pass • Condensing Medium Shell Side — Tube Supports



VT REBOILER VERTICAL TUBE SUPPORTS SHELL SIDE	Shell O. D. Inches	*DIMENSIONS (in Inches)					NOZZLE & FITTINGS (in Inches)				
		J	K	L	M & Q	N	A	B	C	D	E
	6 $\frac{3}{8}$	5	11 $\frac{1}{4}$	9 $\frac{1}{8}$	SEE TABLE BELOW	8 $\frac{5}{16}$	3	1	TO MEET YOUR REQUIREMENTS	TO MEET YOUR REQUIREMENTS	3 $\frac{1}{4}$
	8 $\frac{5}{8}$	6	13	9 $\frac{1}{8}$		9 $\frac{5}{16}$	4	2			3 $\frac{1}{4}$
	10 $\frac{3}{4}$	8	17	9 $\frac{5}{8}$		10 $\frac{3}{8}$	6	2			3 $\frac{1}{4}$
	12 $\frac{3}{4}$	8	17 $\frac{1}{2}$	10 $\frac{1}{8}$		11 $\frac{3}{8}$	6	2			3 $\frac{1}{4}$
	14	10	22	10 $\frac{3}{8}$		12	8	3			3 $\frac{1}{4}$
	16	10	22 $\frac{1}{2}$	10 $\frac{1}{4}$		13	8	3			3 $\frac{1}{4}$
	18	11	24 $\frac{1}{4}$	11 $\frac{5}{8}$		14	8	3			3 $\frac{1}{4}$
	20	13	29	12 $\frac{1}{8}$		15	10	4			3 $\frac{1}{4}$
	22	13	29 $\frac{1}{4}$	12 $\frac{3}{8}$		16	10	4			3 $\frac{1}{4}$
	24	13	29 $\frac{5}{8}$	12 $\frac{7}{8}$		17	10	4			3 $\frac{1}{4}$
	26	15	35 $\frac{7}{8}$	15 $\frac{1}{4}$		18	12	4			1
	28	15	36 $\frac{3}{8}$	15 $\frac{3}{4}$		19	12	4			1
	30	17	40	16 $\frac{1}{4}$		20	14	6			1
	32	17	40 $\frac{1}{2}$	16 $\frac{3}{4}$		21	14	6			1
	34	19	44 $\frac{3}{8}$	17 $\frac{1}{4}$		23	16	6			1
	36	19	44 $\frac{7}{8}$	17 $\frac{3}{4}$		24	16	6			1
	38	21	49 $\frac{3}{8}$	18 $\frac{1}{4}$		25	18	8			1
	40	21	49 $\frac{3}{4}$	18 $\frac{3}{4}$		26	18	8			1
	42	21	50 $\frac{3}{8}$	19 $\frac{1}{4}$		27	18	8			1

*Dimension "F" equals tube length minus $\frac{1}{8}$ " which is face to face dimension of tube sheets.

For physical dimensions of shell supports see standard support drawing (page 17).

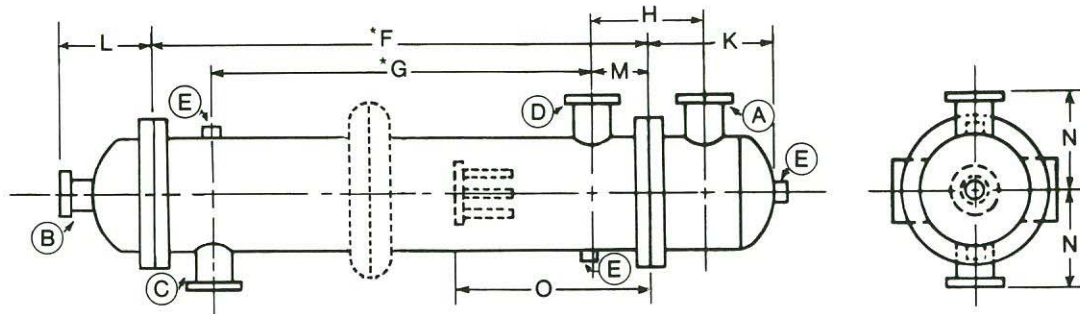
SHELL SIZES 6 $\frac{3}{8}$ " thru 24"	Dimensions	NOZZLE SIZE C & D N.P.S. (in inches)							
		1	2	3	4	6	8	10	12
	M	5	5	6	7	8	10	12	14
	Q	4 $\frac{7}{8}$	4 $\frac{7}{8}$	5 $\frac{7}{8}$	6 $\frac{7}{8}$	7 $\frac{7}{8}$	9 $\frac{7}{8}$	11 $\frac{7}{8}$	13 $\frac{7}{8}$
SHELL SIZES 26" thru 42"	Dimensions	NOZZLE SIZE C & D N.P.S. (in inches)							
		4	6	8	10	12	14	16	18
	M	10	11	12	14	16	17	19	21
	Q	9 $\frac{7}{8}$	10 $\frac{7}{8}$	11 $\frac{7}{8}$	13 $\frac{7}{8}$	15 $\frac{7}{8}$	16 $\frac{7}{8}$	18 $\frac{7}{8}$	20 $\frac{7}{8}$

For Tube Counts and Surface Areas for Groups 5, 6 & 8, See "VT" Condensers Horizontal on pages 4 & 5

DIMENSIONAL STANDARDS

STANDARD MODEL "VT" CONDENSER • GROUPS 5, 6 & 8

"VT" Condenser Vertical • Condensing Tube Side — Single Pass • Coolant Liquid Shell Side—Baffled



VT CONDENSER VERTICAL BAFFLED SHELL SIDE	Shell O. D. (in Inches)	*DIMENSIONS (in Inches)					NOZZLE & FITTINGS (in Inches)				
		H	K	L	M	N	A	B	C	D	E
	6 ⁵ / ₈	10	11 ¹ / ₄	9 ¹ / ₈	5	8 ⁵ / ₁₆	3	1	2	2	3/4
	8 ⁵ / ₈	12	13	9 ¹ / ₈	6	9 ⁵ / ₁₆	4	2	3	3	3/4
	10 ³ / ₄	14	17	9 ⁵ / ₈	6	10 ³ / ₈	6	2	3	3	3/4
	12 ³ / ₄	15	17 ¹ / ₂	10 ⁵ / ₈	7	11 ⁵ / ₈	6	2	4	4	3/4
	14	18	22	10 ⁵ / ₈	8	12	8	3	6	6	3/4
	16	18	22 ¹ / ₂	10 ³ / ₄	8	13	8	3	6	6	3/4
	18	19	24 ¹ / ₄	11 ⁵ / ₈	8	14	8	3	6	6	3/4
	20	23	29	12 ¹ / ₈	10	15	10	4	8	8	3/4
	22	23	29 ¹ / ₄	12 ⁵ / ₈	10	16	10	4	8	8	3/4
	24	23	29 ⁵ / ₈	12 ⁷ / ₈	10	17	10	4	8	8	3/4
	26	27	35 ⁵ / ₈	15 ¹ / ₄	12	18	12	4	8	8	1
	28	27	36 ⁵ / ₈	15 ³ / ₄	12	19	12	4	8	8	1
	30	31	40	16 ¹ / ₄	14	20	14	6	10	10	1
	32	31	40 ¹ / ₂	16 ³ / ₄	14	21	14	6	10	10	1
	34	35	44 ³ / ₈	17 ¹ / ₄	16	23	16	6	12	12	1
	36	35	44 ⁷ / ₈	17 ³ / ₄	16	24	16	6	12	12	1
	38	38	49 ³ / ₈	18 ¹ / ₄	17	25	18	8	14	14	1
	40	38	49 ³ / ₄	18 ³ / ₄	17	26	18	8	14	14	1
	42	38	50 ³ / ₈	19 ¹ / ₄	17	27	18	8	14	14	1

*Dimension "F" equals tube length minus ¹/₈" which is face to face dimension of of tube sheets.

*Dimension "G" equals tube length minus 2 times dimension "M" in above table.

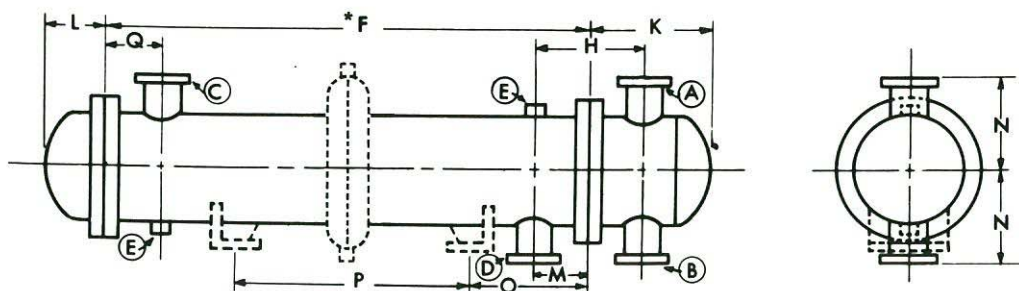
For physical dimensions of shell supports see standard support drawing (page 17).

Dimension	TUBE LENGTH								
	4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
O	20"	24"	2'-6"	3'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"

For Tube Counts and Surface Areas for Groups 5, 6 & 8, See
"VT" Condensers Horizontal on pages 4 & 5

ENGINEERED FOR TOMORROW TODAY!

NOTE: If smaller N.P.S. is desired for Nozzles C & D, refer to the Nozzle Table on Page 10 to determine the proper dimensions.

DIMENSIONAL STANDARDS**STANDARD MODEL "VS" GROUPS 5, 6 & 8****"VS" Condenser, Horizontal, Coolant Liquid Tube Side —****Two Pass. Condensing Shell Side — Tube Supports****TWO PASS**

	Shell O. D. Inches	*DIMENSIONS (in Inches)						NOZZLES & FITTINGS (in Inches)				
		H	K	L	M	Q	N	A	B	C	D	E
VS Condenser Two Pass Tube Side Tube Supports Shell Side	6 ⁵ / ₈	10	10 ⁵ / ₈	4 ¹ / ₈	5	5 ⁷ / ₈	8 ⁵ / ₁₆	2	2	3	1	3/ ₄
	8 ⁵ / ₈	10	11 ¹ / ₂	4 ³ / ₈	5	6 ⁷ / ₈	9 ⁵ / ₁₆	3	3	4	2	3/ ₄
	10 ³ / ₄	10	11 ³ / ₄	4 ⁵ / ₈	5	7 ⁷ / ₈	10 ³ / ₈	3	3	6	2	3/ ₄
	12 ³ / ₄	11	13 ³ / ₄	5 ¹ / ₈	5	7 ⁷ / ₈	11 ³ / ₈	4	4	6	2	3/ ₄
	14	14	18	5 ⁵ / ₈	6	9 ⁷ / ₈	12	6	6	8	3	3/ ₄
	16	14	18 ¹ / ₂	6 ¹ / ₈	6	9 ⁷ / ₈	13	6	6	8	3	3/ ₄
	18	15	20 ¹ / ₄	6 ⁷ / ₈	6	9 ⁷ / ₈	14	6	6	8	3	3/ ₄
	20	16	20 ³ / ₈	7 ¹ / ₂	7	11 ⁷ / ₈	15	6	6	10	4	3/ ₄
	22	18	25 ¹ / ₈	7 ³ / ₄	7	11 ⁷ / ₈	16	8	8	10	4	3/ ₄
	24	18	25 ¹ / ₂	8 ¹ / ₈	7	11 ⁷ / ₈	17	8	8	10	4	3/ ₄
	26	21	27 ⁵ / ₈	10 ¹ / ₄	10	16	18	8	8	12	4	1
	28	21	28 ¹ / ₈	10 ³ / ₄	10	16	19	8	8	12	4	1
	30	24	32 ³ / ₄	11 ¹ / ₄	11	17	20	10	10	14	6	1
	32	25	34 ¹ / ₄	11 ³ / ₄	11	17	21	10	10	14	6	1
	34	25	34 ³ / ₄	12 ¹ / ₄	11	19	22	10	10	16	6	1
	36	27	39 ³ / ₈	12 ³ / ₄	11	19	23	12	12	16	6	1
	38	28	39 ⁷ / ₈	13 ¹ / ₄	12	21	24	12	12	18	8	1
	40	29	42 ¹ / ₂	13 ⁵ / ₈	12	21	25	14	14	18	8	1
	42	29	43	14 ¹ / ₄	12	21	26	14	14	18	8	1

*Dimension "F" equals tube length minus 1/8" which is face to face dimension of tube sheets.

For physical dimensions of shell supports and dimensions "O" and "P" see standard support drawing (page 16).

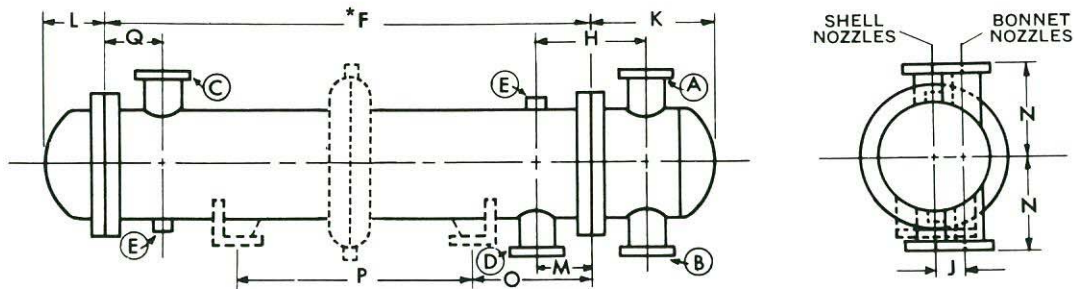
See LL groups 5, 6 & 8 for surface areas and replace prefix LL with VS.

DIMENSIONAL STANDARDS

STANDARD MODEL "VS" GROUPS 5, 6 & 8

"VS" Condenser, Horizontal, Coolant Liquid Tube Side —

Four Pass. Condensing Shell Side — Tube Supports.



FOUR PASS

	Shell O. D. Inches	*DIMENSIONS (in Inches)							NOZZLES & FITTINGS (in Inches)				
		H	J	K	L	M	Q	N	A	B	C	D	E
VS Condenser Four Pass Tube Side Tube Supports Shell Side	6 ⁵ / ₈	9	1 ¹ / ₂	9 ¹ / ₈	4 ¹ / ₈	5	5 ⁷ / ₈	8 ⁵ / ₁₆	1	1	3	1	3 ³ / ₄
	8 ⁵ / ₈	10	2	10 ⁷ / ₈	4 ³ / ₈	5	6 ¹ / ₈	9 ¹ / ₁₆	2	2	4	2	3 ³ / ₄
	10 ³ / ₄	10	2	11 ¹ / ₈	4 ⁵ / ₈	5	7 ¹ / ₈	10 ³ / ₈	2	2	6	2	3 ³ / ₄
	12 ³ / ₄	10	2 ¹ / ₂	12 ¹ / ₄	5 ⁵ / ₈	5	7 ⁷ / ₈	11 ³ / ₈	3	3	6	2	3 ³ / ₄
	14	12	3	14 ¹ / ₄	5 ⁵ / ₈	6	9 ¹ / ₈	12	4	4	8	3	3 ³ / ₄
	16	12	3	14 ³ / ₄	6 ¹ / ₈	6	9 ⁷ / ₈	13	4	4	8	3	3 ³ / ₄
	18	13	3	16 ¹ / ₂	6 ⁷ / ₈	6	9 ⁹ / ₈	14	4	4	8	3	3 ³ / ₄
	20	14	3	17 ¹ / ₈	7 ¹ / ₂	7	11 ¹ / ₈	15	4	4	10	4	3 ³ / ₄
	22	16	4	21 ¹ / ₈	7 ³ / ₄	7	11 ⁷ / ₈	16	6	6	10	4	3 ³ / ₄
	24	16	4	21 ¹ / ₂	8 ¹ / ₈	7	11 ⁷ / ₈	17	6	6	10	4	3 ³ / ₄
	26	19	4 ¹ / ₂	23 ⁵ / ₈	10 ¹ / ₄	10	16	18	6	6	12	4	1
	28	19	4 ¹ / ₂	24 ¹ / ₈	10 ³ / ₄	10	16	19	6	6	12	4	1
	30	22	5 ¹ / ₂	28 ⁵ / ₄	11 ¹ / ₄	11	17	20	8	8	14	6	1
	32	22	5 ¹ / ₂	29 ¹ / ₈	11 ³ / ₄	11	17	21	8	8	14	6	1
	34	23	5 ¹ / ₂	30 ⁵ / ₈	12 ¹ / ₄	11	19	23	8	8	16	6	1
	36	25	6 ¹ / ₂	35 ¹ / ₄	12 ³ / ₄	11	19	24	10	10	16	6	1
	38	26	6 ¹ / ₂	35 ³ / ₄	13 ¹ / ₄	12	21	25	10	10	18	8	1
	40	28	7 ¹ / ₂	40 ¹ / ₄	13 ³ / ₈	12	21	26	12	12	18	8	1
	42	28	7 ¹ / ₂	40 ⁷ / ₈	14 ¹ / ₄	12	21	27	12	12	18	8	1

*Dimension "F" equals tube length minus 1/8" which is face to face dimension of tube sheets.

For physical dimensions of shell supports and dimensions "O" and "P" see standard support drawing (page 16).

See LL groups 5, 6 & 8 for surface areas and replace prefix LL with VS.

STANDARD BAFFLE SPACING DATA

FOR "VT"

CONDENSER GROUPS

5, 6 & 8

AND "LL"

HEAT EXCHANGERS

GROUPS 5, 6 & 8

NOMINAL BAFFLE SPACINGS AND NUMBER OF
BAFFLES FOR TUBE LENGTHS 4'-0" TO 8'-0"

Shell O.D. (Inches)	4'-0"		6'-0"		8'-0"		
	Pitch	No.	Pitch	No.	Pitch	No.	
6 $\frac{5}{8}$	2 $\frac{1}{4}$	14	2 $\frac{1}{4}$	24	2 $\frac{1}{4}$	34	
	4 $\frac{1}{8}$	8	4 $\frac{1}{8}$	14	4 $\frac{1}{8}$	20	
	5 $\frac{7}{8}$	6	5 $\frac{7}{8}$	10	5 $\frac{7}{8}$	14	
	—	—	7 $\frac{3}{8}$	8	7 $\frac{3}{8}$	12	
8 $\frac{5}{8}$ & 10 $\frac{3}{4}$	2 $\frac{3}{8}$	12	2 $\frac{3}{8}$	22	2 $\frac{3}{8}$	30	
	3 $\frac{7}{8}$	8	3 $\frac{7}{8}$	14	3 $\frac{7}{8}$	20	
	5 $\frac{3}{4}$	6	5 $\frac{3}{4}$	10	5 $\frac{3}{4}$	14	
	—	—	6 $\frac{7}{8}$	8	6 $\frac{7}{8}$	12	
	10 $\frac{1}{4}$	4	10 $\frac{1}{4}$	6	10 $\frac{1}{4}$	8	
12 $\frac{3}{4}$	3	10	3	18	3	26	
	3 $\frac{7}{8}$	8	3 $\frac{7}{8}$	14	3 $\frac{7}{8}$	20	
	5 $\frac{3}{4}$	6	5 $\frac{3}{4}$	10	5 $\frac{3}{4}$	14	
	—	—	7 $\frac{1}{8}$	8	7 $\frac{1}{8}$	12	
	10	4	10	6	10	8	
	14 $\frac{3}{8}$	2	14 $\frac{3}{8}$	4	14 $\frac{3}{8}$	6	
14 16 & 18	4 $\frac{3}{8}$	6	4 $\frac{3}{8}$	12	4 $\frac{3}{8}$	18	
	—	—	5 $\frac{3}{8}$	10	5 $\frac{3}{8}$	14	
	7 $\frac{1}{2}$	4	7 $\frac{1}{2}$	8	7 $\frac{1}{2}$	10	
	—	—	10 $\frac{1}{8}$	6	10 $\frac{1}{8}$	8	
	—	—	13 $\frac{1}{8}$	4	13 $\frac{1}{8}$	6	
	16 $\frac{3}{8}$	2	—	—	16 $\frac{3}{8}$	4	
20 22 & 24	5 $\frac{7}{8}$	4	5 $\frac{7}{8}$	8	5 $\frac{7}{8}$	12	
	—	—	7 $\frac{3}{4}$	6	7 $\frac{3}{4}$	10	
	—	—	—	—	9 $\frac{7}{8}$	8	
	—	—	12 $\frac{5}{8}$	4	12 $\frac{5}{8}$	6	
	14 $\frac{3}{4}$	2	—	—	—	—	
	—	—	—	—	18	4	
26 & 28	—	—	22	2	22	2	
	—	—	—	—	—	—	
	—	—	5 $\frac{5}{8}$	8	5 $\frac{5}{8}$	12	
	—	—	7 $\frac{1}{8}$	6	7 $\frac{1}{8}$	10	
	—	—	—	—	9 $\frac{1}{2}$	8	
	15 $\frac{1}{4}$	2	12	4	12	6	
30 & 32	—	—	—	—	—	—	
	22 $\frac{1}{4}$	1*	—	—	19 $\frac{1}{2}$	4	
	—	—	25	2	25	2	
	—	—	—	—	—	—	
34 & 36	8 $\frac{3}{8}$	2	6 $\frac{5}{8}$	6	6 $\frac{5}{8}$	10	
	—	—	11 $\frac{3}{8}$	4	8 $\frac{3}{8}$	8	
	—	—	—	—	11 $\frac{3}{8}$	6	
	—	—	—	—	—	—	
	22 $\frac{1}{4}$	1*	22 $\frac{1}{4}$	2	19 $\frac{3}{4}$	4	
	—	—	—	—	28	2	
38 40 & 42	7 $\frac{3}{4}$	2	7 $\frac{3}{4}$	4	—	—	
	—	—	—	—	9 $\frac{1}{2}$	6	
	—	—	—	—	—	—	
	—	—	—	—	—	—	
	22	1*	22	2	17 $\frac{3}{4}$	4	
	—	—	—	—	27	2	
38 40 & 42	9 $\frac{1}{2}$	2	9 $\frac{1}{2}$	4	9 $\frac{1}{2}$	6	
	—	—	—	—	—	—	
	—	—	—	—	—	—	
	—	—	—	—	15 $\frac{1}{2}$	4	
	22	1*	22	2	—	—	
	—	—	—	—	27	2	

*NOZZLES ON THE SAME SIDE OF SHELL

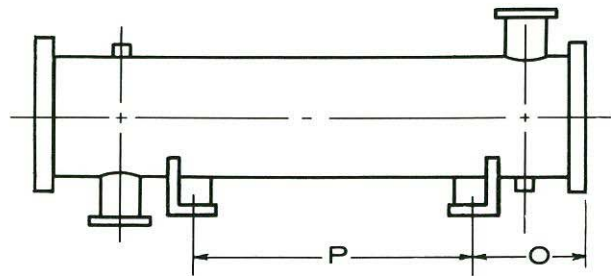
DOYLE & ROTH MANUFACTURING COMPANY inc.

FOR TUBE LENGTHS 10'-0" TO 20'-0"
NOMINAL BAFFLE SPACINGS AND NUMBER OF BAFFLES

	10'-0"		12'-0"		14'-0"		16'-0"		18'-0"		20'-0"		Shell O.D. (Inches)
	Pitch	No.	Pitch	No.	Pitch	No.	Pitch	No.	Pitch	No.	Pitch	No.	
	2¼	44	—	—	—	—	—	—	—	—	—	—	6½
	4⅛	26	4⅛	30	4⅛	36	4⅛	42	4⅛	46	4⅛	52	
	5⅞	18	5⅞	22	5⅞	26	5⅞	30	5⅞	34	5⅞	38	
	7⅝	14	7⅝	18	7⅝	20	7⅝	24	7⅝	28	7⅝	30	
	2¾	40	—	—	—	—	—	—	—	—	—	—	8½ & 10¾
	3⅞	26	3⅞	30	3⅞	36	3⅞	44	3⅞	50	3⅞	56	
	5¾	18	5¾	22	5¾	26	5¾	30	5¾	34	5¾	38	
	6⅞	14	6⅞	18	6⅞	22	6⅞	26	6⅞	30	6⅞	32	
	10¼	10	10¼	12	10¼	16	10¼	18	10¼	20	10¼	22	
	3	32	—	—	—	—	—	—	—	—	—	—	12¾
	3⅞	26	3⅞	30	3⅞	36	3⅞	44	3⅞	50	3⅞	56	
	5¾	18	5¾	22	5¾	26	5¾	30	5¾	34	5¾	38	
	7⅞	14	7⅞	18	7⅞	22	7⅞	24	7⅞	28	7⅞	30	
	10	10	10	12	10	14	10	18	10	22	10	22	
	14¾	8	14¾	8	14¾	10	14¾	12	14¾	14	14¾	16	
	4¾	22	4¾	28	4¾	34	4¾	38	4¾	44	4¾	50	14 16 & 18
	5⅞	18	5⅞	22	5⅞	26	5⅞	30	5⅞	34	5⅞	40	
	7½	14	7½	16	7½	20	7½	22	7½	26	7½	28	
	10½	10	10½	12	10½	14	10½	18	10½	18	10½	24	
	13½	8	13½	10	13½	12	13½	14	13½	14	13½	18	
	16¾	6	16¾	8	16¾	10	16¾	10	16¾	12	16¾	14	
	5⅞	16	5⅞	20	5⅞	24	5⅞	28	5⅞	32	5⅞	36	20 22 & 24
	7¾	12	7¾	16	7¾	18	7¾	22	7¾	26	7¾	28	
	9⅞	10	9⅞	12	9⅞	14	9⅞	18	9⅞	20	9⅞	22	
	12½	8	12½	10	12½	12	12½	14	12½	16	12½	18	
	—	—	14¾	8	14¾	10	14¾	12	14¾	14	14¾	14	
	18	6	18	6	18	8	18	10	18	12	18	12	
	22	4	22	4	22	6	22	8	22	8	22	10	
	—	—	—	—	—	—	—	—	—	—	—	—	
	5⅞	16	5⅞	20	5⅞	24	5⅞	28	5⅞	32	5⅞	36	26 & 28
	7⅞	12	7⅞	16	7⅞	20	7⅞	22	7⅞	26	7⅞	28	
	9½	10	9½	12	9½	14	9½	18	9½	20	9½	22	
	12	8	12	10	12	12	12	14	12	16	12	18	
	15¼	6	15¼	8	15¼	10	15¼	12	15¼	12	15¼	14	
	—	—	19½	6	19½	8	19½	8	19½	10	19½	12	
	25	4	25	4	25	6	25	6	25	8	25	8	
	—	—	—	—	—	—	—	—	—	—	—	—	
	6⅞	12	6⅞	16	6⅞	20	6⅞	22	6⅞	26	6⅞	30	30 & 32
	8¾	10	8¾	14	8¾	16	8¾	18	8¾	22	8¾	24	
	11¾	8	11¾	10	11¾	12	11¾	14	11¾	16	11¾	18	
	14¾	6	14¾	8	14¾	10	14¾	12	14¾	12	14¾	14	
	—	—	19¾	6	19¾	8	19¾	8	19¾	10	19¾	12	
	22¼	4	—	—	22¼	6	—	—	22¼	8	22¼	10	
	—	—	28	4	—	—	28	6	28	6	28	8	
	—	—	—	—	—	—	—	—	—	—	—	—	
	7¾	10	7¾	14	7¾	16	7¾	20	7¾	22	7¾	24	34 & 36
	9½	8	9½	12	9½	14	9½	16	9½	18	9½	20	
	—	—	11½	10	11½	12	11½	14	11½	14	11½	16	
	13¾	6	13¾	8	13¾	10	13¾	12	13¾	12	13¾	14	
	—	—	17¾	6	17¾	8	17¾	10	17¾	10	17¾	12	
	22	4	—	—	22	6	22	8	22	8	22	10	
	—	—	27	4	—	—	27	6	27	6	27	8	
	—	—	—	—	—	—	—	—	—	—	—	—	
	9½	8	9½	10	9½	14	9½	16	9½	18	9½	20	38 40 & 42
	—	—	—	—	10¾	12	10¾	14	10¾	16	10¾	18	
	13¾	6	13¾	8	13¾	10	13¾	12	13¾	14	13¾	16	
	—	—	—	—	15½	8	15½	10	15½	12	15½	14	
	—	—	17½	6	—	—	—	—	17½	10	17½	12	
	22	4	—	—	22	6	22	8	22	8	22	10	
	—	—	27	4	—	—	27	6	27	6	27	8	
	—	—	—	—	—	—	—	—	—	—	—	—	

DOYLE & ROTH FABRICATED SHELL SUPPORTS

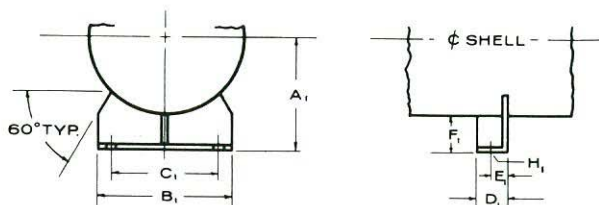
NOTE: Dimensions "O" and "P"
can be varied to meet
special design requirements,



Shell O. D. Inches	Dimen.	DIMENSIONS O & P FOR TUBE LENGTH								
		4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"	18'-0"	20'-0"
6 $\frac{5}{8}$ thru 10 $\frac{3}{4}$	O	12"	19"	2'-1"	2'-1"	2'-1"	2'-7"	2'-7"	2'-7"	3'-1"
	P	21"	2'-10"	3'-10"	5'-10"	7'-10"	8'-10"	10'-10"	12'-10"	13'-10"
12 $\frac{3}{4}$ thru 18	O	12"	21"	2'-3"	2'-3"	2'-3"	2'-9"	2'-9"	2'-9"	3'-3"
	P	17"	2'-6"	3'-6"	5'-6"	7'-6"	8'-6"	10'-6"	12'-6"	13'-6"
20 thru 24	O	12"	23"	2'-5"	2'-5"	2'-5"	2'-11"	2'-11"	2'-11"	3'-5"
	P	17"	2'-2"	3'-2"	5'-2"	7'-2"	8'-2"	10'-2"	12'-2"	13'-2"
26 thru 32	O	12"	2'-1"	2'-7"	2'-7"	2'-7"	3'-1"	3'-1"	3'-1"	3'-7"
	P	16"	22"	2'-10"	4'-10"	6'-10"	7'-10"	9'-10"	11'-10"	12'-10"
34 thru 42	O	12"	2'-3"	2'-9"	2'-9"	2'-9"	3'-3"	3'-3"	3'-3"	3'-9"
	P	16"	18"	2'-6"	4'-6"	6'-6"	7'-6"	9'-6"	11'-6"	12'-6"

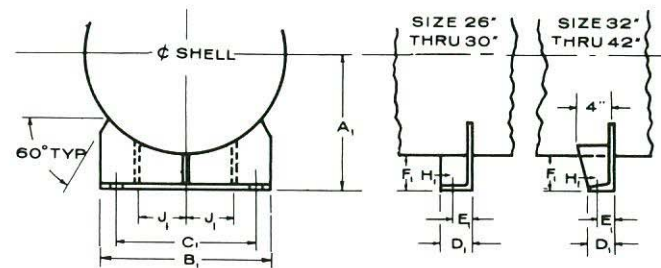
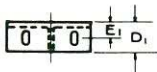
FOR SHELL SIZES 6 $\frac{5}{8}$ " THRU 24"

FOR SHELL SIZES 26" THRU 42"



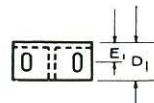
Shell Size Inches	A ₁	B ₁	C ₁	D ₁	E ₁	F ₁	*H ₁
(in Inches)							
6 $\frac{5}{8}$	8 $\frac{3}{8}$	6	4	3 $\frac{1}{2}$	2	4 $\frac{7}{8}$	$\frac{3}{4}$
8 $\frac{5}{8}$	9 $\frac{3}{8}$	7	5	3 $\frac{1}{2}$	2	4 $\frac{7}{8}$	$\frac{3}{4}$
10 $\frac{3}{4}$	10 $\frac{1}{4}$	9	7	3 $\frac{1}{2}$	2	4 $\frac{7}{8}$	$\frac{3}{4}$
12 $\frac{3}{4}$	11 $\frac{1}{4}$	11	9	4	2 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{3}{4}$
14	11 $\frac{7}{8}$	12	10	4	2 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{7}{8}$
16	12 $\frac{7}{8}$	14	12	4	2 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{7}{8}$
18	13 $\frac{7}{8}$	16	14	4	2 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{7}{8}$
20	14 $\frac{7}{8}$	17	15	4	2 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{7}{8}$
22	15 $\frac{7}{8}$	19	17	4	2 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{7}{8}$
24	16 $\frac{7}{8}$	21	19	4	2 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{7}{8}$

Note:
*Holes (2) in one support to
be slotted with slots 1 $\frac{1}{2}$ " to
1 $\frac{5}{8}$ " long parallel to longi-
tudinal axis of shell.



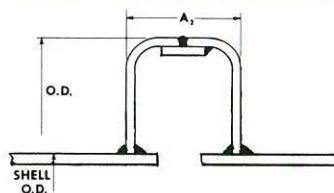
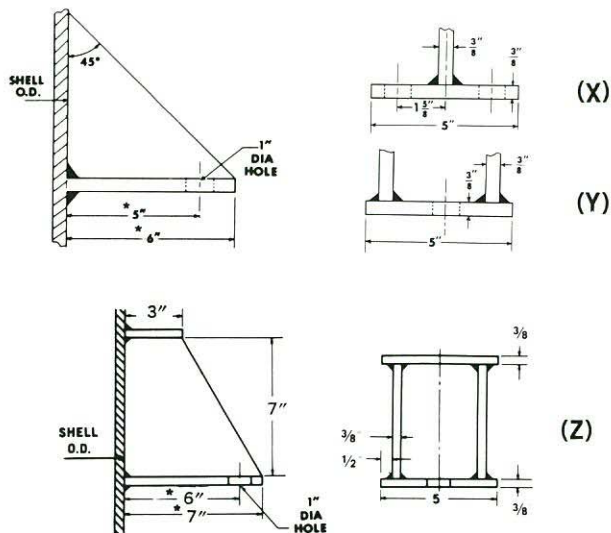
Nom. Shell Size Inches	A ₁	B ₁	C ₁	D ₁	E ₁	F ₁	*H ₁	J ₁
(in Inches)								
26	17 $\frac{1}{2}$	22	18	4	2 $\frac{1}{2}$	4 $\frac{1}{2}$	$\frac{7}{8}$	—
28	18 $\frac{1}{2}$	24	20	4	2 $\frac{1}{2}$	4 $\frac{1}{2}$	$\frac{7}{8}$	—
30	19 $\frac{1}{2}$	26	22	4	2 $\frac{1}{2}$	4 $\frac{1}{2}$	$\frac{7}{8}$	—
32	20 $\frac{1}{2}$	28	24	4	2 $\frac{1}{2}$	4 $\frac{1}{2}$	$\frac{7}{8}$	7 $\frac{1}{2}$
34	21 $\frac{1}{2}$	29	25	4	2 $\frac{1}{2}$	4 $\frac{1}{2}$	$\frac{7}{8}$	7 $\frac{1}{2}$
36	22 $\frac{1}{2}$	27	23	3 $\frac{1}{8}$	1 $\frac{3}{4}$	4 $\frac{1}{2}$	$\frac{7}{8}$	7 $\frac{1}{2}$
38	23 $\frac{1}{2}$	28	24	3 $\frac{1}{8}$	1 $\frac{3}{4}$	4 $\frac{1}{2}$	$\frac{7}{8}$	7 $\frac{1}{2}$
40	24 $\frac{1}{2}$	29	25	3 $\frac{1}{8}$	1 $\frac{3}{4}$	4 $\frac{1}{2}$	$\frac{7}{8}$	7 $\frac{1}{2}$
42	25 $\frac{1}{2}$	30	26	3 $\frac{1}{8}$	1 $\frac{3}{4}$	4 $\frac{1}{2}$	$\frac{7}{8}$	7 $\frac{1}{2}$

Note:
*Holes (2) in one support to
be slotted with slots 1 $\frac{5}{8}$ "
long parallel to longitudinal
axis of shell.



*For Alloy Shell Side Exchangers add $\frac{1}{8}$ " to Dimension for Alloy Pad.

**Fabricated Steel Shell Supports
for D & R Standard Heat Exchangers**



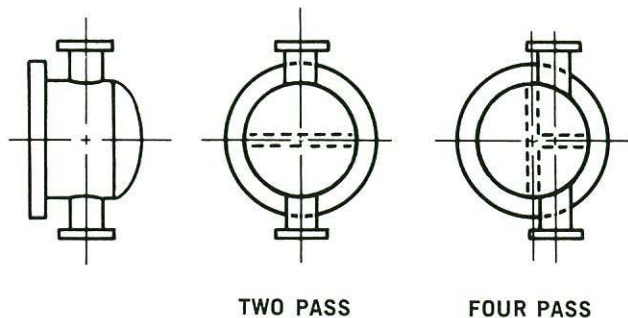
Expansion Joints for
D & R Standard
Heat Exchangers

Shell O.D. (in Inches)	Expansion Joint O.D. (in Inches)	A ₁ Steel Shells (in Inches)	A ₁ Alloy Shells (in Inches)
6 $\frac{7}{8}$	14	4	3
8 $\frac{5}{8}$	16	4	3
10 $\frac{3}{4}$	18	4	3
12 $\frac{3}{4}$	20	4 $\frac{1}{2}$	3
14	22	4 $\frac{1}{2}$	3
16	24	4 $\frac{1}{2}$	3
18	26	5	3
20	28	5	3
22	30	5	3
24	32	5	3
26	34	5	3 $\frac{1}{2}$
28	36	5	3 $\frac{1}{2}$
30	38	5	4
32	40	5 $\frac{1}{2}$	4
34	42	5 $\frac{1}{2}$	4
36	44	5 $\frac{1}{2}$	4
38	46	6	4
40	48	6	4
42	50	6	4

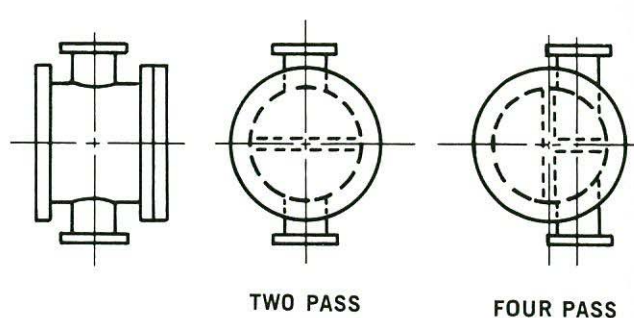
*For Alloy Shell Side Exchangers add $\frac{1}{8}$ " to Dimension for Alloy Pad.

ALTERNATE HEAD SELECTIONS

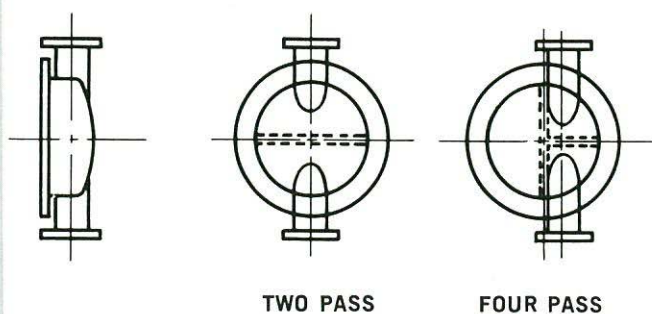
FABRICATED BONNETS



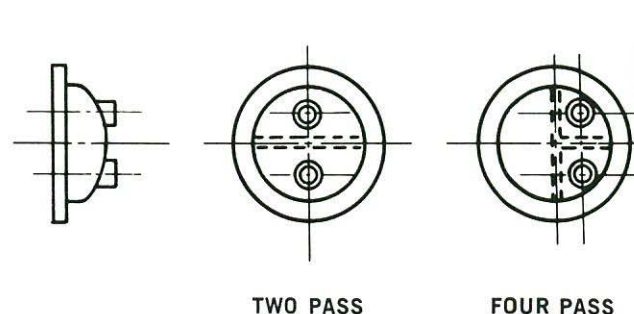
FABRICATED CHANNEL



CAST HEAD (with Flanged Nozzles)



CAST HEAD (with Threaded Nozzles)



MATERIALS OF CONSTRUCTION AND DESIGN CONDITIONS†

D & R STANDARD MODELS VT, LL, LLS & VS GROUPS 5, 6 & 8

Selection I:

- (a) All Steel construction.

Selection II:

- (a) Steel shell side and Stainless Steel tube side (Type 304 or Type 316).
- (b) Stainless Steel shell side (Type 304 or 316) and Steel tube side.

Selection III:

- (a) Steel shell side and Monel tube side.
- (b) Monel shell side and Steel tube side.

Selection IV:

- (a) Steel shell side and Nickel tube side.
- (b) Nickel shell side and Steel tube side.

STANDARD DESIGN CONDITIONS

Selection I:

Design pressure 75 & 150 p.s.i. @ 500°F shell and tube side.

Selections II, III, IV

Design pressure 75 & 150 p.s.i. @ 350°F shell and tube sides.

CONSTRUCTION

All Selections are designed and constructed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code.

SHELL ASSEMBLY

ALL (a) SELECTIONS

Shell:

Seamless Steel SA-53B, rolled Steel SA-285C (above 24" O.D.).

Nozzles:

150# Std. ANSI, R.F. S/O Steel SA-105 flanges with Steel SA-53B Pipe.

Fittings:

3000# F.S. half couplings SA-105.

Supports:

Steel SA-36.

ALL (b) SELECTIONS

Shell:

Type 304 Stainless Steel SA-312/SA-240, Type 316 Stainless Steel SA-312/SA-240, Monel SB-127, or Nickel SB-162.

Shell Ring Flange (1F Required):

Steel SA-285C, SA-181 CL60 or SA-516 GR 70.

Nozzles:

- (a) For sizes 1" N.P.S. through 4" N.P.S.: 150# STD. ANSI L.J. SA-105 flanges with stub ends (same materials as shell).
- (b) For sizes 6" N.P.S. and above: 150# Std. ANSI S/O Steel SA-105 flanges, Stainless Steel, Monel or Nickel faced, with nozzle of same materials as facing.

Fittings:

3000# half couplings, same material as shell.

Supports:

Steel SA-36 with saddles same material as shell.

TUBE BUNDLE ASSEMBLY

TUBE SHEET

Selection I (a):

Steel SA-285C or SA-181, or SA-516 GR 70.

Selection II (a) & (b):

Stainless Steel Type 304 SA-240 or Type 316 SA-240.

Selection III (a) & (b):

Monel SB-127.

Selection IV (a) & (b):

Nickel SB-162.

TUBES

Selection I (a):

Steel SA-214 and SA-179, #16, #14, or #12 BWG.

Selection II (a) & (b):

Stainless Steel SA-249 Type 304 or Type 316, average wall full finished annealed and pickled, #18 or #16 BWG.

Selection III (a) & (b):

Monel SB-163 annealed, #18 or #16 BWG.

Selection IV (a) & (b):

Nickel SB-163 annealed, #18 or #16 BWG.

BAFFLES, TUBE SUPPORTS, TIE RODS AND SPACERS

All Selections same material as shell.

BONNET ASSEMBLY

Selection II (a), III (a) & IV (a):

Cylinder:

Type 304 Stainless Steel SA-312/SA-240, Type 316 Stainless Steel SA-312/SA-240, Monel SB-127, or Nickel SB-162.

Cover:

Semi-elliptical ASME head same material as cylinder.

Ring Flanges:

Steel SA-285C, SA-181 CL60 or SA-516 GR 70 faced with same material as cylinder.

Nozzles:

(a) for sizes 1" N.P.S. through 4" N.P.S.: 150# Std. ANSI L.J., SA-105 flanges with stub ends (same materials as cylinder).

(b) For sizes 6" N.P.S. and above: 150# Std. ANSI S/O Steel SA-105 flanges, Stainless Steel, Monel or Nickel faced, with nozzle of same material as facing.

Fittings:

3000# half couplings, same material as cylinder.

Selections I (a), II (b), III (b), IV (b):

Cylinder:

Seamless Steel SA-53B, rolled Steel SA-285C (above 24" O.D.).

Cover:

Steel SA-285C Semi-elliptical ASME head.

Ring Flange:

Steel SA-285C, SA-181 CL60 or SA-516 GR 70.

Fittings:

3000# F.S. half couplings SA-105.

Miscellaneous All Selections:

Gaskets:

Compressed Asbestos.

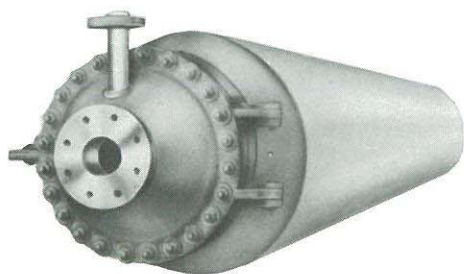
Bolting:

Alloy A-193 B7M Full threaded studs with A-194 Class 2H heavy hex. nuts.

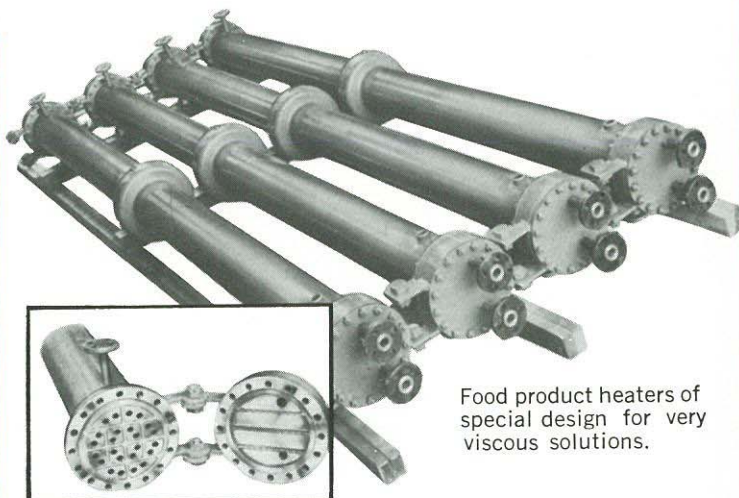
†Other materials & design conditions available upon request.

DOYLE & ROTH HEAT TRANSFER EQUIPMENT

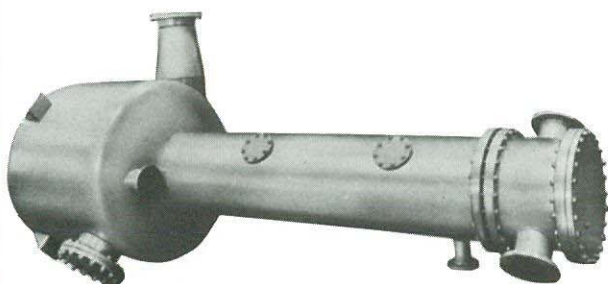
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APPLICATION AND REQUIREMENT
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Stainless-clad Food Processing Vessel designed for 450 psi @ 600°F.—24" O.D. x 16 ft. long.



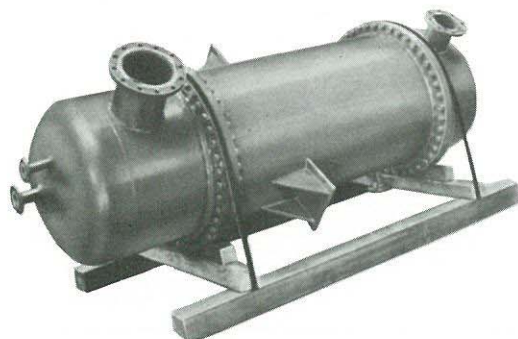
Food product heaters of special design for very viscous solutions.



Turpentine Condenser with integral separator, provide 1500 sq. ft. surface—steel construction with stainless steel tubes.



Titanium Reboiler providing 380 sq. ft. surface for nitric acid service.

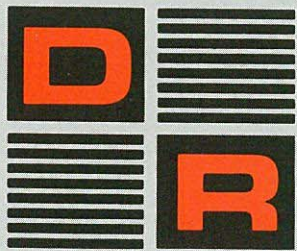


Thermoshyon reboiler made to suit the specific requirement of a major producer of styrene.



Ready to ship—complete tubular requirements needed for a given process design, made entirely of D & R standard units.

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