



TITANIUM-TUBED CONDENSER

2-pass												
SKN 8.5/8" F-45												
L	L tot	A	B	C	D	E	F	G	H	Weight appr. kg	Pump down capacity dm ³	Internal net volume ltr.
1500	1700						DN 50			120	25,8	30,3
2000	2200						PN 6			150	34,5	40,6
2500	2700	75	75	219,1	71	282	DIN 2631	48,3	48,3	185	43,4	51,0
3000	3200									215	52,1	61,3
SKN 10.3/4" F-72												
1500	1700						DN 50			175	40,9	48,1
2000	2200						PN 16			215	54,8	64,5
2500	2700	75	75	273,0	85	336	DIN 2633	60,3	48,3	265	68,8	80,9
3000	3200									310	82,6	97,2
SKN 12.3/4" F-105												
1500	1700						DN 65			245	56,7	66,7
2000	2200						PN 16			305	76,0	89,4
2500	2700	85	77	323,9	96	380	DIN 2633	76,1	60,3	375	95,3	112,1
3000	3200									440	114,6	134,8
SKN 14" F-134												
1500	1700						DN 80			305	65,5	77,0
2000	2200						PN 6			385	87,7	103,2
2500	2700	85	78	355,6	103	408	DIN 2633	76,1	60,3	525	110,0	129,4
3000	3200									545	132,3	155,6
SKN 16" F-175												
2000	2250						DN 100			500	115,3	135,6
2500	2750	95	100	406,4	111	442	PN 16	88,9	76,1	610	144,5	170,0
3000	3250						DIN 2633			710	173,8	204,5
SKN 18" F-227												
3000	3250	125	125	457	127,5	523	DN 125	114,3	88,9	925	215,3	253,3
3500	3750						PN 16			1055	251,5	295,9
4000	4250						DIN 2633			1190	287,8	338,6
SKN 22" F-342												
3000	3750						DN 150			1250	326,3	383,9
3500	4250	450	295	559	147,5	635	PN 16	125	100	1440	381,2	448,5
4000	4750						DIN 2633			1630	436,2	513,2
SKN 24" F-424												
3000	3750						DN 150			1250	326,3	383,9
3500	4250	450	295	559	147,5	635	PN 16	125	100	1440	381,2	448,5
4000	4750						DIN 2633			1630	436,2	513,2
4-pass												
SKN 8.5/8" F-28												
1100	1290						DN 32			85	23,8	28,0
1500	1700	75	75	219,1		247	PN 6	42,4	42,4	100	32,3	38,0
							DIN 2631					
SKN 8.5/8" F-40												
1100	1290						DN 32			95	20,4	24,0
1500	1700	75	75	219,1		247	PN 6	42,4	42,4	115	28,1	33,0
2000	2200						DIN 2631			145	37,4	44,0

Consult Teknotherm for full specification for your project.

Type SKN: Shell & Tube design for ammonia refrigerants, cooled by seawater or freshwater.

Condenser Shell: This is made of seamless steel tubes in marine quality P235GH according to Det Norske Veritas' and mostly other classification societies' requirements.

Tube End Plates: These are plates in stainless steel AISI 316L and are electrically welded to the condenser shell. The holes for the tubes are exactly made with grooves to assure a safe tightening when tubes are rolled in.

The tubes are made of titanium Grade 2. ASTM 338. Titanium is extremely qualified in resisting corrosion from sea water and brackish water.

Supporting Plates: For support of the tubes and to avoid vibration and noise, supporting plates are mounted in the condenser.

Water end covers: The water end covers are in standard design in cast iron, and are made for flange connections. For corrosion protection the water end covers are equipped with corrosion plugs. The larger models will have endcovers in hot dipped galvanized steel.

Connections: For the refrigerant side, the condensers are prepared with steel connections for welding steel tubes. For the water connections standard flanges are used, PN 10 - 16 for the bigger types, and PN 6 for the smallest. The condensers are further equipped with connections for safety valve, for gas equalization to possible receiver, for liquid level glass and for water valve.

Pressure and leakage testing: This is performed according to Det Norske Veritas' and mostly other classification societies' requirements. After testing, the condenser is sealed and charged with nitrogen gas with a small overpressure. The condenser external surface is painted with rust protecting paint.



CONDENSER SELECTION

Rating tables for condenser capacities are worked out covering all conditions. To select a condenser, the following data must be known:

- * Condenser capacity (kW)
- * Condensing temperature (°C)
- * Water temperature inlet (°C)
- * Water type (Fouling)
- * Water amount allowed used (L/min.)

Selection procedure:

- Condenser capacity is calculated in kW/°C difference between condensing temperature and water inlet temperature, and we get the condenser loading factor.

$$\text{Condensing loading factor} = \frac{\text{Condenser capacity in kW}}{\text{Cond. temp.} - \text{Water inlet temp.}}$$

The capacities are calculated with fouling 0,000086 and 0,000172 m²/°C/W. The first figure is for seawater and the second figure is for brackish water and fresh water.

- Entering the tables, the condenser capacity can be determined according to this equation:

$$\text{Condenser capacity} = \text{loading factor} \times (\text{condensing temperature} - \text{water inlet temperature}).$$

- Water temperature outlet =

$$\text{water temperature inlet} + \frac{\text{Condenser capacity} \times 860}{\text{l/min.} \times 60}$$

The loading factor is for each condenser calculated for 4 different water amounts and K-values. Pressure loss in m. W.G. is given in the table for the water amount in question. Interpolation between loading factor and water amount as well as scale factor is allowed.

Type SKN 2 pass	Cooling surface m ²	Press. loss m WG	l/min	Cond. loading factor kW °C		Type SKN 2 pass	Cooling surface m ²	Press. loss m WG	l/min	Cond. loading factor kW °C	
				0,000086	0,000172					0,000086	0,000172
8.5/8" F45	3,92	0,12	113	3,75	3,45	16" F175	20,48	0,14	439	17,77	16,48
L 1500		0,47	226	5,71	5,02	0,53		878	27,77	24,68	
		1,06	342	7,01	6,00	1,18		1329	34,60	29,88	
	2,69	549	8,53	7,08	3,01	2134	42,77	35,73			
8.5/8" F45	5,27	0,14	113	4,57	4,24	16" F175	25,70	0,15	439	20,32	19,01
L 2000		0,53	226	7,14	6,35	0,59		878	32,55	29,18	
		1,19	342	8,90	7,68	1,31		1329	41,13	35,81	
	3,03	549	10,99	9,19	3,34	2134	51,55	43,38			
8.5/8" F45	6,61	0,15	113	5,22	4,89	16" F175	30,92	0,17	439	22,36	21,08
L 2500		0,59	226	8,37	7,50	0,65		878	36,64	33,13	
		1,32	342	10,58	9,21	1,44		1329	46,92	41,19	
	3,37	549	13,25	11,16	3,69	2134	59,60	50,51			
8.5/8" F45	7,95	0,17	113	5,75	5,42	16" F175	36,15	0,19	439	23,99	22,78
L 3000		0,65	226	9,42	8,52	0,71		878	40,15	36,59	
		1,45	342	12,06	10,59	1,58		1329	52,06	46,05	
	3,7	549	15,32	12,99	4,03	2134	66,98	57,16			
10.3/4" F72	6,28	0,2	181	6,00	5,51	18" F227	41,37	0,2	439	25,30	24,18
L 1500		0,79	361	9,13	8,04	0,77		878	43,16	39,62	
		1,8	547	11,21	9,60	1,71		1329	56,62	50,45	
	3,02	712	12,57	10,57	4,36	2134	73,75	63,36			
10.3/4" F72	8,42	0,22	181	7,31	6,78	18" F227	39,76	0,16	564	28,75	27,10
L 2000		0,85	361	11,43	10,15	0,59		1129	47,11	42,59	
		1,93	547	14,24	12,29	1,32		1709	60,32	52,95	
	3,24	712	16,10	13,65	4,53	3214	82,07	68,76			
10.3/4" F72	10,57	0,24	181	8,36	7,82	18" F227	46,48	0,17	564	30,85	29,29
L 2500		0,92	361	13,39	12,01	0,65		1129	51,62	47,04	
		2,05	547	16,92	14,74	1,45		1709	66,93	59,21	
	3,46	712	19,29	16,48	4,99	3214	92,59	78,08			
10.3/4" F72	12,72	0,25	181	9,20	8,67	18" F227	53,19	0,19	564	32,53	31,09
L 3000		0,98	361	15,08	13,63	0,71		1129	55,49	50,94	
		2,2	547	19,30	16,95	1,58		1709	72,80	64,87	
	3,69	712	22,18	19,09	5,44	3214	102,34	86,84			
12.3/4" F105	9,15	0,17	263	8,75	8,04	22" F342	61,85	0,16	878	44,72	42,16
L 1500		0,66	527	13,32	11,72	0,61		1756	73,29	66,26	
		1,5	797	16,35	14,00	1,36		2658	93,84	82,37	
	2,48	1031	18,29	15,38	4,27	4731	124,73	104,91			
12.3/4" F105	12,29	0,19	263	10,66	9,89	22" F342	72,30	0,18	878	47,99	45,56
L 2000		0,72	527	16,66	14,81	0,67		1756	80,30	73,18	
		1,63	797	20,76	17,93	1,49		2658	104,12	92,10	
	2,69	1031	23,41	19,85	4,68	4731	140,54	118,99			
12.3/4" F105	15,42	0,2	263	12,19	11,40	22" F342	82,74	0,2	878	50,61	48,36
L 2500		0,78	527	19,53	17,51	0,73		1756	86,31	79,25	
		1,76	797	24,68	21,49	1,63		2658	113,24	100,91	
	2,91	1031	28,05	23,97	5,1	4731	155,13	132,19			
12.3/4" F105	18,55	0,22	263	13,41	12,65	24" F424	0,00	0,16	0	0,00	0,00
L 3000		0,84	527	21,99	19,88	0,61		878	47,99	45,56	
		1,9	797	28,15	24,71	1,36		1756	80,30	73,18	
	3,13	1031	32,24	27,76	4,27	2658	104,12	92,10			
14" F134	11,68	0,16	336	11,17	10,26	24" F424	82,74	0,18	878	50,61	48,36
L 1500		0,61	672	17,00	14,96	0,67		1756	86,31	79,25	
		1,38	1018	20,87	17,86	1,49		2658	113,24	100,91	
	2,34	1335	23,47	19,72	4,68	4731	155,13	132,19			
14" F134	15,68	0,17	336	13,60	12,62	24" F424	0,00	0,2	0	0,00	0,00
L 2000		0,67	672	21,27	18,89	0,73		0	0,00	0,00	
		1,51	1018	26,50	22,88	1,63		0	0,00	0,00	
	2,56	1335	30,06	25,47	5,1	0	0,00	0,00			
14" F134	19,68	0,19	336	15,56	14,55	24" F424	0,00	0,16	0	0,00	0,00
L 2500		0,73	672	24,92	22,34	0,61		878	47,99	45,56	
		1,64	1018	31,49	27,42	1,36		1756	80,30	73,18	
	2,79	1335	36,03	30,76	4,27	2658	104,12	92,10			
14" F134	23,68	0,21	336	17,12	16,14	24" F424	0,00	0,16	35	1,49	1,39
L 3000		0,79	672	28,06	25,37	0,52		70	2,35	2,09	
		1,77	1018	35,93	31,54	1,15		106	2,94	2,55	
	3,02	1335	41,43	35,64	6,58	255	4,23	3,45			

Notes:

The connections for refrigerant for the gas- and liquid side are pipe connections intended for welding. Flanges for welding or soldering can be delivered at an additional price. For connections for water, all types are delivered with flange connections. Pumping down capacity is based on appr. 85% free volume.

Type SKN 4 pass	Cooling surface m ²	Press. loss m WG	l/min	Cond. loading factor kW °C	
				0,000086	0,000172
8 5/8" F28 L 1100	1,77	0,13	35	1,49	1,39
L 1100		0,52	70	2,35	2,09
		1,15	106	2,94	2,55
	6,58	255	4,23	3,45	
8 5/8" F28 L 1500	2,44	0,16	35	1,78	1,67
L 1500		0,61	70	2,91	2,63
		1,36	106	3,72	3,26
	7,79	255	5,55	4,57	
8 5/8" F40 L 1100	2,53	0,16	50	2,13	1,98
L 1100		0,61	100	3,36	2,99
		1,37	152	4,20	3,64
	3,83	255	5,31	4,43	
8 5/8" F40 L 1500	3,49	0,19	50	2,54	2,39
L 1500		0,71	100	4,15	3,75
		1,58	152	5,31	4,66
	4,42	255	6,87	5,80	