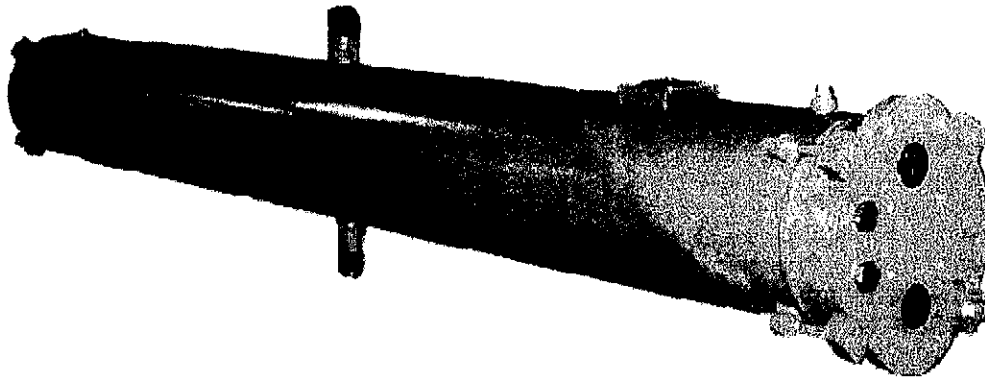


Flexibility is our strength



WATERCOOLED CONDENSER

Type SK8: Shell & Tube design for halocarbon refrigerants, cooled by seawater or freshwater. (Type SKN for ammonia on request.)

Condenser Shell: This is made of seamless steel tubes in marine quality RSt.35 according to Det Norske Veritas' and mostly other classification societies' requirements.

Tube End Plates: These are plates in stainless steel SIS 2343 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 aluminium-brass in the well known alloy for sea water, 76% copper, 2% aluminium and 22% zinc. This alloy has turned out to be extremely qualified in resisting corrosion from sea water and brackish water. The tubes are in high capacity construction with external fins and internal grooves made from the tube itself. Outside surface is then increased considerably, and thereby efficiency is increased, and we get a compact, efficient condenser.

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. If wanted, the water end covers can be delivered in marine brass.

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.

SK8-condensers from Teknotherm are constructed with the following important details to be observed:

1. **Small dimensions** by using high capacity condenser tubes with external finned surface. The ratio inside/outside surface is approx. the same ratio as the heat transfer figures outside/inside.
2. **Materials in tubes and end plates** against the water side are chosen to give a smallest possible corrosion at the electrolytic action, which arises when seawater is used. The combination of the selected materials, aluminium-brass and stainless steel for the quality used here, gives little voltage difference and thereby little electrolytical corroion. As a further protection the water endcovers are equipped with zinc or soft iron corrosion plugs.
3. **Gas inlet:** The condenser has one gas inlet only and inside distribution of the gas.
4. **Liquid outlet:** The condenser has as standard one outlet dimensioned to cover the various types max. capacity.
5. **Flange-connections on the waterside for all types:**
The water is going in 2 passes for all bigger sizes of condensers. This is suitable for ship and cooling tower with small temperature rise of water.
2 types, SK8-8.5/8" F28 with L1100-L1500 and F40 with L100-L1500 and L2000, are made for 4 passes and are well suited at capacities from 20-100 kW.
6. **All materials** are according to the requirements of Det Norske Veritas and and mostly other classification societies' requirements.
When ordering, certificate can be delivered according to agreement at cost price.
7. **Condenser tubes can be replaced.**

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	(Scale factor)
* Water amount allowed used	(L/min.)

Selection procedure:

1. 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 scale factors 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.

2. Entering the tables, the condenser capacity can be determined according to this equation:
Condenser capacity = loading factor x (condensing temperature - water inlet temperature).
3. 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 SK8 2 pass	Cooling surface m ²	Press. loss m WG	l/min	Cond. loading factor kW °C		Type SK8 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 L 1500	14,22	0,3	115	5,01	4,54	14" F134 L 2000	56,46	0,3	336	17,25	15,88
		0,9	230	7,89	6,70			1,2	673	28,17	24,39
		2	346	9,80	8,05			2,6	1009	35,76	29,88
		3,5	461	11,15	8,93			4,6	1345	41,26	33,57
8.5/8" F45 L 2000	19,37	0,3	115	5,91	5,45	14" F134 L 2500	71,34	0,4	336	19,08	17,83
		1,1	230	9,66	8,36			1,4	673	32,20	28,35
		2,3	346	12,26	10,25			2,7	1009	41,66	35,36
		4	461	14,15	11,51			5,1	1345	48,70	40,20
8.5/8" F45 L 2500	24,22	0,3	115	6,51	6,08	14" F134 L 2750	78,79	0,4	336	19,78	18,61
		1,2	230	10,97	9,66			1,5	673	33,87	30,06
		2,6	346	14,19	12,04			3,1	1009	44,22	37,82
		4,5	461	16,58	13,68			5,4	1345	52,01	43,24
8.5/8" F45 L 2750	26,79	0,4	115	6,76	6,35	14" F134 L 3000	86,23	0,4	336	20,37	19,26
		1,3	230	11,56	10,25			1,5	673	35,35	31,61
		2,8	346	15,08	12,89			3,3	1009	46,56	40,10
		4,8	461	17,73	14,73			5,6	1345	55,08	46,11
8.5/8" F45 L 3000	29,37	0,4	115	6,97	6,59	16" F175 L 2000	74	0,3	439	22,53	20,74
		1,4	230	12,08	10,79			1,1	878	36,79	31,85
		3	346	15,90	13,69			2,3	1318	46,71	39,02
		5,1	461	18,80	15,73			4	1757	53,88	43,84
10.3/4" F72 L 1500	22,75	0,3	181	7,96	7,21	16" F175 L 2500	93	0,3	439	24,92	23,29
		1,2	361	12,54	10,67			1,2	878	42,05	37,02
		2,7	542	15,61	12,83			2,6	1318	54,41	46,18
		4,7	723	17,77	14,25			4,5	1757	63,60	52,50
10.3/4" F72 L 2000	31	0,4	181	9,36	8,63	16" F175 L 2750	103	0,4	439	25,83	24,30
		1,4	361	15,34	13,30			1,3	878	44,23	39,25
		3	542	19,50	16,31			2,8	1318	57,76	49,39
		5,3	723	22,52	18,35			4,8	1757	67,92	56,47
10.3/4" F72 L 2500	38,75	0,4	181	10,29	9,63	16" F175 L 3000	113	0,4	439	26,60	25,17
		1,6	361	17,40	15,33			1,4	878	46,17	41,28
		3,4	542	22,53	19,14			3	1318	60,80	52,37
		5,8	723	26,35	21,77			5,1	1757	71,93	60,21
10.3/4" F72 L 2750	42,87	0,4	181	10,67	10,05	16" F175 L 3500	132	0,4	439	29,46	28,40
		1,6	361	18,31	16,27			1,6	878	52,13	47,36
		3,5	542	23,94	20,49			3,3	1318	68,83	59,95
		6,1	723	28,17	23,45			5,6	1757	81,76	69,18
10.3/4" F72 L 3000	47	0,5	181	10,99	10,41	16" F175 L 4000	151	0,5	439	28,62	27,61
		1,7	361	19,12	17,11			1,7	878	51,94	47,68
		4	542	25,21	21,74			3,6	1318	70,49	62,35
		6,4	723	29,86	25,02			6,1	1757	85,23	73,17
12.3/4" F105 L 1500	32,58	0,3	264	11,48	10,39	18" F227 L 3000	145	0,4	565	34,20	32,37
		1,1	527	18,06	15,35			1,3	1129	59,36	53,07
		2,4	791	22,45	18,44			2,9	1694	78,17	67,34
		4,2	1054	25,53	20,46			4,9	2259	92,49	77,42
12.3/4" F105 L 2000	44,24	0,3	264	13,52	12,44	18" F227 L 3500	170	0,4	565	35,73	34,17
		1,3	527	22,08	19,11			1,5	1129	63,52	57,59
		2,8	791	28,02	23,41			3,2	1694	84,98	74,22
		4,8	1054	32,33	26,30			5,4	2259	101,69	86,24
12.3/4" F105 L 2500	55,90	0,4	264	14,95	13,97	18" F227 L 4000	195	0,5	565	36,80	35,50
		1,4	527	25,23	22,21			1,7	1129	66,78	61,30
		3,1	791	32,65	27,71			3,5	1694	90,63	80,17
		5,3	1054	38,16	31,50			6	2259	109,58	94,08
12.3/4" F105 L 2750	61,74	0,4	264	15,50	14,58	22" F342 L 3000	225	0,4	878	53,20	50,35
		1,5	527	26,54	23,55			1,4	1757	92,34	82,56
		3,2	791	34,65	29,63			2,9	2635	121,60	104,75
		5,6	1054	40,75	33,88			4,9	3514	143,87	120,43
12.3/4" F105 L 3000	67,57	0,4	264	15,96	15,10	22" F342 L 3500	264	0,4	878	55,57	53,15
		1,6	527	27,70	24,77			1,5	1757	98,81	89,58
		3,4	791	36,48	31,42			3,2	2635	132,20	115,45
		5,8	1054	43,16	36,13			5,5	3514	158,18	134,14
14" F134 L 1500	41,58	0,3	336	14,65	13,26	22" F342 L 4000	303	0,5	878	57,24	55,23
		1,1	673	23,05	19,59			1,7	1757	103,88	95,36
		2,3	1009	28,65	23,53			3,5	2635	140,98	124,70
		4	1345	32,69	26,11			6	3514	170,46	146,35

Type SK8 4 pass	Cooling surface m ²	Press. loss m WG	l/min	Cond. loading factor kW °C		Type SK8 4 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" F28 L 1100	6,09	0,4	35	1,83	1,69	8 5/8" F40 L 1100	8,70	0,4	50	2,61	2,41
		1,4	70	3,00	2,60			1,5	100	4,29	3,72
		3	105	3,82	3,20			3,2	151	5,46	4,57
		5,2	141	4,41	3,60			5,6	201	6,30	5,14
8 5/8" F28 L 1500	8,85	0,5	35	2,12	2,00	8 5/8" F40 L 1500	12,64	0,5	50	3,02	2,86
		1,6	70	3,66	3,27			1,7	100	5,23	4,67
		3,5	105	4,82	4,14			3,7	151	6,88	5,92
		6	141	5,69	4,76			6,4	201	8,13	6,60
8 5/8" F40 L 2000	17,22	0,6	50	3,27	3,15	8 5/8" F40 L 2000	17,22	0,6	50	3,27	3,15
		2,1	100	5,93	5,44			2,1	100	5,93	5,44
		4,4	151	8,04	7,11			4,4	151	8,04	7,11
		7,5	201	9,71	8,34			7,5	201	9,71	8,34

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.

TEKNOTHERM

MARINE AND INDUSTRIAL REFRIGERATION

Consult Teknotherm for full specification for your project.

We reserve the rights to make alterations without notice.

L	Ltot	A	B	C	D	E	F	G	H	Weight appr. kg	Pump down capacity dm ³	Internal net volume ltr.
2-pass SK8-8.5/8" F-45												
1500	1700	1700	1700	2200	2200	2200	2200	2200	2200	140	25.8	30.3
2000	2200	2200	2200	2700	2700	2700	2700	2700	2700	175	34.5	40.6
2500	2700	2700	2700	3200	3200	3200	3200	3200	3200	215	43.4	51.0
2750	2950	2950	2950	3400	3400	3400	3400	3400	3400	230	47.7	56.1
3000	3200	3200	3200	3600	3600	3600	3600	3600	3600	250	52.1	61.3
SK8.10.3/4" F-72												
1500	1700	1700	1700	2200	2200	2200	2200	2200	2200	140	25.8	30.3
2000	2200	2200	2200	2700	2700	2700	2700	2700	2700	175	34.5	40.6
2500	2700	2700	2700	3200	3200	3200	3200	3200	3200	215	43.4	51.0
2750	2950	2950	2950	3400	3400	3400	3400	3400	3400	230	47.7	56.1
3000	3200	3200	3200	3600	3600	3600	3600	3600	3600	250	52.1	61.3
SK8.12.3/4" F-105												
1500	1700	1700	1700	2200	2200	2200	2200	2200	2200	140	25.8	30.3
2000	2200	2200	2200	2700	2700	2700	2700	2700	2700	175	34.5	40.6
2500	2700	2700	2700	3200	3200	3200	3200	3200	3200	215	43.4	51.0
2750	2950	2950	2950	3400	3400	3400	3400	3400	3400	230	47.7	56.1
3000	3200	3200	3200	3600	3600	3600	3600	3600	3600	250	52.1	61.3
SK8.14" F-134												
1500	1700	1700	1700	2200	2200	2200	2200	2200	2200	140	25.8	30.3
2000	2200	2200	2200	2700	2700	2700	2700	2700	2700	175	34.5	40.6
2500	2700	2700	2700	3200	3200	3200	3200	3200	3200	215	43.4	51.0
2750	2950	2950	2950	3400	3400	3400	3400	3400	3400	230	47.7	56.1
3000	3200	3200	3200	3600	3600	3600	3600	3600	3600	250	52.1	61.3
SK8.16" F-175												
2000	2250	2250	2250	2750	2750	2750	2750	2750	2750	115.3	144.5	170.0
2500	2750	2750	2750	3000	3000	3000	3000	3000	3000	144.5	158.2	187.3
2750	3000	3000	3000	3250	3250	3250	3250	3250	3250	158.2	173.8	204.5
3000	3250	3250	3250	3500	3500	3500	3500	3500	3500	173.8	187.3	204.5
SK8.18" F-227												
3000	3250	3250	3250	3500	3500	3500	3500	3500	3500	108.5	215.3	253.3
3500	3750	3750	3750	4000	4000	4000	4000	4000	4000	124.0	251.5	295.9
4000	4250	4250	4250	4500	4500	4500	4500	4500	4500	140.0	287.8	338.6
SK8.22" F-342												
3000	3750	3750	3750	4250	4250	4250	4250	4250	4250	147.0	326.3	383.9
3500	4250	4250	4250	4500	4500	4500	4500	4500	4500	169.0	381.2	448.5
4000	4750	4750	4750	5000	5000	5000	5000	5000	5000	192.0	436.2	513.2
4-pass SK8-8.5/8" F-28												
1100	1290	1290	1290	1700	1700	1700	1700	1700	1700	110	20.4	24.0
1500	1700	1700	1700	2100	2100	2100	2100	2100	2100	135	28.1	33.0
2000	2200	2200	2200	2500	2500	2500	2500	2500	2500	170	37.4	44.0
SK8-8.5/8" F-40												
1100	1290	1290	1290	1700	1700	1700	1700	1700	1700	110	20.4	24.0
1500	1700	1700	1700	2100	2100	2100	2100	2100	2100	135	28.1	33.0
2000	2200	2200	2200	2500	2500	2500	2500	2500	2500	170	37.4	44.0

