ALARKO

Hot Water Storage Tank
Accumulation Tank

Advanced Technology
Excellent Design

COMFORT, RELIABILITY,
AND COST EFFICIENCY ALL TOGETHER...

ALARKO STORAGE TANK

Alarko Storage Tank meets the hot water requirements of 2000's conscious users, with its advanced technology and perfectly designed shape. The result of over half a century of experience in the industry and advanced technology... It provides comfort, reliability, and cost efficiency with a single product. It offers the optimum selection range with 2 models and 23 types in the volume range of 100-3000 liter for villas, apartment blocks, hospitals, hotels, or workplaces. Ergonomic, easy to assemble, use and maintain.

Long-Lasting and Hygienic

Inner surface 200–500 micron enameled. (DIN 4753-3 standard min. 150 microns.)

Full Quality Control

Safety provided by one-to-one control with 13 bar test pressure during production.

Elegant and Modern

Cylindrical structure. Polyethylene coating for 100-500 liter types, vinlex-imitation leather for 800 and above types.

Complies With European Standards

Fully compliant with EN 12897 standard with its production principles, durability, and efficiency values.

Corrosion Resistant

Cathodic protection is provided through a magnesium anode installed in the tank. The device is protected against chemical and electrochemical reactions, and metal wear is prevented.

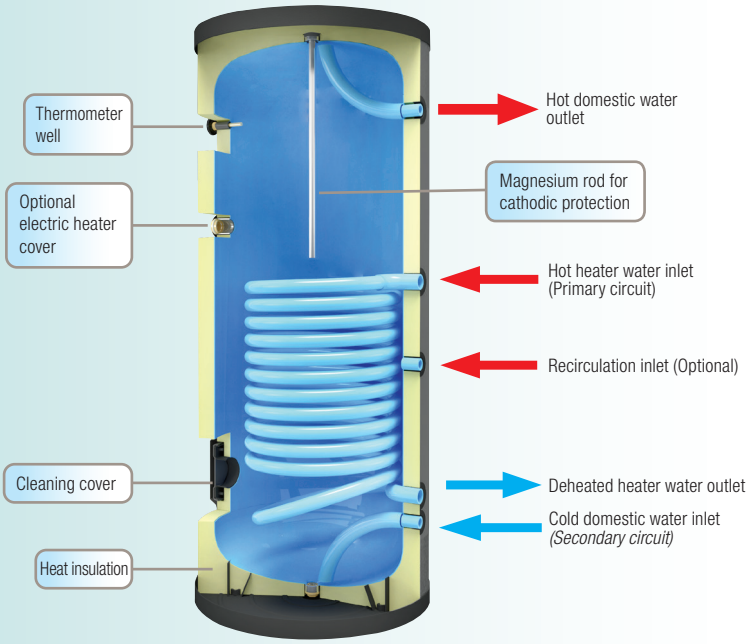
Excellent Insulation

Rigid polyurethane foam insulation with 50 mm thickness for 100-500 liter boilers (~42 kg/m³), and soft polyurethane foam insulation with 80 mm thickness for 800-2,000 liter boilers (~15 kg/m³).

Rigid polyurethane foam boiler heat loss - 1°C/24 hours Soft polyurethane foam boiler heat - 4-6°C/24 hours

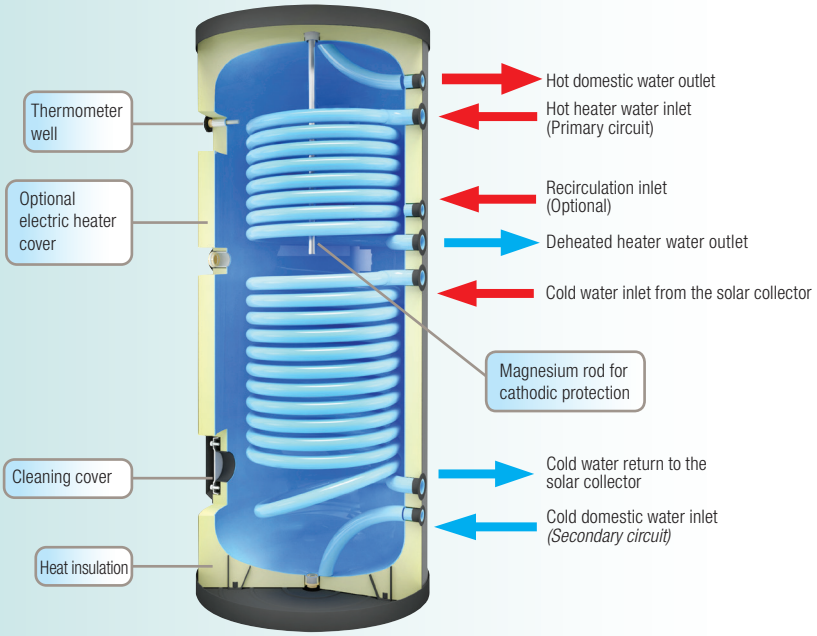
Single Coil Tank

Hot water or steam is used as the heating fluid. The heat of the heating fluid is transferred to domestic water by a coil with a large section and large heat transfer surface.
Tank installation controlled by pump only works when needed.



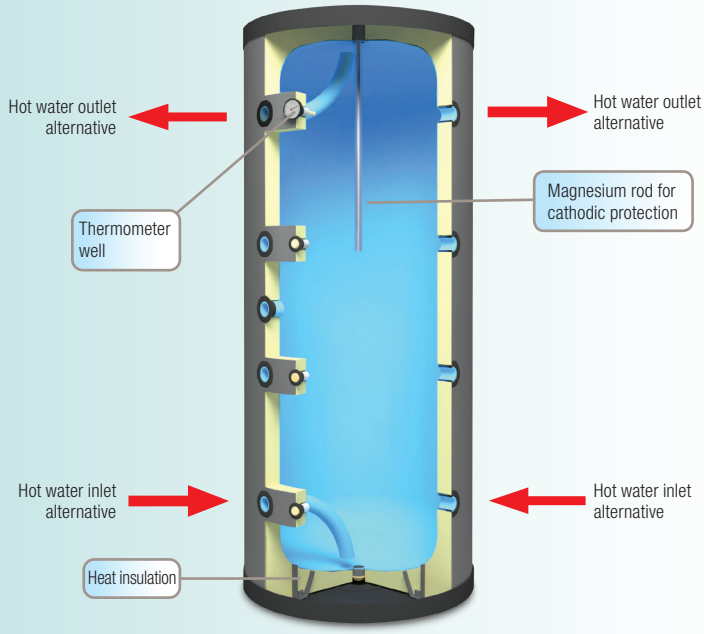
Double Coil Tank

Double coil tank allows maximum utilization of solar energy during hot water supply from heater or steam boiler. One coil in the tank is connected to the solar energy system. It transfers the hot water heat from the solar energy system to the domestic water. If the hot domestic water is heated to the set degree the tank connected to the other coil is not activated. If the desired temperature is not reached, the boiler is activated and provides the missing energy. Therefore, double coil tanks provide hot water very economically in western and southern climates, which get more sunlight during winter.



Accumulation Tank

Accumulation tanks are used in villas and buildings to store process water below 95°C in hygienic conditions with minimum heat loss. It can be connected to the installation from left or right side.



PERFORMANCE TABLES

Table 1: Single Coil Tank (ASB 1) Capacity Table

Table 1-a) Tank Circuit: Cold water inlet → 10°C / Hot water outlet → Continous Capacities For 60°C

Heating coil circuit	Tank model	ASB-1	100	160	200	300	500	800	1000	1500	2000	2500	3000
90 → 70 °C	Tank flow rate	l/h	280	400	620	620	1080	1560	1560	2000	2580	3361	3881
	Tank power	kW	16.3	23.3	36.1	36.1	62.8	90.7	90.7	116.3	150.0	195.4	225.6
	Coil flow rate	m³/h	0.7	1.0	1.6	1.6	2.8	4.0	4.0	5.1	6.6	8.6	10.0
	Coil resistance	mSS	0.03	0.02	0.10	0.10	0.37	0.98	0.98	1.98	3.96	3.72	5.73
80 → 60 °C	Tank flow rate	l/h	178	238	380	380	680	1020	1020	1300	1680	2200	2560
	Tank power	kW	10.4	13.8	22.1	22.1	39.5	59.3	59.3	75.6	97.7	127.9	148.9
	Coil flow rate	m³/h	0.5	0.6	1.0	1.0	1.7	2.6	2.6	3.3	4.3	5.6	6.5
	Coil resistance	mSS	0.01	0.01	0.03	0.03	0.17	0.40	0.40	0.91	1.76	1.75	2.61
70 → 50 °C	Tank flow rate	l/h	88	110	190	190	360	566	566	740	960	1260	1480
	Tank power	kW	5.1	6.4	11.0	11.0	20.9	32.9	32.9	43.0	55.8	73.3	86.1
	Coil flow rate	m³/h	0.2	0.3	0.5	0.5	0.9	1.4	1.4	1.9	2.4	3.2	3.8
	Coil resistance	mSS	0.01	0.01	0.01	0.01	0.04	0.19	0.19	0.36	0.62	0.67	0.88

Table 1-b) Tank Circuit: Cold water inlet → 10°C / Hot water outlet → Continuous Capacities For 45°C Heat Pump

Heating coil circuit	Tank model	ASB-1	100	160	200	300	500	800	1000	1500	2000	2500	3000
55 → 50 °C Heat pump	Tank flow rate	l/h	146	195	300	300	513	729	729	933	1006	1341	1341
	Tank power	kW	5.8	7.8	12.0	12.0	20.5	29.1	29.1	37.2	40.1	53.5	53.5
	Coil flow rate	m³/h	1.0	1.4	2.1	2.1	3.6	5.1	5.1	6.5	7.0	9.3	9.3
	Coil resistance	mSS	0.06	0.05	0.14	0.14	0.61	1.58	1.58	3.16	4.62	4.47	5.12

Table 2: Double Coil Tank (ASB 2) Top Coil Capacity Table

Table 2-a) Tank Circuit: Cold water inlet → 10°C / Hot water outlet → Continous Capacities For 60°C

Heating coil circuit	Tank model	ASB-2	160	200	300	500	800	1000	1500	2000	2500	3000
90 → 70 °C	Tank flow rate	l/h	180	244	244	628	700	700	700	1170	1440	1788
	Tank power	kW	10.5	14.2	14.2	36.5	40.7	40.7	40.7	68.0	83.7	104.0
	Coil flow rate	m³/h	0.5	0.6	0.6	1.6	1.8	1.8	1.8	3.0	3.7	4.6
	Coil resistance	mSS	0.01	0.01	0.01	0.10	0.13	0.13	0.13	0.48	0.36	0.64
80 → 60 °C	Tank flow rate	l/h	96	140	140	388	440	440	440	750	920	1150
	Tank power	kW	5.6	8.1	8.1	22.6	25.6	25.6	25.6	43.6	53.5	66.9
	Coil flow rate	m³/h	0.2	0.4	0.4	1.0	1.1	1.1	1.1	1.9	2.4	2.9
	Coil resistance	mSS	0.01	0.01	0.01	0.03	0.05	0.05	0.05	0.22	0.18	0.33
70 → 50 °C	Tank flow rate	l/h	34	52	52	196	224	224	224	404	636	636
	Tank power	kW	2.0	3.0	3.0	11.4	13.0	13.0	13.0	23.5	37.0	37.0
	Coil flow rate	m³/h	0.1	0.1	0.1	0.5	0.6	0.6	0.6	1.0	1.6	1.6
	Coil resistance	mSS	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.12	0.15

Table 2-b) Tank Circuit: Cold water inlet → 10°C / Hot water outlet → Continuous Capacities For 45°C Heat Pump

Heating coil circuit	Tank model	ASB-1	160	200	300	500	800	1000	1500	2000	2500	3000
55 → 50 °C Isı pompası	Tank flow rate	l/h	265	335	335	869	1006	1006	1006	1006	1341	1341
	Tank power	kW	10.6	13.4	13.4	34.7	40.1	40.1	40.1	40.1	53.5	53.5
	Coil flow rate	m³/h	1.8	2.3	2.3	6.0	7.0	7.0	7.0	7.0	9.3	9.3
	Coil resistance	mSS	0.11	0.20	0.20	2.49	4.42	4.42	5.15	6.90	6.54	7.63

NOTES (For Table 1 and 2):
01) Tank flow rate and power values in the tables are applicable if a circulation pump large enough to provide coil flow rate and resistances are used.
02) The table above is given for the top coil of the double coil tank. The capacity of the bottom coil to be used by the solar panel is not included. In case of the bottom coil is used by another energy source other than solar energy, ASB1 tank values can be used as examples.

Table 3: Recommendations for Tank Use in Solar Energy

Table 3-a) Selection For Year-Round Use Of The System

m²	2.2 - 3.0	3.5 - 4.5	4.5 - 6.0	6.5 - 10.0	11.0 - 17.0	18.0 - 21.0	22.0 - 32.0
Tank volume (l)	100	160	200	300	500	800	1000

m²	33.0 - 43.0	44.0 - 54.0	55.0 - 65.0	66.0 - 87.0	88.0 - 109.0	110.0 - 136.0
Tank volume (l)	1500	2000	2500	3000	4000	5000

EXAMPLE: In year-round use, 800 l volume boiler or accumulation tank is suitable for 18-21 m² solar collector.

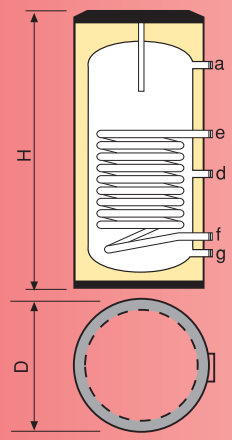
Table 3-b) Selection For Summer Use Of The System

m²	1.8 - 2.2	2.9 - 3.5	3.6 - 5.0	5.5 - 8.4	8.5 - 13.0	14.0 - 17.0	18.0 - 25.0
Tank volume (l)	100	160	200	300	500	800	1000

m²	26.0 - 34.0	35.0 - 44.0	45.0 - 53.0	54.0 - 66.0	67.0 - 88.0	89.0 - 110.0
Tank volume (l)	1500	2000	2500	3000	4000	5000

EXAMPLE: In mainly summer use, 1500 l volume tank or accumulation tank is suitable for 26-34 m² solar collector.

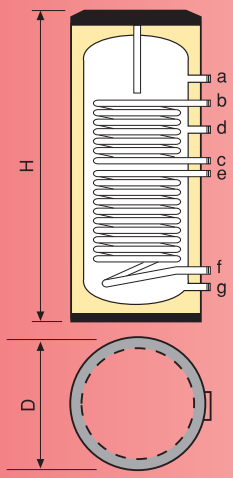
NOTES (For Table 3):
The volumes given in the tables above are for SINGLE COIL models. The volumes should be increased by 40-50% in DOUBLE COIL tank is selected.
m²: Maximum net suction area of the solar collector with Cu/Cu-selective surface and prismatic glass that can be connected to the tank.
m³/h: Required circulation pump flow rate to provide m² and kW values given above.
The values given in the table above are calculated according to the monthly averages of the annual data of the Turkish Republic Directorate General of Meteorology for the Aegean and Mediterranean Regions and may vary ±15% yearly.



Single Coil ASB - 1

Model	100	160	200	300	400	500	800	1.000	1.500	2.000	2.500	3.000
Volume l	100	160	200	300	400	500	800	1.000	1.500	2.000	2.500	3.000
Diameter (D) mm	490	590	590	700	750	750	900	1.000	1.120	1.260	1.460	1.460
Height (H) mm	1.080	1.125	1.320	1.210	1.450	1.800	2.100	2.070	2.300	2.230	2.200	2.560
Heater Inlet - Outlet (e-f)	1"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"
Domestic Water Inlet- Outlet (a-g)	¾"	¾"	¾"	1"	1"	1"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"
Recirculation (d)	¾"	¾"	¾"	1"	1"	1"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"
Packaged Weight Without Water kg	66	87	105	118	151	189	351	269	366	579	695	818

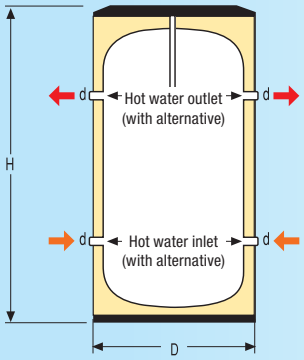
The maximum operating temperature is 120°C for the heating fluid circuit, and 70°C for the domestic water circuit.
The maximum operating pressure of the heating fluid circuit is 18 bar for hot water, 1 bar for steam, and 8 bar for the domestic water circuit.



Double Coil ASB - 2

Model	160	200	300	400	500	800	1.000	1.500	2.000	2.500	3.000
Volume l	160	200	300	400	500	800	1.000	1.500	2.000	2.500	3.000
Diameter (D) mm	590	590	700	750	750	900	1.000	1.120	1.260	1.460	1.460
Height (H) mm	1.125	1.320	1.210	1.450	1.800	2.100	2.070	2.300	2.230	2.200	2.560
Heater Inlet - Outlet (b-c)	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"
Domestic Water Inlet - Outlet (e-f)	1 ¼"	1 ¼"	1"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"
Domestic Water Inlet- Outlet (g-a)	¾"	¾"	1"	1"	1"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"
Recirculation (d)	¾"	¾"	1"	1"	1"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"
Packaged Weight Without Water kg	91	108	127	165	218	280	304	405	625	709	903

The maximum operating temperature is 120°C for the heating fluid circuit, and 70°C for the domestic water circuit.
The maximum operating pressure of the heating fluid circuit is 18 bar for hot water, 1 bar for steam, and 8 bar for the domestic water circuit.



Hot Water Accumulation Tank - AAT

Type	100	160	200	300	400	500	800	1.000	1.500	2.000	2.500	3.000	4.000	5.000
Volume l	100	160	200	300	400	500	800	1.000	1.500	2.000	2.500	3.000	4.000	5.000
Diameter (D) mm	490	590	590	700	750	750	900	1.000	1.120	1.260	1.460	1.460	1.660	1.660
H mm	1.080	1.125	1.320	1.210	1.450	1.800	2.100	2.070	2.300	2.230	2.220	2.540	2.665	3.100
d	1"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ¼"	1 ½"	1 ½"	1 ½"	1 ½"	2"	2"	3"	3"
Packaged Weight Without Water kg	53	68	78	94	124	147	193	211	295	489	573	677	738	858

Maximum operating temperature is 90°C, and maximum operating pressure is 8 bar.

Table 4: Average hot water need at consumption points for 60°C water (l/h)

	Villa	Building	Hospital	Hotel	Workplace	School	Factory
Personal Lavatory	7.5 - 9	7.5 - 9	7.5 - 9	7.5 - 9	7.5 - 9	7.5 - 9	7.5 - 9
Public Lavatory	-	15 - 28	20 - 27	30 - 36	23 - 27	50 - 68	40 - 54
Bathroom	90 - 250	76 - 250	76 - 250	76 - 250	-	-	-
Dishwasher	40 - 68	40 - 68	160 - 680	160 - 760	-	75 - 450	75 - 450
Kitchen sink	35 - 45	35 - 45	70 - 90	70 - 136	38 - 90	35 - 90	70 - 90
Washing machine	70 - 90	70 - 90	75 - 126	75 - 126	-	-	-
Shower	136 - 250	114 - 250	250 - 340	250 - 340	114 - 136	250 - 1000	750 - 1000
Use diversity factor	(1)	(1)	0.25	0.25	0.3	0.4	0.4
Storage factor	0.70	1.25	0.60	0.80	2.00	1.00	1.00

(1) Use diversity factor for villas and residences will be taken from Table 5.

Table 5: Use diversity factor for residences (TSE1258)

Residences	1	5	10	15	20	30	40	50	80	120	150	200
Use diversity factor	1.00	0.55	0.49	0.45	0.4	0.36	0.34	0.32	0.30	0.30	0.30	0.30

IMPORTANT NOTES:

01) Dishwasher and washing machine hot water need values given in the table above are not taken into account for new machines as they heat the water themselves and don't take it from outside. Also, although it is given in the table, shower hot water need values are taken into account instead of bath hot water need values depending on the application habit changes.

02) Since the tank power tables are given according to tank operation at 10/60°C, hot water usage should also be determined as 60°C.

Hot water use temperatures in the shower and mixer after mixing the hot water are taken as 45°C.

Mixed hot water consumption with the tank at 60°C;

For 40°C multiplied by 0.6

For 45°C multiplied by 0.7 (45°C value is used mostly)

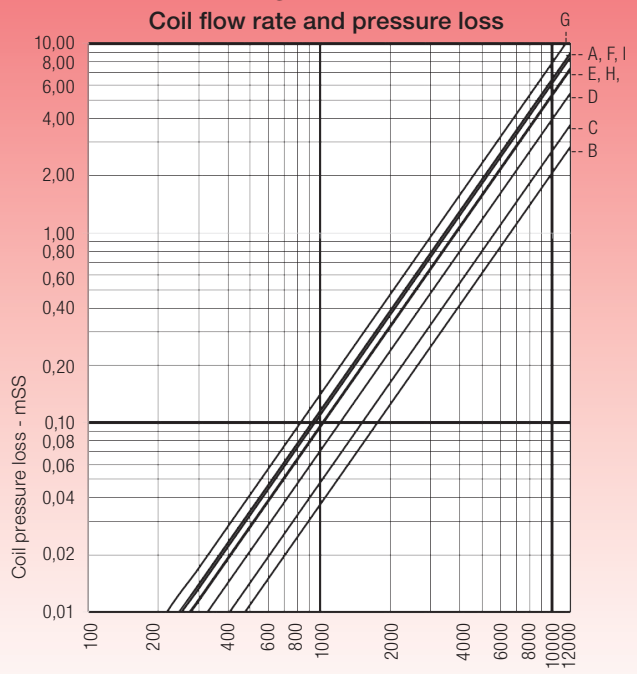
to get water flow rate at 60°C and this value is taken as basis when selecting the tank.

Accordingly, if hot water amount is given as 1500 l/h for 45°C, water flow rate at 60°C as the basis for selecting the tank is 1500 x 0.7 = 1050 l/h.

The values in table 4 are consumption values for 60°C, and cannot be used for 45°C.

Since tank temperature will be 45°C maximum when using a low temperature heat pump, hot water consumption amount for 45°C is directly used for selecting the tank.

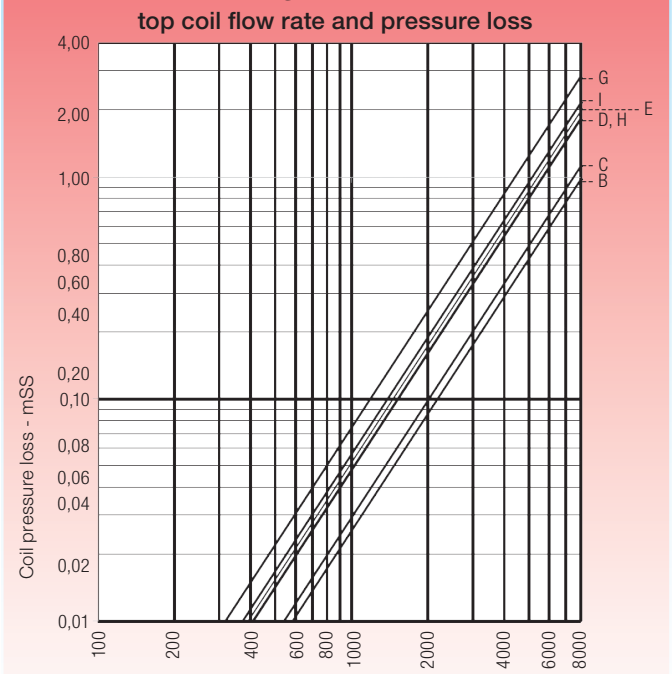
ASB-1 TANK
Coil flow rate and pressure loss



Coil heating water flow rate - l / h

A..ASB-1/100 B..ASB-1/KBS160 C..ASB-1/200-300
D..ASB-1/500 E..ASB-1/800-1000 F..ASB-1/1500
G..ASB-1/2000 H..ASB-1/2500 I..ASB-1/3000

ASB-2 TANK
top coil flow rate and pressure loss



Coil heating water flow rate - l / h

B..ASB-2/160 C..ASB-2/200-300
D..ASB-2/500 E..ASB-2/800-1000-1500
G..ASB-2/2000 H..ASB-2/2500 I..ASB-2/3000

1. WATER QUALITY:

Properties for the water used in the tank

It must comply with regulation on water intended for human consumption of Turkish Republic Ministry of Health. (Regulation of 07/03/2013-28580)

In summary, to minimize the corrosion damage, domestic water chemical properties should be within the limit values given in the adjacent table.

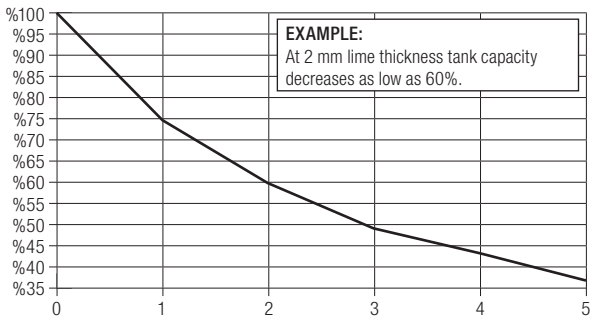
Water chemical properties for tank warranty terms

	Limit values
pH	6,5 - 9,5
Conductivity at 20°C	50 - 500 µS/cm
Total hardness	10 - 20 °Fr (*)
	(5,5 - 11 °dH, 100 - 200 ppm)
Chloride (Cl)	≤250 mg/l
Sulphate (SO42-)	≤250 mg/l
Hydrogen carbonate (HCO^3)	70 - 300 mg/l
Free chlorine gas (Cl^2)	< 1 mg/l (in 5 hours)

* 1 French degree (°F) = 0,56 German degree (°dH) = 10 $CaCO_3$ (ppm)

Domestic water hardness values

The maximum total hardness value allowed within the water is 10-20 °F as given in the table above. On certain temperatures where the hot-cold balance of calcium (calcium carbonate $CaCo_3$), Magnesium (magnesium carbonate $MgCO_3$) minerals in water is disrupted, crystallization and therefore lime formation occurs. Lime formation on metal surfaces begins at a water temperature of about 25°C - 40°C depending on the Ca and Mg amount and increases at an equal rate as the temperature. In hot water applications, the negative effect of lime formation on heater surfaces on heat transfer and the capacity drop rates are given in the graph below.

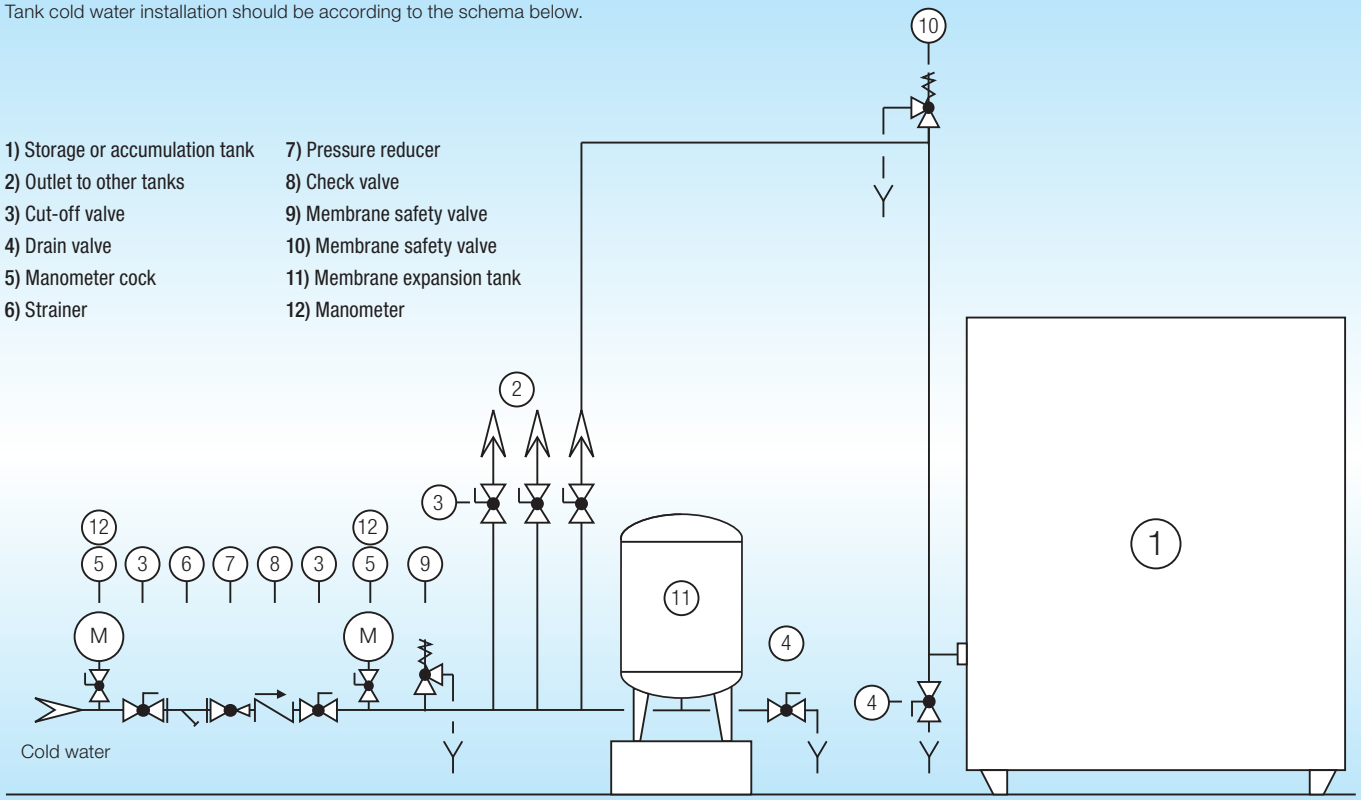


2. ASSEMBLY:

Tank cold water supply system cold water installation schema and armatures (DIN1988)

Tank cold water installation should be according to the schema below.

1) Storage or accumulation tank
2) Outlet to other tanks
3) Cut-off valve
4) Drain valve
5) Manometer cock
6) Strainer
7) Pressure reducer
8) Check valve
9) Membrane safety valve
10) Membrane safety valve
11) Membrane expansion tank
12) Manometer



Dimensions for membrane safety valve and expansion tank that should be used for tank inlet is given below.

Safety valve dimension for systems working with hot water according to tank volume

Storage or accumulation tank volume (l)	≤ 200	201 - 800	1000 - 5000	5001 - 10000	> 10000
Membrane safety valve dimension	½"	¾"	1"	1 ¼"	1 ½"

Tank safety valve maximum opening pressure is 8 bar.

Expansion tank selection according to total tank volume

Total tank volume (l)	≤ 200	201 - 500	501 - 1000	1001 - 2000	2001 - 3000
Expansion tank volume (l)	24	50	80	150	300

Total tank volume (l)	3001 - 5000	5001 - 8000	8001 - 12000	12001 - 15000	15001 - 20000
Expansion tank volume (l)	500	750	1000	1500	2000

Expansion tank volumes are for 10/60°C water temperatures, storage tank and other installation elements with 10 bar resistance, 6 bar cold water maximum inlet pressure, and safety valve use with 8 bar nominal opening pressure. Expansion tank gas pressure must be set to 6.2 bar.

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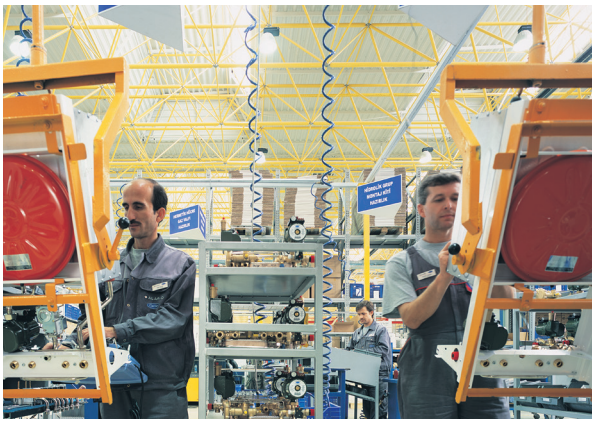
ALARKO CARRIER GEBZE COMPLEX - ACGK

ACGK has a closed area of 36,800 m² on a 60,500 m² land in Gebze Organized Industrial Zone. Construction of the complex started on July 1, 1999 and completed on November 1, 2000.

Air handling unit and Roof-top is produced under Carrier brand at the ISO 9001, ISO 14001, ISO 50001, SA 8000, OHSAS 18000 certified Main Production Facility of the Alarko Carrier, which renovated its production technology and modernized its organization. Combi boilers, burner, submersible pump, circulation pump, and booster pump are also produced at this facility under Alarko brand, and panel radiators are produced at Radiator Production Facility with 18,000 m² open and 9,250 m² closed area in Dudullu Organized Industrial Zone.



ALARKO

Carrier

ALARKO CARRIER SANAYİ VE TİCARET A.Ş.

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