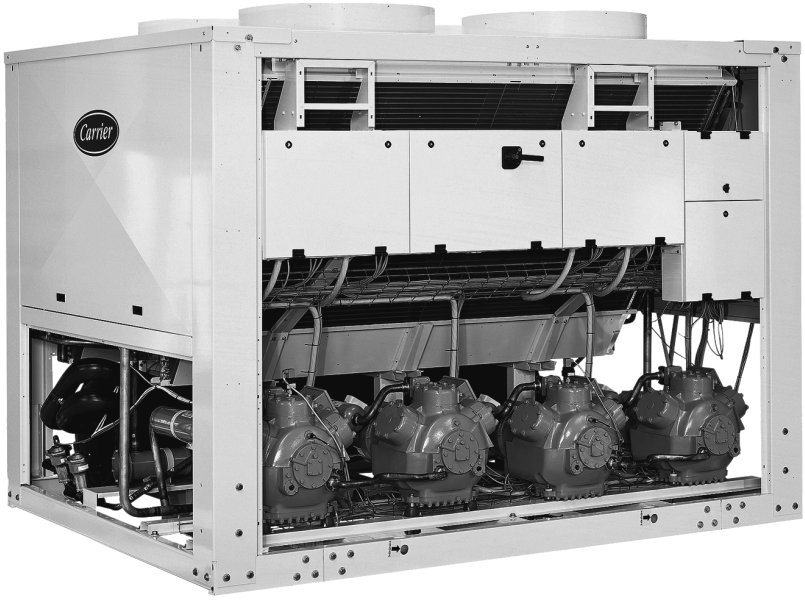
Carrier

Air-Cooled Liquid Chillers

PRO-DIALOG PLUS



Carrier is participating in the Eurovent Certification Programme. Products are as listed in the Eurovent Directory of Certified Products.

Quality Management System Approval

HFC-407C

30GK

Nominal cooling capacity 238-725 kW

The 30GK series of air-cooled liquid chillers is designed for operation with refrigerant HFC-407C to meet new environmental protection requirements. These chillers feature extra-quiet operation and a new ecological refrigerant, and offer an ideal solution for chilled water production.

Features

- The new, ecological refrigerant HFC-407C has an ozone depletion potential of zero and is not affected by international regulations on the usage of CFCs and their derivatives. This new refrigerant ensures similar performances to HCFC-22 and offers an economical solution to environmental protection problems.
  HFC-407C is a blend of HFC-32, 125 and 134a. As it is produced and distributed world-wide, it is widely available.
  These new HFC-407C chillers have been designed using specific refrigeration components and new production methods and are backed by thousands of hours of laboratory and field tests. This allows Carrier to offer tomorrow's chiller technology today.
- Low-noise operation. The new version of the second-generation revolutionary, low-noise, shrouded axial Flying Bird fan is made of a composite plastic material which is fully recyclable. Together with a further reduction of compressor noise transmission (discharge muffler, anti-vibration mountings), this results in a uniform chiller sound spectrum and eliminates intrusive low frequency noises.
- Excellent part-load energy efficiency through use of multiple compressors and electronic expansion valves. As the chiller rarely operates at full load, significant savings are ensured.
  This reduced power consumption also contributes to limiting the greenhouse effect, resulting from power generation from fossil energy.
- Two independent refrigerant circuits, the second one takes over automatically when the first one malfunctions, maintaining partial cooling under all circumstances.
- Refrigerant containment - rigorous factory tightness tests and use of temperature or pressure sensors without capillary tubes eliminate the risk of leaks. Shut-off valves permit isolation of the refrigerant charge in the heat exchangers. Maintenance operations become less frequent and more effective.

PRO-DIALOG Plus control

- PRO-DIALOG Plus is an advanced numeric control system that combines complex intelligence with great operating simplicity.

PRO-DIALOG Plus ensures intelligent leaving water temperature control and optimises energy requirements.

- The PID control algorithm with return water temperature compensation anticipates load variations, guarantees leaving water temperature stability and prevents unnecessary compressor cycling.
- The long-stroke electronic expansion valves (EXV) and PID superheat control, together with a patented head pressure control algorithm allow a significant energy efficiency improvement at part load conditions, and faultless chiller operation in a wider temperature range.
- Several capacity loading possibilities ensure improved start-up at low outdoor air temperature, and permit use of one of the refrigerant circuits as a back-up circuit.
- Adjustable ramp loading, according to the inertia of the application, avoids load increases that are too fast and too frequent, increasing unit life and limiting power consumption peaks.

PRO-DIALOG Plus ensures preventive protection and enhances chiller reliability.

- Equalisation of operating time and number of compressor start-ups
- No capillary tubes or pressostats (except as safety device)
- PRO-DIALOG Plus monitors all chiller safety parameters. The fault history function and the 80 fault codes facilitate immediate fault location.

PRO-DIALOG Plus offers extended communications capabilities

- Clear and easy-to-understand operator interface. The LEDs, numeric displays and touch keys are well-positioned on the schematic chiller diagram. The user immediately knows all operating parameters: pressures, temperatures, operating hours, etc.
- The extensive chiller remote control capabilities (wired connection) allow integration into building monitoring systems.
- RS485 series port for connection to the Carrier Comfort Network (CCN) or any other monitoring system (accessory communications interface with open protocol allows transfer of almost 50 parameters).
- Parallel piloting of two units as standard, or of several units with Flotronic System Manager (FSM) and Chiller System Manager (CSM III) options.

Low-noise Flying Bird fan

PRO-DIALOG Plus operator interface

Options and accessories

	Option	Accessory
Condenser anti-corrosion pre-treatment for marine applications*	X	
Condenser post-assembly anti-corrosion for medium marine and urban applications*	X	
Low leaving brine temperatures from 5°C to -6°C*	X	
Very low leaving brine temperatures from -6°C to -10°C (except ISPESL code)*	X	
Refrigerant R-22	X	
Condenser fan with 150 Pa available pressure	X	
Compressor and low speed fan sound insulation (contact Carrier for performances)*	X	
Tropicalised version	X	
Protection grilles	X	X
Part-winding compressor start	X	
High and low pressure manometer	X	
Electronic oil pressure protection and display for all compressors	X	
Head pressure control for outside temperature applications <0 ˚C (fan speed variation)	X	X
Compressor suction valve	X	
Evaporator with fewer or more baffles	X	
Capacity reduction (one per lead compressor, 30GK 100-170)	X	
50% heat reclaim	X	
Desuperheater	X	
RS485 communications interface with open protocol		X
Evaporator pump starter	X	

* Modified performances and operating limits. See electronic selection program.

Sound levels

30GK	085	095	100	120	130	148	160	170	190	220	245
Sound power, dB(A) 10^{-12} W											
Standard units	93	93	95	95	95	95	95	95	98	98	98
Units with open 15LS	87	87	88	90	90	90	90	90	92	92	92

According to ISO standard 3744 and Eurovent 8/1.
The sound levels above are published in accordance with Eurovent tolerances (+3 dB).

Physical data

30GK		085	095	100	120	130	148	160	170	190	220	245
Net nominal cooling capacity*	kW											
Standard units		238	269	325	390	409	466	500	533	598	657	725
Units with option 15LS		227	255	298	370	387	444	474	507	562	618	696
Operating weight	kg											
Operating weight		2730	2760	3275	3550	3930	4350	4465	4715	5470	6100	6450
Standard units		3008	3038	3553	3862	4265	4734	4849	5099	5969	6677	7060
Refrigerant charge	kg	R-407C										
Circuit A		34.4	31.6	34.4	38.0	51.0	53.5	53.5	55.0	63.0	69.0	69.0
Circuit B		17.6	17.2	34.4	38.0	41.0	53.0	53.0	55.0	58.0	63.0	69.0
Compressors		Semi-hermetic, 4 or 6 cylinders, 24.2 r/s										
Quantity - Circuit A		2	2	2	2	3	3	3	3	4	4	4
Quantity - Circuit B		1	1	2	2	2	2	2	3	3	4	4
Capacity control		PRO-DIALOG Plus control										
No. of control steps		8	8	4	4	5	5	5	6	7	8	8
Minimum step capacity	%	20	22	22	25	17	16	20	14	12	10	12.5
Evaporator		Direct-expansion, multi-tube shell type										
Net water volume	l	92	92	154	154	199	199	227	227	227	227	227
Water connections		Victaulic connections										
Inlet and outlet	in	5	5	5	5	6	6	6	6	6	6	6
Drain and purge	in	1/2 FPT										
Max. water side operating pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Condenser		Copper tubes, aluminium fins										
Condenser fans		Shrouded axial, Flying Bird fan										
Quantity		4	4	4	6	6	8	8	8	8	10	12
Total air flow	l/s	20165	20165	21110	31660	31660	42220	42220	42220	42220	52770	63330
Fan speed**	r/s	15.8/12.5	15.8/12.5	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8

* Standard Eurovent conditions: Evaporator entering/leaving water temperature 12°C and 7°C. Condenser entering air temperature 35°C. Evaporator fouling factor 0.44 x 10^{-4} m^2 K/W.
Net cooling capacity = gross cooling capacity minus the capacity corresponding to the evaporator pressure loss (flow x loss/0.3).
** 30GK 085-095: circuit A/circuit B

Electrical data

30GK		085	095	100	120	130	148	160	170	190	220	245
Power wiring												
Nominal power supply	V-ph-Hz	400-3-50										
Voltage range	V	360-440										
Control circuit power supply		The control circuit is supplied via a factory-installed transformer.										
Nominal operating power input*	kW											
Standard units		97	120	142	163	171	192	205	219	257	294	313
Units with option 15LS		97	122	140	162	171	189	203	218	259	292	310
Nominal operating current draw*	A	160	199	227	268	283	316	329	363	425	485	515
Max. operating power input**	kW	109	137	156	186	193	218	227	250	292	333	355
Circuit A		-	-	-	-	-	-	-	-	165	176	177
Circuit B		-	-	-	-	-	-	-	-	127	157	177
Max. operating current draw (Un)***	A	183	230	261	311	325	366	381	419	490	558	595
Circuit A		-	-	-	-	-	-	-	-	277	296	298
Circuit B		-	-	-	-	-	-	-	-	213	263	298
Max. starting current (standard unit)†	A	464	509	540	594	607	651	668	704	777	846	890
Circuit A		-	-	-	-	-	-	-	-	558	582	583
Circuit B		-	-	-	-	-	-	-	-	491	541	583
Max. starting current, part-winding start option (Un) †	A	326	371	402	456	469	513	530	566	639	708	752
Circuit A		-	-	-	-	-	-	-	-	420	444	445
Circuit B		-	-	-	-	-	-	-	-	353	403	445
Available power, unit or circuit A for evaporator water pump supply‡	kW	5.2	5.2	7	8	8	11	11	11	11	13	16.5

* Standard Eurovent conditions: Evaporator entering/leaving water temperature 12°C and 7°C. Outdoor air temperature 35°C.
Nominal power input: unit power input (compressors, fans, control) plus the capacity corresponding to the evaporator pressure loss (flow x loss/0.3).
** Power input, compressor and fan, at unit operating limits (evaporator water entering/leaving temperature = 15°C/10°C, outdoor air temperature = 46°C) and a nominal voltage of 400 V (data given on the unit name plate).
*** Maximum unit operating current at maximum unit power input.
† Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + fan current + locked rotor current or reduced starting current of the largest compressor).
Fan electrical data: power input 2.4 kW and current draw 5.5 A per fan, except for circuit B, sizes 30GK 085 and 095: 1.1 kW and 3.6 A per fan.
‡ Current and power inputs not included in the values above

Electrical data notes:

- 30GK units have a single power connection point (except 30GK 190-245 which have two connection points).
- The control box includes the following standard features:
  - Starter equipment and motor protection devices for each compressor and the fan(s)
  - Control devices
- **Field connections:**
- All connections to the system and the electrical installations must be in full accordance with all applicable local codes.
- The Carrier 30GK chillers are designed and built to ensure conformance with these codes. The recommendations of European standard EN 60 204-1 (corresponds to IEC 60204-1) (machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment.

NOTES:

- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60 204 is the best means of ensuring compliance with the Machines Directive § 1.5.1.
- Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.

1. The operating environment for the 30GK chillers is specified below:
   Environment* - Environment as classified in EN 60 721 (corresponds to IEC 60721):
   - outdoor installation*
   - ambient temperature range: -18°C to +46°C, class 4K3*
   - altitude: ≤ 2000 m
   - presence of hard solids, class 4S2 (no significant dust present)
   - presence of corrosive and polluting substances, class 4C2 (negligible)
   - vibration and shock, class 4M2

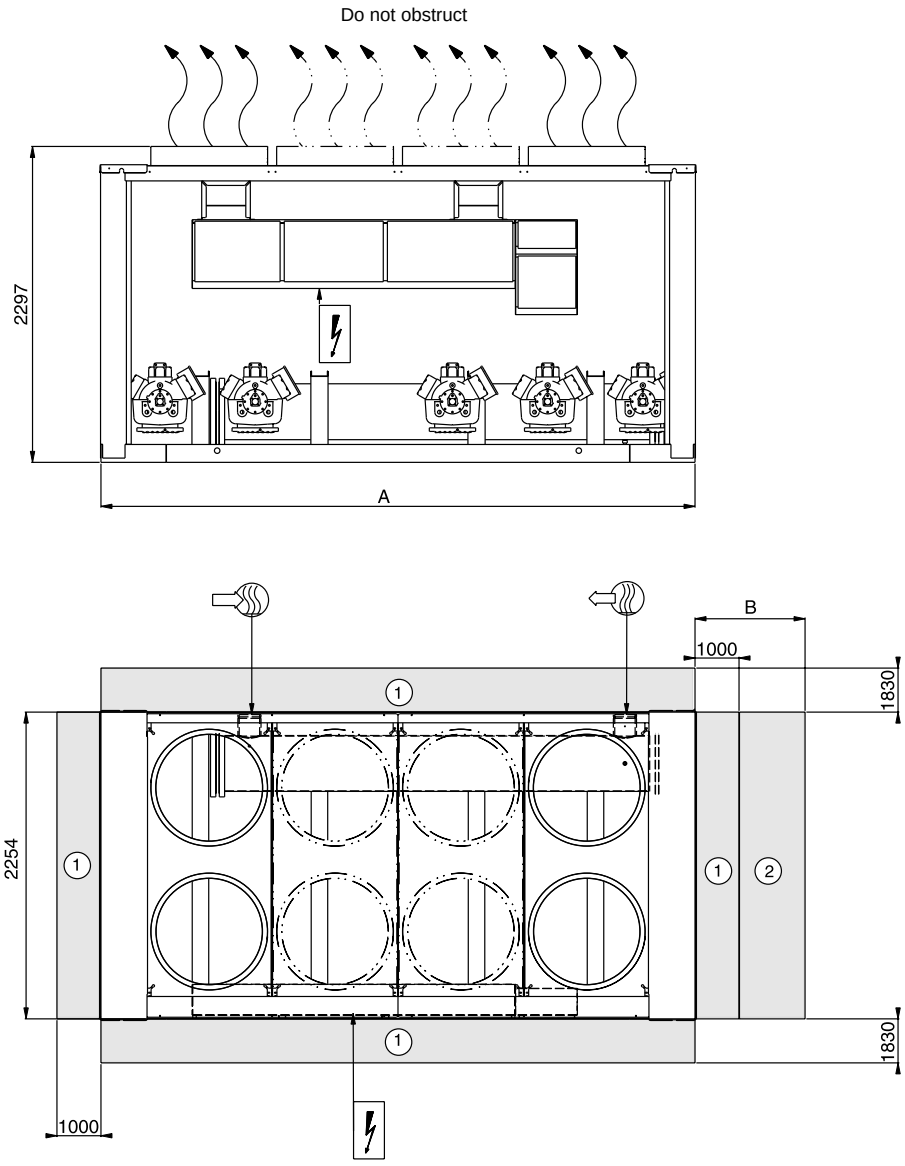
   Competence of personnel, class BA4* (trained personnel in accordance with IEC 60364)
2. Power supply frequency variation: ± 2 Hz.
3. The neutral (N) line must not be connected directly to the unit (if necessary use a transformer).
4. Overcurrent protection of the power supply conductors is not provided with the unit.
5. The factory-installed disconnect switch(es)/circuit breaker(s) is (are) of a type suitable for power interruption in accordance with EN 60947-3 (corresponds to IEC 60947-3).
6. The units are designed for connection to TN networks (IEC 60364). For IT networks the earth connection must not be at the network earth. Provide a local earth, consult competent local organisations to complete the electrical installation.

NOTE:
If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.

* The required protection level for this class is IP43B (according to reference document IEC 60529). All 30GK units are protected to IP44CW and fulfil this protection condition.

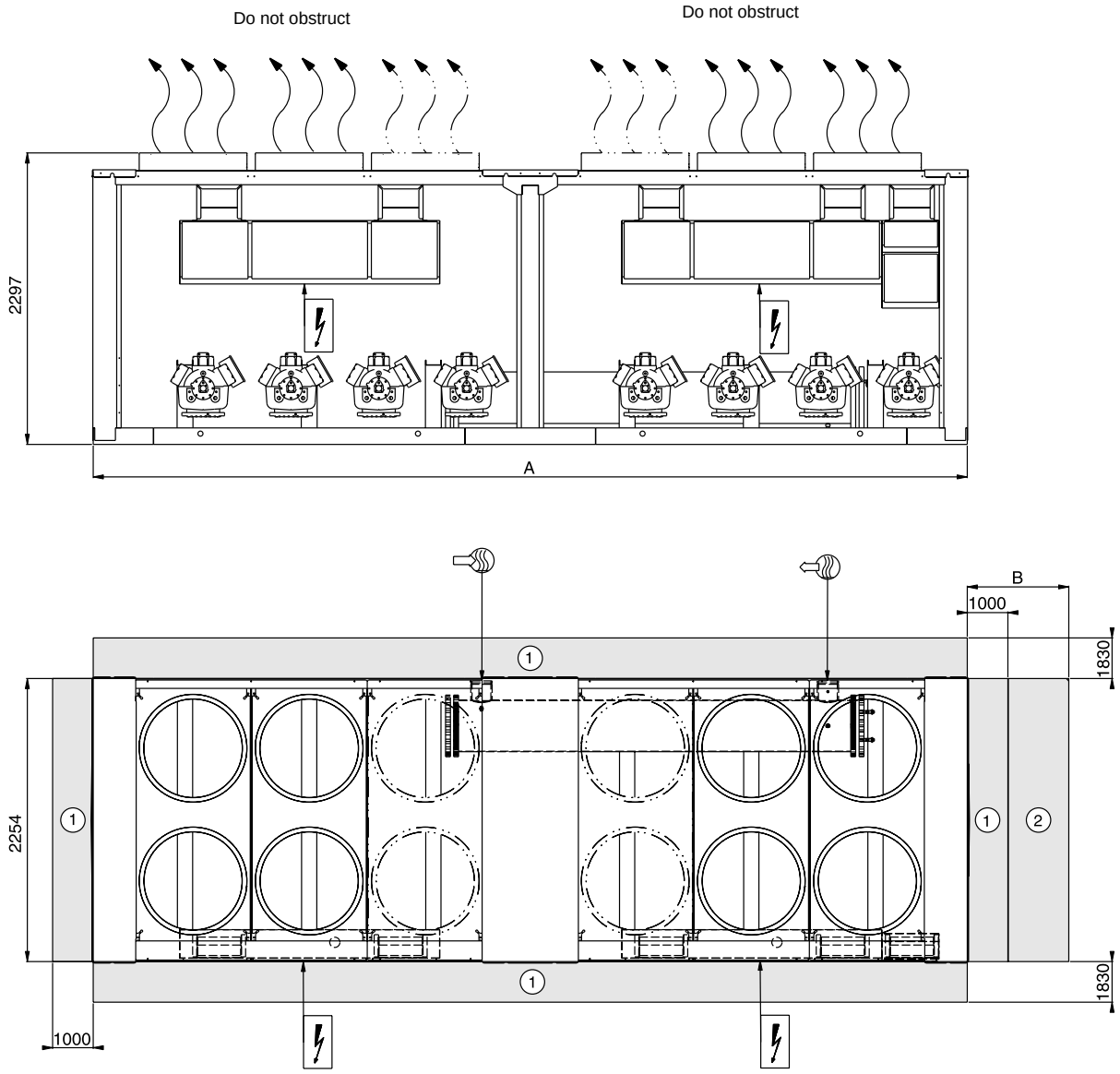
Dimensions/clearances

30GK 085-170



Dimensions/clearances

30GK 190-245



30GK	A	B
085-095-100	2967	2500
120	3425	2500
130	3775	2500
148-160-170	4340	3000
190	5536	2500
220	6451	2500
245	6909	2500

ATTENTION: 30GK 190-245 units have two power connection points.

Legend:

All dimensions are given in mm.

(1) Required clearances for operation and maintenance

(2) Recommended clearances for the removal of evaporator tubes

Water inlet

Water outlet

Power supply

Air outlet, do not obstruct

NOTE:
Non-contractual drawings. When designing an installation, refer to the certified dimensional drawings, available on request.

Cooling capacities

30GK		Condenser entering air temperature, °C																								
	LWT	25					30					35					40					45				
		CAP	COMP	UNIT	COOL		CAP	COMP	UNIT	COOL		CAP	COMP	UNIT	COOL		CAP	COMP	UNIT	COOL		CAP	COMP	UNIT	COOL	
	°C	kW	kW	kW	l/s	kPa	kW	kW	kW	l/s	kPa	kW	kW	kW	l/s	kPa	kW	kW	kW	l/s	kPa	kW	kW	kW	l/s	kPa
085	5	253	76	84	12.1	19	238	80	89	11.4	17	222	84	93	10.6	15	205	88	96	9.82	13	188	92	100	9.01	11
095		289	96	105	13.9	25	271	102	110	13	22	253	106	115	12.1	19	235	111	119	11.2	17	216	115	123	10.3	14
100		354	113	125	17	25	330	119	131	15.8	22	306	124	136	14.7	19	282	129	140	13.5	16	258	134	145	12.4	14
120		415	126	143	19.9	33	389	133	150	18.7	29	364	140	156	17.5	26	339	147	163	16.2	23	313	153	169	15	20
130		438	134	151	21	27	410	141	158	19.7	24	382	148	164	18.3	21	354	154	171	16.9	18	326	160	176	15.6	16
148		497	146	169	23.9	35	466	155	177	22.4	31	435	162	184	20.9	27	405	170	192	19.4	23	374	177	199	17.9	20
160		530	158	180	25.4	22	499	167	188	23.9	20	467	175	197	22.4	18	434	183	204	20.8	15	400	191	212	19.2	13
170		565	170	193	27.1	25	531	179	201	25.4	22	496	188	210	23.8	20	462	196	218	22.1	17	427	204	226	20.5	15
190		639	202	226	30.7	32	599	213	236	28.8	28	559	224	246	26.8	25	519	234	256	24.9	22	480	243	265	23	19
220		704	230	259	33.9	39	660	242	271	31.7	34	615	253	281	29.5	30	570	264	292	27.4	26	525	275	302	25.2	22
245		767	240	276	36.9	46	722	254	288	34.7	41	677	267	300	32.5	36	632	279	312	30.4	31	587	291	324	28.2	27
085	6	263	78	86	12.6	21	247	82	91	11.8	18	230	86	95	11	16	213	90	99	10.2	14	195	94	102	9.35	12
095		298	99	108	14.3	26	280	104	113	13.4	23	261	109	118	12.5	20	242	114	122	11.6	18	222	118	126	10.7	15
100		365	116	128	17.5	26	340	122	133	16.3	23	316	127	139	15.1	20	291	132	143	13.9	17	266	137	148	12.8	15
120		429	128	146	20.6	35	403	136	153	19.3	31	377	143	160	18.1	28	351	150	166	16.8	24	325	156	172	15.6	21
130		453	137	154	21.7	29	424	144	161	20.3	26	395	151	168	19	23	367	158	174	17.6	20	338	164	180	16.2	17
148		514	149	172	24.7	37	482	158	180	23.2	33	451	166	188	21.6	29	419	174	196	20.1	25	387	181	203	18.6	22
160		549	161	183	26.3	24	517	170	192	24.8	21	484	179	201	23.2	19	450	187	209	21.5	16	415	195	216	19.9	14
170		586	174	197	28.1	27	550	183	206	26.4	24	514	192	214	24.7	21	479	201	223	23	18	443	209	231	21.2	16
190		661	207	231	31.8	34	620	218	242	29.8	30	579	229	252	27.8	27	538	239	261	25.8	23	496	249	271	23.8	20
220		728	235	265	35	41	682	247	277	32.8	36	636	259	288	30.6	32	590	270	298	28.3	28	543	281	308	26.1	23
245		794	246	282	38.2	49	748	259	295	36	43	701	273	307	33.7	38	655	285	319	31.5	34	608	298	330	29.2	29
085	7	272	79	88	13.1	22	255	84	93	12.2	20	238	88	97	11.4	17	221	92	101	10.6	15	203	96	104	9.7	13
095		307	101	110	14.7	28	288	106	115	13.8	25	269	111	120	12.9	22	249	116	125	11.9	19	229	121	129	11	16
100		376	119	131	18.1	27	351	125	136	16.8	24	325	130	142	15.6	21	300	135	146	14.4	18	274	140	151	13.1	15
120		443	131	149	21.3	37	416	139	156	20	33	390	146	163	18.7	29	363	153	170	17.4	26	336	160	176	16.1	22
130		468	139	157	22.5	31	438	147	164	21	27	409	154	171	19.6	24	380	161	178	18.2	21	350	167	184	16.8	18
148		531	152	176	25.5	39	498	161	184	23.9	35	466	169	192	22.4	31	433	177	199	20.8	27	401	185	207	19.2	23
160		567	165	187	27.2	26	534	174	196	25.6	23	500	183	205	24	20	465	192	213	22.3	17	429	200	221	20.6	15
170		606	178	201	29.1	29	569	187	210	27.3	26	533	197	219	25.6	23	496	205	227	23.8	20	459	214	235	22	17
190		683	212	236	32.8	37	641	223	247	30.8	32	598	234	257	28.7	28	556	245	267	26.7	25	513	254	276	24.6	21
220		752	241	271	36.2	44	705	253	283	33.9	39	657	265	294	31.6	34	609	277	305	29.3	29	561	288	315	26.9	25
245		821	251	288	39.5	52	773	265	301	37.2	46	725	279	313	34.9	41	677	292	326	32.6	36	629	304	337	30.2	31
085	8	282	81	90	13.5	24	264	86	94	12.7	21	246	90	99	11.8	18	228	94	103	10.9	16	210	98	106	10	14
095		316	103	113	15.2	29	297	109	118	14.2	26	277	114	123	13.3	23	256	119	127	12.3	20	-	-	-	-	-
100		387	121	133	18.6	29	361	127	139	17.3	25	335	133	144	16	22	308	138	150	14.8	19	-	-	-	-	-
120		458	134	152	22	40	430	142	159	20.7	35	402	149	166	19.3	31	375	156	173	18	27	347	163	180	16.6	24
130		483	142	160	23.2	33	453	150	168	21.7	29	423	157	175	20.3	26	393	164	181	18.8	22	362	171	187	17.4	19
148		548	155	179	26.3	42	514	164	187	24.7	37	481	173	195	23.1	33	448	181	203	21.5	28	414	189	211	19.9	24
160		586	168	191	28.1	27	551	178	200	26.5	24	517	187	209	24.8	21	481	196	217	23	19	444	204	225	21.3	16
170		627	181	205	30.1	31	589	191	214	28.3	27	551	201	223	26.4	24	513	210	232	24.6	21	476	219	240	22.8	18
190		705	216	241	33.9	39	661	228	252	31.8	34	617	239	263	29.6	30	574	250	273	27.5	26	530	260	282	25.4	22
220		775	246	277	37.3	47	727	259	289	35	41	678	271	300	32.6	36	629	283	311	30.2	31	580	294	322	27.8	27
245		848	257	294	40.9	55	799	271	307	38.5	49	749	285	320	36.1	44	700	298	332	33.6	38	650	311	344	31.2	33
085	10	301	84	94	14.4	27	282	89	98	13.5	24	263	94	103	12.6	21	244	98	107	11.7	18	-	-	-	-	-
095		334	108	117	16.1	33	314	114	123	15.1	29	292	119	128	14	25	271	124	133	13	22	-	-	-	-	-
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120		486	139	158	23.4	44	457	147	165	22	39	428	155	173	20.6	35	399	163	180	19.1	31	369	170	187	17.7	27
130		513	148	166	24.7	37	482	156	174	23.1	33	450	164	181	21.6	29	418	171	188	20.1	25	-	-	-	-	-
148		581	162	186	28	47	547	171	195	26.3	41	512	180	203	24.6	37	477	189	211	22.9	32	441	197	219	21.2	28
160		622	175	198	29.9	31	586	185	208	28.1	27	550	195	217	26.4	24	512	204	226	24.5	21	-	-	-	-	-
170		668	189	213	32.1	35	628	199	223	30.1	31	588	209	232	28.2	27	548	219	241	26.3	24	508	228	250	24.4	21
190		749	225	251	36	44	702	238	262	33.8	39	656	250	273	31.5	34	610	261	284	29.3	29	564	272	294	27	25
220		822	257	289	39.6	52	772	270	301	37.1	46	720	283	313	34.6	40	668	295	324	32.1	35	-	-	-	-	-
245		901	268	307	43.5	62	850	283	320	41	56	797	297	333	38.4	49	745	311	346	35.8	43	692	324	358	33.3	37

Legend:

LWT	Leaving water temperature
CAP kW	Net cooling capacity = gross cooling capacity minus the capacity corresponding to the evaporator pressure drop (flow x drop/0.3).
COMP kW	Compressor power input
UNIT kW	Unit power input (compressors, fans, control) plus the capacity corresponding to the evaporator pressure drop (flow x drop/0.3).
COOL l/s	Evaporator water flow rate
COOL kPa	Evaporator pressure drop

Capacity based on standard EUROVENT conditions

The published performances are certified by EUROVENT in accordance with document 6/C/003:
- 5% for heating and cooling capacities
- 5% for power input
- 15% for the pressure drop

Full load correction factors for Eur ovent laboratory test:

Net cooling capacity	1.000
Energy efficiency ratio	1.000
Evaporator pressure drop	1.000

Application data:

Standard units
Refrigerant: R-407C
Evaporator temperature rise: 5 K
Evaporator fluid: chilled water
Fouling factor: 0.44 x 10^{-4} m^2 K/W

Operating limits

Minimum evaporator flow rates

30GK	Minimum flow, l/s
085-095	6.0
100-120	8.5
130-148	9.8
160-245	12

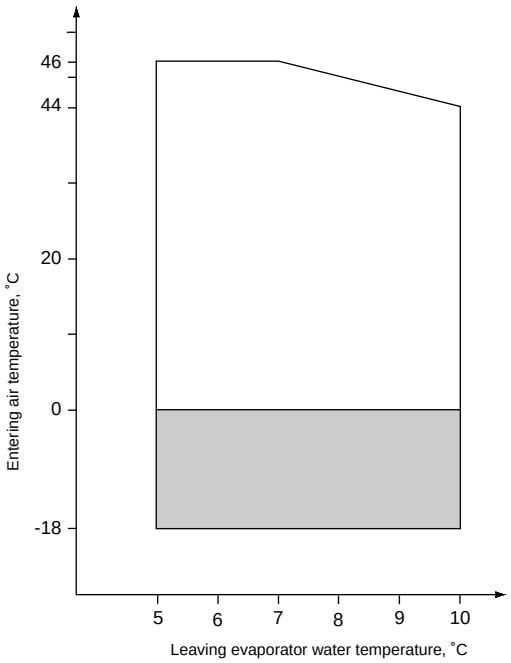
Minimum chilled water loop flow rate

Whatever the size of the system, the water loop minimum volume is given by the following formula:
Volume = CAP $_{[kW]}$ x N = litres
where CAP is the nominal system capacity (kW) at the nominal operating conditions of the installation.

Application	N
Air conditioning	3.25
Industrial process cooling	6.50
Low ambient temperature	6.50

This volume is necessary for stable operation and accurate control. It is often necessary to add a buffer water reservoir to the circuit in order to achieve the required volume.

30GK operating range at full load



Notes

1 Evaporator ΔT = 5 K
2 The evaporator is protected against frost down to -18°C.

Standard unit operating range

Operating range, unit equipped with optional head pressure control for operation at low outdoor temperatures.

Technical description

Air-cooled packaged liquid chillers for outdoor installation
Nominal cooling capacity 238-725 kW
Carrier model: 30GK

Part 1 - General

1.01 System description

- Microprocessor controlled, air-cooled liquid chiller utilizing chlorine-free refrigerant HFC-407C, dual refrigeration circuits, reciprocating compressors, and electronic expansion devices.

1.02 Quality assurance

- Unit shall be rated in accordance with Eurovent standard
- Unit construction shall comply with European directives:
  - Pressurised equipment directive (PED) 97/23/EC
  - Machinery directive 98/37/EC, modified
  - Low voltage directive 73/23/EEC, modified
  - Electromagnetic compatibility directive 89/336/EEC, modified, and the applicable recommendations of European standards:
  - Machine safety: electrical equipment in machines, general regulations EN 60204-1
  - Electromagnetic emission EN 50081-2
  - Electromagnetic immunity EN 50082-2.
- Unit shall be designed, manufactured and tested in a facility with a quality assurance system certified ISO 9001 and with an environment management system certified ISO 14001.

Part 2 - Products

2.01 Equipment

- General
  Factory assembled, single-piece, air-cooled liquid chiller. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge (HFC-407C) and oil charge.

- Unit cabinet
  1. Frame shall be made of U steel beam and covered by three protection layers.
  2. Cabinet shall be galvanized steel casing with a oven-baked polyester-paint finish.
  3. Cabinet shall be capable of withstanding 500-hour salt spray test in accordance with the ASTM B-117 standard (U.S.A.).

- Fans
  1. Condenser fans shall be direct-driven, 11-blade, shrouded-axial type, shall be statically and dynamically balanced, and made of recyclable material with inherent corrosion resistance. Air shall be discharged vertically upward.
  2. Fans shall be protected by coated steel wire safety guards.

- Compressors
  1. Unit shall have reciprocating semi-hermetic compressors lubricated by POE oil and a reversible oil pump.
  2. Each compressor shall be equipped with a discharge shutoff valve, a crankcase heater with a safety device that stops the compressor in case of a fault.
  3. The 4-pole electric motor with two windings shall be cooled by suction gas and protected against abnormal operating conditions by thermo-magnetic circuit breaker.
  4. The compressors are mounted on rubber anti-vibration dampers and equipped with discharge mufflers.

■ Evaporator
Unit shall be equipped with a multi-tube evaporator with two refrigerant circuits.
1. Evaporator shall be manufactured, tested and stamped in accordance with the European directive for pressurised equipment 97/23/EC. The maximum refrigerant-side operating pressure will be 2100 kPa, and the maximum water-side pressure will be 1000 kPa. The evaporator shall be tested using pressurised dry air; no oil test is necessary.
2. Tubes shall be internally-enhanced, seamless-copper type, and shall be rolled into tube sheets.
3. The evaporator shall be designed for Victaulic type water connections.
4. The shell shall have thermal insulation, using 19 mm polyurethane foam, be equipped with a trace heater and provided with a water drain and vent.

■ Condenser
1. Coil shall be air-cooled with integral subcooler, and shall be constructed of aluminium fins mechanically bonded to internally finned copper tubes. The tubes are then cleaned, dehydrated, and sealed.
2. Condenser coils shall be leak tested and shall be pressure tested at 3400 kPa.
3. Condenser fan motors shall be 3-phase type with permanently-lubricated bearings and Class F insulation.

■ Refrigerant circuits
Refrigerant circuit components shall include discharge valves, and liquid line shutoff valves, filter driers, moisture indicating sight glasses, electronic expansion devices, high pressure safety switches, and a complete operating charge of both refrigerant HFC-407C and compressor oil.

Controls, safeties, and diagnostics
1. Controls
   a. Unit controls shall include as a minimum: the microprocessor, the LOCAL/OFF/REMOTE/CCN selector and a 6-digit diagnostic display (scroll-down text) with keypad.
   b. Shall be capable of performing the following functions:
      - Automatic change-over between the main circuit and the non-active circuit(s).
      - Capacity control based on leaving chilled fluid temperature with return fluid temperature sensing.
      - Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range of 0.1°C to 1.1°C per minute to prevent excessive demand spikes at start-up.
      - Enable adjustment of leaving chilled water temperature according to the return water temperature or the outdoor temperature or by means of a 0-10 V signal.
      - Provide a dual set point for the leaving chilled water temperature activated by a remote contact closure signal.
      - Enable a 2-level demand limit control (between 0 and 100%), activated by a remote contact closure or a 0 to 10 V signal.
      - Control evaporator water pump and, if installed, safety pump operation.
      - Enable automatic lead-lag of two chillers in a single system.
      - With two time scheduling programs enable unit start-up control and set-point change.
2. Diagnostics
   a. The display module shall be capable of displaying set points, system status (including temperatures, pressures, run time and percent loading), and any alarm or alert conditions.
   b. The control shall allow a quick test of all machine elements to verify the correct operation of every switch, circuit breaker, contactor etc. before the chiller is started.
   c. The control shall be capable of balancing the compressor operating times and the number of compressor start-ups.
3. Safeties
   a. Unit shall be equipped with all necessary components to provide the unit with protection against the following:
      - Loss of refrigerant charge.
      - Low chilled water temperature.
      - Low oil pressure (per compressor).
      - Thermal overload.
      - High pressure.
      - Electrical overload.
      - Circuit pumpdown.
      - Low suction temperature.
   b. Fan motors shall be individually protected by a circuit breaker

■ Control shall provide general alarm remote indication for each refrigeration circuit.

■ Control system shall have a RS485 serial output port.

■ Operating characteristics
Unit shall be capable of starting and running at full load at outdoor ambient temperatures from 0°C to 46°C with a evaporator leaving fluid set point from 5°C to 10°C.

■ Electrical data
1. Unit electrical power supply shall enter the unit at one (30GK 085-170) or two locations.
2. Unit shall operate on 3-phase power supply without neutral.
3. Control voltage shall be supplied by a factory-installed transformer that will allow supply control circuit power from the main unit power supply.
4. Unit shall be supplied with factory-installed, non-fused electrical disconnect for the power supply.

■ Finishing
Casing and control box colour: RAL 7035
Compressor colour: RAL 7037

Environmental Management System Approval

Carrier

Order No. 13053-20, 01. 2003. Supersedes order No.: 13053-20, 01. 2002.
Manufacturer reserves the right to change any product specifications without notice.
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