



SMARTER
ENERGY SAVING COMPANY



IKEA Italia Retail Srl 'Smart Cooling™' system energy efficiency Test report

Test was carried
SMARTER ENERGY SAVING COMPANY SAGL
VIA BALESTRA 12 – CP 6382 6901,
SWITZERLAND
September 16, 2014
Catania Italy

Project:

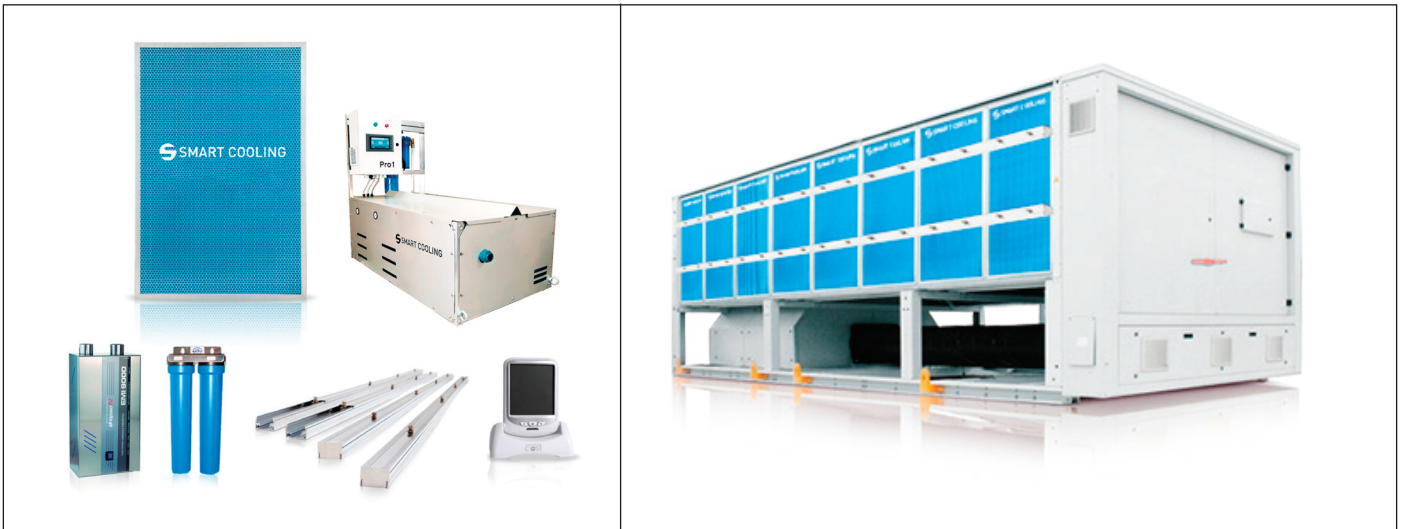
IKEA Italia Retail Srl
Via Passo del Cavaliere - Contrada
Buttaceto
95121 zona industriale (CT - ITALY)
Web www.IKEA.it

Project: IKEA Italia Retail Srl

Concerning the results of the testing of units **Climaveneta FOCS-CA/LN/S5424** power saving by using adiabatic pre-cooling of intake air through "Smart Cooling™" pre-cooling system.

On September 15-16 Jonson Control Dipl. Mech. Engineer, accompanied by the representative of IKEA Italia Retail Srl engineer, Climaveneta engineer performed the test of the status and operational indicators of the air-cooled liquid chiller CLIMAVENE- TA FOCS-CA/LN 5424, 1 pc., and recording of the IKEA BMS data.

Before the tests the following defects were found with the unit: (GF03), FOCS-CA/LN 5424, s/n: 32007483, (hereinafter in the text referred to as unit **GF03**):



**"Smart Cooling™"
chiller booster unit PRO 10**

**Unit Climaveneta FOCS-CA/LN
5424, (GF03).**

Testing with 100% cooling load for the unit GF03 was performed on 15.09.2014.,

Weather conditions: outside air temp.+32°C, humidity 66.8%, sunny, data recorded within a framework of 1 hour:

- a) (from 13:51 -14:51) – without adiabatic pre-cooling system and 1h
 b) (from 15:23-16:23) – with adiabatic pre-cooling system.

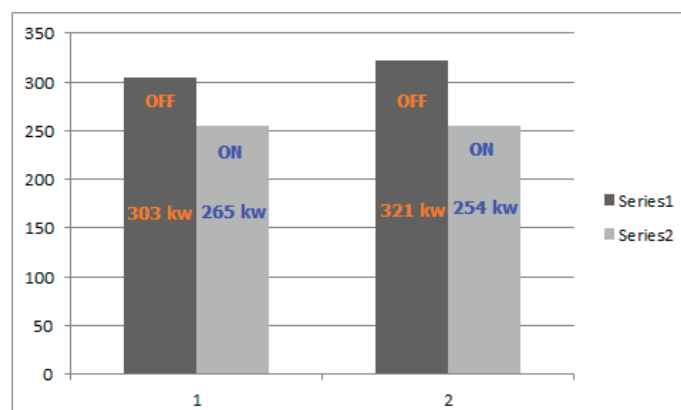
Data recording in the IKEA BMS is shown in the table #1:

Units	kWT termici (cooling capacity)			kWH elettricità (electrical power)			
	MaxkWH	Peak kW	Peak time	MaxkWH	Peak kW	Peak time	
FOCS-CA/ LN5424	1164	1247	14:00:03	303,9	321,5	14:28:19	Panels OFF
FOCS-CA/ LN5424	1288	1356	15:31:17	256,3	254,3	16:00:27	Panels ON
DIFFER- ENCE	124 kw	109 kw		47,6 kw	67,2 kw		≈21%

The table #1 shows that the cooling capacity of **GF03** with the adiabatic pre-cooling system „Smart Cooling” increased within the framework of 1h on average by **109-124 kWh**, which in turn reduced the interval of the operation time of the unit for the purpose of achieving the recommended water temperature IN/OUT; **+12/+7°C**. Power consumption within the framework of 1h decreased on average by **47,6- 67,2kWh**.

The table gives the consumer power of the unit **GF03** as **321,5kWh**, having the unit working with 100% cooling load, without adiabatic cooling system, recorded (14:28:19), and the power of **254,3kWh** working with adiabatic cooling system, the power saving within the framework of 1 h amounts to **67,2kWh**, and that means **21%** from the nominal power.

Power consumption with adiabatic pre-cooling system „Smart Cooling™” being **ON**
 Power consumption with adiabatic pre-cooling system „Smart Cooling™” being **OFF**
 The table and the schedule shows that the difference of the consumed power is 21%



The unit FOCS-CA/LN 5424, (**GF03**), according to the technical values provided by the manufacturer CLIMAVENETA, can achieve the cooling capacity of **1470kW**, by consuming 348,1kW/h of power, given the IN/OUT temperature of the water to be cooled of **+12/+7°C**, outside air temperature of **+25°C** and relative air humidity of **<70%**.

The printout of the data recorded in the IKEA BMS system for the unit **GF03** within the time period from 30.07.2014 – 30.08.2014 (August), during the interval of 31 days and 24h (daily) shows the average produced cooling capacity of **7'270,68kW**; the recording was done once a day, the unit **GF03** working from 7:00-18:00, i.e., 11h/day, **7'270,68 / 11 ≈ 661kW**, which allows concluding that the unit **GF03** is using on average **45%** of its cooling capacity.

The printouts of weather and outside air temperature values were recorded from the weather station.

10:55 PM	23.0 °C -23.0 °C	100% 1013 hPa 11.1 km/h / 3.1 m/s	10.0 km	ESE	N/A	Mostly Cloudy
11:00 PM	23 °C - 23°C	99% 1013 hPa km/h /	15 km	ESE	11.1	- - Mostly Cloudy
11:55 PM	23.0 °C -23.0 °C	100% 1013 hPa 5.6 km/h / 1.5 m/s	10.0 km	ESE	N/A	Scattered Clouds

<http://www.wunderground.com/history/airport/LICZ/2014/9/16/DailyHistory.html?>

During the test the internal management of the cooling units did not launch all levels of condenser fan rotations due to the weather conditions, which affected the test results.

**Specification:**

Adiabatic pre-cooling system "Smart Cooling™"
preparation equipment BY 70 / UV Block
Automation BY - 70 - 3
Nozzles misting panel BY - 70 HP - SS 5
Condenser protecting membrane BY - 70 M2
Water treatment, filtration block BY 100



Summary

Conclusion: the adiabatic pre-cooling system „Smart Cooling™“ for the condensers demonstrates its maximum efficiency of **21%** and more when the cooling units are working with 90 - 100% cooling load.

The best efficiency – exceeding 21% and more – was demonstrated by the adiabatic system in this project, given the outside air temperature was over +29°C and the relative air humidity below 70%.

The time interval, during which the cooling unit achieves the recommended water temperature and shut off has to be considered in the power consumption formula, since using the adiabatic cooling results in significant reduction of this time interval, reduction of working hours of the compressors, working cycle, which in turn significantly increases the working resource of the compressors.

The printouts of the data recorded in the IKEA BMS system and the compressor working hour timers in the units: GF03, during the time period 30.07.2014 – 30.08.2014 (August) show that the chillers are working concurrently supplying one consumer with the daily average cooling load of **45-50%** per each unit. (It means that the cooling power reserve in this project is **50 – 55%**, which is not being used).

In order to ensure additional power saving above the achieved **21%**, the BMS system algorithm should be changed.

Certified engineer
Pauls Brencons
Email: pauls@altergrupa.lv
Tel + 371 67 113 068

