

**ANCE TEST LABORATORY
RESULTS REPORT**

Rep. No: AN007409
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Report No: AN007409

Company: CISNE DE MÉXICO, S.A. DE C.V.

Address: AV. TECNOLÓGICO #118 INT. 503
COL. SAN ÁNGEL
C.P 76000 QUERÉTARO, QUERÉTARO.

Sample: ENERGY SAVER

Brand: FORCE

Model: F-50

Serial: 0806105050007
0811275050001

Representative: DAE KANG JEON

Procedure: TEST PROTOCOL FOR THE ENERGY
SAVING SYSTEM BRAND FORCE
MODEL F-50 WITH A CAPACITY OF
50Kw.
Note: the protocol accepted by both parties
is hereinafter described.

Starting date: 12/JANUARY/2009

Completion date: 28/APRIL/2009

Product category: NEW

This document is issued at the interested party's request and with no purpose for certification

1. OBJECTIVE

The objective is to determine the Wh of energy consumption on a test load (given by the client), in order to determine the energy saving given by the device called “Energy saver”, from the FORCE brand, model F-50 with a 50kW capacity, when connected to mains as indicated in the test procedure (see 4.2).

Note: Brand data, model and capacity are given by the client as it is not specified on the samples labels.

2. PLACE

ANCE, A.C. test laboratory
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3. MEASUREMENT EQUIPMENT

EQUIPMENT	BRAND	MODEL	INVENTORY
Power Analyzer*	XITRON	2553	ANCELAB-434-I
Temperature-controlled chamber*	No brand	No model	ANCELAB-414-I
Autoadjustable Váriac	POWER STAT	30M146T	ANCELAB-383-I
DATA ACQUISITION UNIT*	YOKOGAWA	MW100	ANCELAB-1219-I
COMPUTER	COMPAQ	501	501

Note: Equipment with * have a valid calibration report traceable to CENAM

4. TEST PROTOCOL

Both parties (client – laboratory) set forth the following test protocol by mutual agreement for the purposes of determine the energy saving achieved by the device called “Energy saver”, from the FORCE brand, model F-50 with a 50kW capacity, when connected to mains as indicated on the circuit at 4.2.

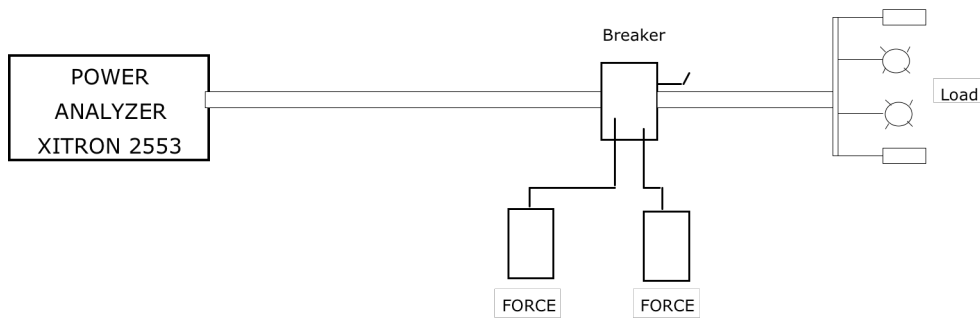
4.1 TEST LOAD

In order to simulate the electric load of a room, the client gives the following electrical appliances:

QTY.	DEVICE	BRAND	MODEL	SERIAL NO.
1	FAN	BREEZO	101	NO SERIAL
1	LIGHTS	NO BRAND	NO MODEL	NO SERIAL
1	HEATER	HONEYWELL	HZ-680-60-01	NO SERIAL
1	TELEVISION	DAEWOO	DTQ-20NF2FC	48554-17800
1	RADIO RECORDER	AIWA	NO MODEL	D10296
1	FRIDGE/FREEZER	HOTPOINT	NO MODEL	NO SERIAL
1	FREEZER	WOOD'S	C12H-MW14W935	60077569HM
1	FRIDGE ONLY	ACROS	ARM05N	VRP3604702

4.2 TEST CIRCUIT

The client asked to use a test circuit as follows:



The client connects one energy saver to the supply phase and the other to the neutral.

4.3 TEST CONDITIONS

The test was done under the following conditions:

- 1.- Supply voltage: 127 V $\sim \pm 1$ V \sim
- 2.- Supply frequency: 60 Hz
- 3.- Room temperature: 32,2 °C $\pm 0,6$ °C

The electrical appliances were located at the temperature-controlled chamber excepting the fan, the heater and the lights, that were connected outside the chamber with an extension cord.

Every device was operating at the highest power consumption mode; the refrigeration devices at the coolest position, the fan at the HIGH position, the recorder on full volume, without CD but with radio, the television on full volume.

In accordance with the NOM-015-ENER-2002 there were only temperature sensors in the fridge/freezer in order to monitor the temperature stabilization in each compartment of the devices. There was not simulated load.

4.4 PARAMETERS TO BE MEASURED

During the testing period, the parameters measured with the data acquisition system for efficiency test and the total load specified on 4.1, were the followings:

- Voltage on V~,
- Electric current on A,
- Active electric power on W,
- Energy on Wh

Temperatures of fridge/freezer compartments were monitored in order to check the stabilization of the device during the whole testing period.

4.5 TEST SEQUENCE

Pre-conditioning. Devices were operating for 24h before starting the test sequence for guaranteeing the temperature and the stabilization of the electrical appliances inside the temperature-controlled chamber.

The stabilization of temperatures in the fridge/freezer compartments was checked before the test.

- a) A 72h testing period with all the electrical appliances connected to the data acquisition system, according to the test circuit solution, without connecting the “energy Saver”.
- b) A 72h testing period with all the electrical appliances connected to the data acquisition system, according to the test circuit solution, having connected the “energy Saver”.

Note: The client installed the “energy Saver” system. At the request of the client, the device called “energy saver” is located inside the temperature-controlled chamber.

5 RESULTS

5.1 TEST LOAD CHECKING

The function of highest energy consumption of the test load was checked before starting the test with the following results:

DEVICE	FUNCTION	VOLTAGE (V)	CURRENT (A)	POWER (W)
FAN	SPEED: HIGH	127	0,495	56,9
LIGHTS	TIMER: ON 15 min. OFF 15 min.	126,9	4,236	537,6
HEATER	BOTH RESISTORS ON	127	12,8	1 625,7
TELEVISION	MAXIMUM VOLUME	127,1	0,74	56,3
RADIO RECORDER	RADIO: MAXIMUM VOLUME	127	0,062	5,6
FRIDGE/FREEZER	LOWEST TEMPERATURE	127	2,823	308,7
FREEZER	LOWEST TEMPERATURE	127	0,645	76
FRIDGE ONLY	LOWEST TEMPERATURE	127	1,093	100,4

5.2 RESULTS WITHOUT SAVER

The file AN007409-1 (excel file; electronic file here enclosed) is generated with the data acquisition system. This file contains every register of the 72h initial test (period a; specified on the test sequence) without connecting the “energy saver” and it is used to determine the initial energy consumption parameter as a reference to prove the saving.

Reference points can not be set to determine the start of the 72h period because the consumption data show different behaviors. Therefore, the consumption analysis must be done on three periods of 24h each in order to set an average consumption of the loads.

Graph 1. Electrical parameters and behavior of the power consumption during the starting period of the test “without saver”.

Electrical parameters WITHOUT SAVER; FORCE energy saver

Graph 2. Temperatures of sensors located at fridge/freezer.

Fridge temperatures WITHOUT SAVER; FORCE energy saver.

5.3 RESULTS WITH SAVER

The client installs and connects the “energy saver” to the mains as indicated on the test sequence (see 4.5 b), to prepare the “energy saver” in order to carry on with the test and monitor any requested parameters.

Connected terminals

Energy savers

Picture 1. Energy savers installation

The file AN007409-2 (excel file; electronic file here enclosed) is generated with the data acquisition system. This file contains every register of the 72h initial test with the “energy saver” (test sequence d see 4.5).

ELECTRICAL PARAMETERS WITH FORCE SAVER

Graph 3. Electrical parameters and power consumption behavior during the testing period “with saver”.

FRIDGE TEMPERATURES WITH FORCE SAVER

Graph 4. Temperatures of the sensors located at fridge/freezer.

5.4 RESULTS ANALYSIS

5.4.1 ENERGY CONSUMPTION RESULTS

Energy consumption and testing time values in each testing period are shown below.

Results without saver.

Cycle 1 (E1).

ANALYSIS TIME AND ENERGY CONSUMPTION DETERMINATION		
cycle 1	START CELL	468
	END CELL	1905
	TIME	24,01 H
	Wh	31 900

AVERAGE TEMPERATURES (R/C - °C) DETERMINATION		
cycle 1	START CELL	468
	END CELL	1905
	FRIDGE	12,1
	FREEZER	-14,53

Cycle 2 (E2).

ANALYSIS TIME AND ENERGY CONSUMPTION DETERMINATION		
cycle 2	START CELL	1944
	END CELL	3381
	TIME	24
	Wh	31 618

AVERAGE TEMPERATURES (R/C - °C) DETERMINATION		
cycle 2	START CELL	1944
	END CELL	3381
	FRIDGE	12,1
	FREEZER	-14,5

Cycle 3 (E3).

ANALYSIS TIME AND ENERGY CONSUMPTION DETERMINATION		
cycle 3	START CELL	1341
	END CELL	2778
	TIME	24,006
	Wh	31 838

AVERAGE TEMPERATURES (R/C - °C) DETERMINATION		
cycle 3	START CELL	1341
	END CELL	2778
	FRIDGE	12,09
	FREEZER	-14,54

Average of each parameter determined with the 3 cycles.

TEMPERATURES, ENERGY AND TIME AVERAGES			
TIME	ENERGY	TEMPERATURES (°C)	
(h)	(kWh)	Fridge	Freezer
24	31,785	12,1	-14,52

Results with saver

Cycle 1 (E1).

ANALYSIS TIME AND ENERGY CONSUMPTION DETERMINATION		
cycle 1	START CELL	474
	END CELL	1910
	TIME	24,014
	Wh	27 786

AVERAGE TEMPERATURES (R/C - °C) DETERMINATION		
cycle 1	START CELL	474
	END CELL	1910
	FRIDGE	12,1
	FREEZER	-14,53

Cycle 2 (E2).

ANALYSIS TIME AND ENERGY CONSUMPTION DETERMINATION		
cycle 2	START CELL	1944
	END CELL	3212
	TIME	24,01
	Wh	29 460

AVERAGE TEMPERATURES (R/C - °C) DETERMINATION		
cycle 2	START CELL	1944
	END CELL	3212
	FRIDGE	12,1
	FREEZER	-14,5

Cycle 3 (E3).

ANALYSIS TIME AND ENERGY CONSUMPTION DETERMINATION		
cycle 3	START CELL	1341
	END CELL	2672
	TIME	24,018
	Wh	29 670

AVERAGE TEMPERATURES (R/C - °C) DETERMINATION		
cycle 3	START CELL	1341
	END CELL	2672
	FRIDGE	12,1
	FREEZER	-14,53

Average of each parameter determined with the 3 cycles.

TEMPERATURES, ENERGY AND TIME AVERAGES			
TIME	ENERGY	TEMPERATURES (°C)	
(h)	(kWh)	Fridge	Freezer
24,014	28,972	12,1	-14,52

The calculation of the energy saving is determined under the following formula:

$$Saving (\%) = \left(1 - \frac{Energy\ with\ saver}{Energy\ without\ saver} \right) 100$$

$$SAVING (\%) = \left(1 - \frac{28,972}{31,78533} \right) \times 100 = 8,85$$

6. CONCLUSIONS

According to the energy saving results (see 5.4.1), there is a 8,85% of saving after installing the “energy saver”.

The temperatures of the freezer/fridges compartments were constant.

It is necessary to take into account that, as specified in the energy efficiency standards of the refrigeration devices, consumption variations of a 5% can be found in these type of devices. So, we can state an apparent energy saving of **3,85%** due to the connection of the saving system to mains.

Written by me

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Revised by me

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