

Energy Efficiency Study regarding the Omega Refrigeration System

To whom it may concern:

Terra Firma Solutions conducted a comparative study to determine the energy efficiency of the Omega Refrigeration System. The study was conducted in an actual SUPER SPAR environment to determine actual findings outside of a controlled environment by an independent third party.

Understanding that the operating environments may differ from site to site the audit was done to compare, as best as it would allow the Omega 12ft (Same compressor used for F&V, Dairy and Meat) to a 12ft Fruit and Vegetable unit (36ft Unit calculated pro rata) as indicated by the below images.



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Conclusions:

- The Omega System utilises one compressor for all Uprights regardless of the products which can develop up to 6.6 Kw @ -5°C Suction and 35 °C Condensing Temperatures at 50 Hz.
- The upright for Dairy/Meat cabinet ONLY requires 4.77Kw from a Bitzer Compressor that has a **1.4KW Input – 2GES-2Y-COP of 3.1**
- Omega Utilise a Standard Compressor 2FES- 2Y Bitzer compressor due to the requirements of the Jumbo Island cabinet that runs at 2.8Kw @ -30 Suction and 35 Condensing Temperatures. Omega regulates the Hz which regulates the kW inputs to attain the required outputs. This is done to ensure it is easier to maintain and keep stock of fewer items and more common parts in the solution for a “**standardised modular service exchange programme**”.
- The demand cooling is done through a **Variable Speed Drive** that regulates from **60Hz** right down to approximately **28Hz** dropping the kW demand which can save on electricity billing if the store is billed on maximum demand and not only energy (kWh’s), which is more often than not the case with the retail environment..
 - speed developing capacity example – 2FES-2Y
 - 50 Hertz = 4.77 kW
 - 60 Hertz = 6.5 kW

The conventional refrigeration cabinet is comprised of a base and 2 and a half shelves as opposed to the Omega unit which has a base and 5 shelves. In addition, the volumetric area is 36% greater on the Omega refrigeration cabinet.

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Bitzer Specifications as per Omega Refrigeration:

Compressor	<u>2JES-07Y-40S</u>	<u>2HES-1Y-40S</u>
Capacity steps	100%	100%
Cooling capacity	4,12 kW	5,16 kW
Cooling capacity *	4,03 kW	5,05 kW
Evaporator capacity	4,12 kW	5,16 kW
Power input	1,05 kW	1,38kW
Current (400V)	2,33 A	2,75 A
Voltage range	380-420V	380-420V
Condenser Capacity	5,17 kW	6,55 kW
COP/EER	3,92	3,73
COP/EER *	3,84	3,65
Mass flow	104,5 kg/h	130,9 kg/h
Operating mode	Standard	Standard
Discharge gas temp. w/o cooling	69,0 °C	70,7 °C

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Based on the following:

The kWh for the conventional cabinet was = 16890 kWh
36% Additional Volume would require an additional = 6080kWh
The total to equal Volumetric Display = 22970 kWh
Omega will be 38% more efficient

- *** Shelf Temperatures and shelf life was not metered
- *** Excessive Voltage fluctuations were observed in both stores

Features of the Omega refrigeration system in the measured environment as per the study are as follow:

- Constant temperatures maintained
- 28% lower demand requirements for kVA (Maximum Demand)
- Lower energy (kWh's) required – 38% more efficient
- Reduced CO2 emission from refrigerants
- On other uprights (meat and dairy) heater usage will also come into play as OMEGA use hot gas defrosts
- DC driven compressor - clean power through inverter
- Modular system – easy for maintenance and repair
- No ambient temperature impacting on Omega as compressor is in the store
- Compressor is water cooled to mitigate heat generation on the trading floor
- Cool compressor more efficient – better capacities (average body temperature is 24 degrees Celsius)
- Multi compressor for better demand management
- Common use of compressors and components

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Summary:

The Omega Refrigeration System compares well with any other system currently available. The Omega System offers:

- Flexibility/ Modularity
- Reliability
- Energy Efficiency

It is within our findings that the Omega System will operate and perform as well, if not better than older conventional systems within a retailer environment.

Thank you.

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