

The most modern refrigeration units in the History



There is D-Range ahead

There is a great rumor around Diesel refrigeration units at the moment and especially about Eurofrigo Diesel-Genset system which are the ones having major success.

People talk about them because performance and features of these units are so amazing and innovative to elicit eagerness and even incredulity.

On the other side there are many incorrect things which are said.

This presentation has the target to explain widely and from an objective point of view all what has to be known about the most recent "*evolution of the species*" in transport refrigeration equipment.

It has furthermore the target to supply information and considerations "from the operator side" to whom want to have an up-to-date opinion.

Eurofrigo D-Range are considered from the many the refrigeration unit of the future.

Here we explain You why.

Units which have made History

- 1960 to 1968: Gasoline Engine refrigeration units
- 1965 to 1978: Alternator drive refrigeration units
- 1968 to 2001. Diesel drive refrigeration units
- 2002: Diesel-Genset refrigeration units

Gasoline Engine refrigeration units

Transport refrigeration units borne using gasoline engines

Till the sixties practically all refrigeration units on the market were using a gasoline engine to drive the compressor.

Very good engines: robust, economical, simple, light, easy to be maintained and, especially the most modern versions, reliable. Ideal for the application

BUT IT WAS

Noisy
Smelling bad
Polluting
Dangerous

AND MOSTLY

Thirsty

All these reasons, but especially the environment and safety related ones, have imposed to abandon the gasoline engine.

The rest of the component of the refrigeration system were: an open type compressor, an electric motor (rarely used) all driven by belts, pulleys and other mechanical items

Alternator Drive refrigeration units

Late sixties: the alternators arrive to transport refrigeration units, clean and quiet

The industry answered to the new requirement by using the technology widely used in power generation.

Helped by the introduction of Semi-hermetic type compressors the alternator were driven by the trucks engine to provide energy to refrigeration system.

More efficient, clean, quiet and more economical to use

BUT IT WAS

Complicate
With an inconstant
output
Complex to install

AND MOSTLY

Not reliable due to lack
of electronic
controllers

At that time this was the only valid answer to gasoline engines, but with great limits dictated by alternator dimensions, requirement to design a bracket to each specific vehicle and having an inconstant output as directly related to vehicle engine's rpm.

Diesel Drive refrigeration units

Late sixties: Diesel technology reach the industry, efficient and reliable

Industry answers the lack of previous technologies adapting the widely used diesel engine to transport refrigeration.

This is a reliable, more efficient and economical way to refrigerate the transported goods.

BUT IT IS

Complex

Using many belts

Using clutch

Using an open type compressor

AND MOSTLY

Not totally reliable

Require a lot of maintenance

At that days it was the only valid answer.

The industry converts to diesel technology and in the years some of units' defects are adjusted.

Still today belt drive diesel refrigeration units cover the widest share of the market, even if this is not the ideal solution in transport refrigeration applications

Diesel-Genset refrigeration units

Finally a real progress

At the beginning of the year 2000, electronic technology supply instruments and ideas to create the best ever transport refrigeration unit.

It is a unit with all the advantages of the Diesel drive and alternator drive technology without their respective inconvenient.

We talk about technology of the future.

INFACT IT IS

Efficient
Simple
Clean
Quiet

AND MOSTLY

Reliable
Easy and inexpensive
to own

Diesel-genset technology begin with a bit of skepticism from the experts, but in few years impose itself as the most evolved technology which better respond the needs of the users. The brand who first believe in this technology is also one of the oldest:

Eurofrigo with its D-Range

Why YES

It is efficient

Less fuel and less electric power to provide higher refrigerating output

It is simple

There are no belts, clutches, pulleys, compressor shaft seal and brushes

It is clean

Very low speed engine use less fuel and pollute less. Semi-hermetic compressor make impossible for the refrigerating gas to leak out.

It is quiet

1500 rpm, no belts moving around, semi-hermetic compressor and low speed fan motors makes of it the quietest ever diesel refrigeration unit on the market

Why NOT

Innovative

Makes conservative people to doubt.

Distinctive

People who like to do what the others do, does not like it

Eurofrigo Diesel-Genset technology.

The refrigeration units which are writing the History

- Technology of the future
- Power when it's needed
- Simplicity
- Maintenance costs
- Low fuel consumption
- A matter of oil
- Ecology
- Safety
- Why to choose an Eurofrigo D-Range
- The unit You need
- Warranty

TECHNOLOGY OF THE FUTURE

We live in a rapid progress era

Technique and technology propose us more modern machines in every field, meaning more:

- Performing
- Simple
- Economical
- Reliable
- Eco-compatible

We can see these progress everywhere, in the car industry as in the home appliances, in the computers as in the hi-fi systems, in agriculture as in biomedical.

Transport refrigeration does not make an exception.

To understand what will be the refrigeration unit of the future we have to ask ourselves:

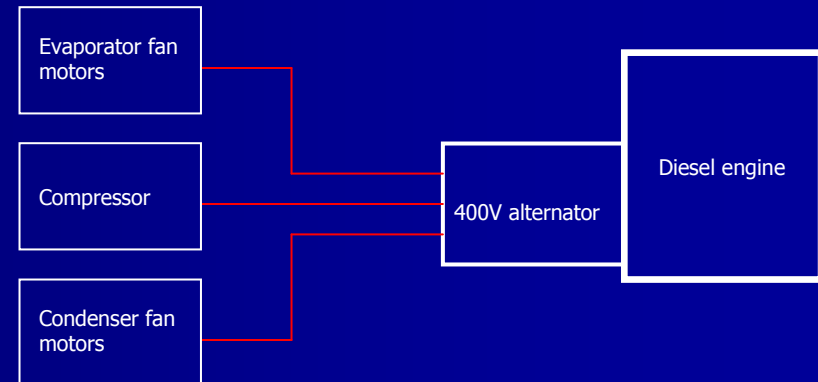
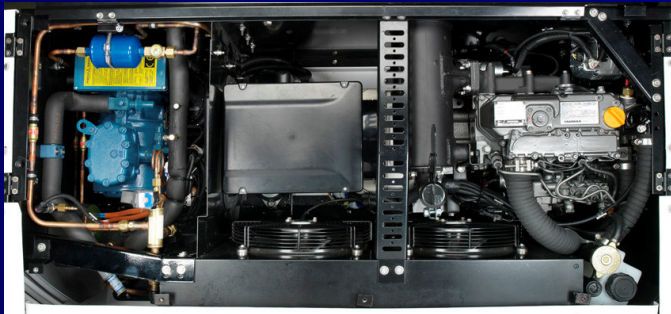
- Which one will better respond to these tendencies ?

The answer is easy: Diesel-Genset technology.

The new Eurofrigo D-Range.

TECHNOLOGY OF THE FUTURE

Technology schema



Future in transport refrigeration already has an History

- 8 years of continuous progress
- Third generation project
- Use of the most innovative materials
- reliable and powerful electronics
- Great success on all markets
- recognition of refrigerated transport professionals

POWER WHEN IT IS NEEDED

What is a performing refrigeration unit ?

When we say a refrigeration unit has, for example, 9000 W @ 0°C it means it absorbs up to 9000 W of heat at that condition. But nobody says "how" does it "absorb" this heat from the insulated body, in which progression.

Everybody knows what is the maximum output of a refrigeration unit, the manufacturer states that everywhere. But what about its distribution over the temperature range ?

Ordinary refrigeration units use condenser's exchanging surface low-dimensioned which force the manufacturers to keep the compressor suction capacity limited, this compromising the units' performance in high ambient temperature and even more important during initial pull down and temperature recovery.

All Eurofrigo D-range units have the adjective "performing" in common.

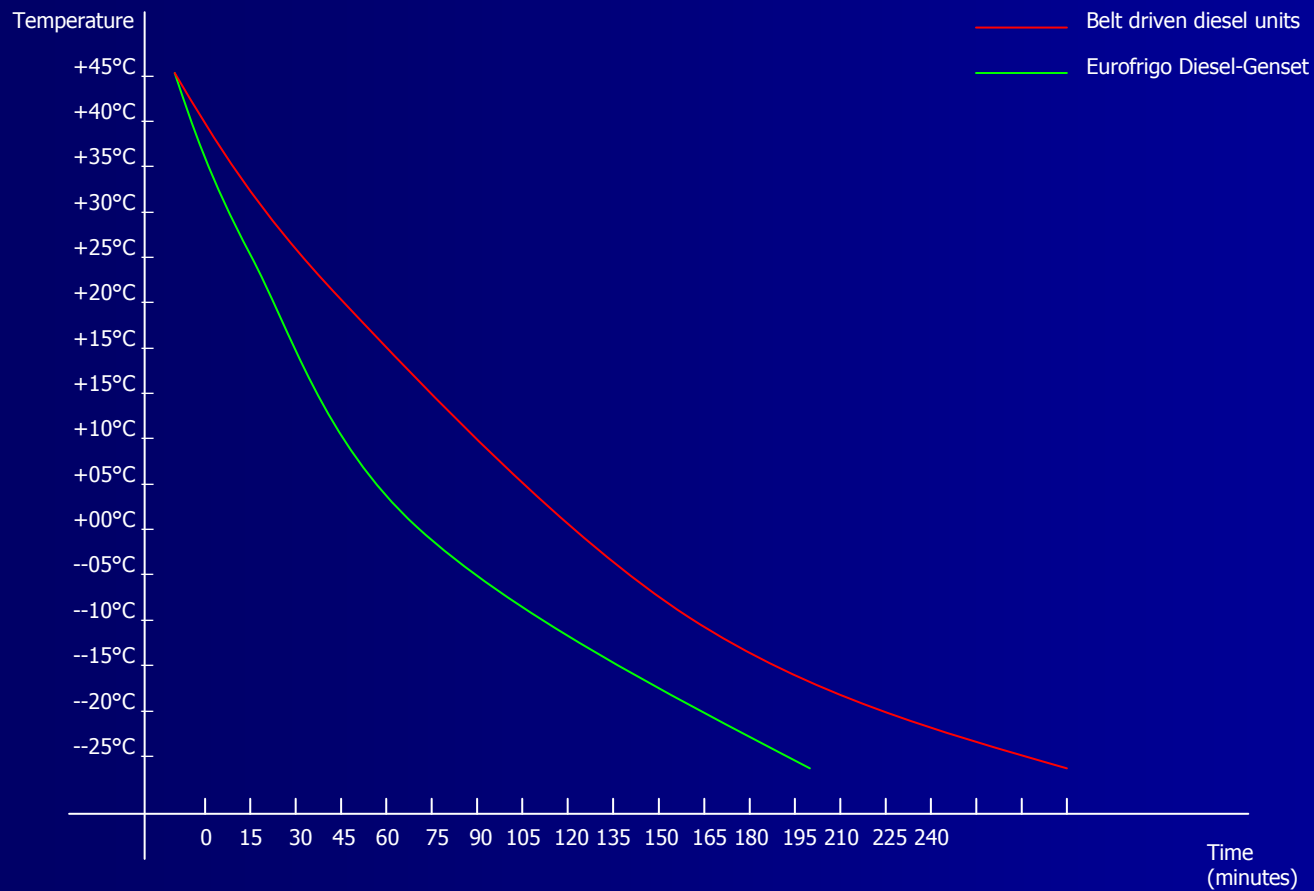
They are designed to supply power at high ambient temperature and with a large heat load on the evaporator coil, this making them the best pull down devices today available on the market but low on fuel consumption.

Maximum suction pressure can reach 3,5 bar (50 psi) against 1,8 bar (25 psi) and discharge pressure is, as average, 3 bar (42 psi) lower of a standard diesel drive refrigeration unit.

Performance are also supported by an evaporator air flow which is by average 35% Higher than in standard equipment.

POWER WHEN IT IS NEEDED

Pull down and recovery comparison diagram



SIMPLICITY: WELCOME WHAT IS NOT IN THERE

Experienced people says: "What is not in there cannot break down"

A simple thing always works.

At the same technological level and performance, to design a simple unit is much more difficult than designing a complex unit.

Simplicity is a target point. Complexity is often and antiquate way to solve problems. This is the main difference between a Diesel-Genset and an ordinary Diesel belt drive refrigeration unit.

Eurofrigo D-Range is the most simple and genial refrigeration unit because it has preserved, updating it, the robust and simple alternator drive technology together with Diesel drive technology

What is not there:

- Does not break down
- Does not weight
- Does not have to be paid
- Does not need maintenance
- Does not make us angry
- Makes what we have to do easy (and less expensive)

SIMPLICITY: WELCOME WHAT IS NOT IN THERE

In a Eurofrigo D-Range product these components are not used

- Transmission belts
- Engine clutch
- Pulleys
- Idlers
- Brushes
- Compressor shaft seal
- Speed solenoid
- In-cab thermostat harness

Number of components used in the system

Component	D-Range	Competitors
Nr. of belts	1	3 to 5
Nr. of bearings	1	10
Nr. of clutches	0	1
Nr. Of pulleys	0	5 to 7
Compressor shaft seal	0	1

MARKET'S LOWEST MAINTENANCE COSTS

When buying a new unit think about your future costs

Scheduled maintenance is a quantifiable cost, and vary a lot from unit to unit.
For certain model this is not a light thing.

Maintenance is an hidden cost to which only few think about.

But maintenance is an hassle too.

Practically it forces You to keep Your vehicle stopped and, sometimes, when it is should not.

Low mandatory maintenance means units' solidity

If a unit requires a lot of maintenance, frequent and complex, means it is fragile.

A unit, like an Eurofrigo D-Range, which require a very low maintenance is necessarily more robust.

No manufacturer would advise a service program below the one effectively needed during warranty period.

All Eurofrigo D-Range have a complete 2 years/2000 hours factory warranty on the entire system and the service requirement is limited to engine oil and filter change.

No other components require service.

Is not this a sturdiness guarantee ?

MARKET'S LOWEST MAINTENANCE COSTS

It is always a good practice to check other unit's components from time to time, especially if the unit has not to be used for a long period of time.

But it remain a great assurance knowing this is not compulsory.

And than what does this cost ? It has not to be considered a vehicle down time !

**EVERYBODY SAYS LOW FUEL CONSUMPTION.
EUROFRIGO D-RANGE PROVES IT.**

To talk about fuel consumption is difficult

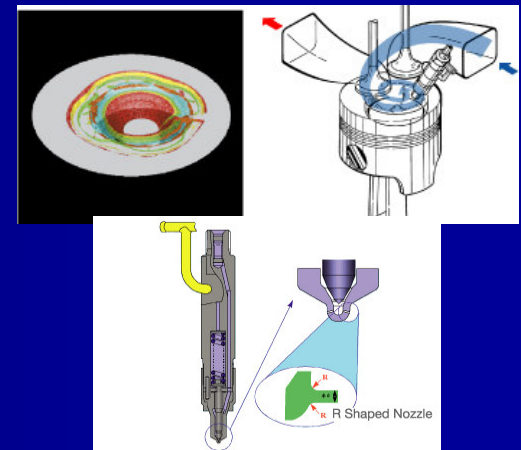
Fuel consumption depend on many factors, some not controllable, like the isothermal body status.
Or the number of door's openings.

So it would be inaccurate and in some case unfair to supply comparison table with the competition,
even if a lot of tests have been made in the EF labs.

Eurofrigo D-Range always obtain excellent fuel consumption results and, at the same working
condition, often below the competition.

How do we achieve these results ? Thanks to:

Lower engine rpm, new design injection nozzle, no transmission
forces involved, lower engine temperature, lower refrigerant
pressure, better refrigerating performance.



A MATTER OF OIL. WHO USE LESS OF IT ?

Oil consumption is proportional to engine speed and load

An engine running at low speed, at the right temperature and with a lower load consume less oil. This is proven.

Some manufacturer are forced to use large oil sump to compensate oil consumption and to avoid engine break downs, disguised by the reason to offer an extended oil service.

Oil service is important to preserve engine life and in any case it has to be made once a year, independently of engine hours.

If, for example the engine runs 100 hour only in a year, oil has to be replaced anyway and large oil quantity means more money.

Eurofrigo D-Range use the oil quantity expressly needed to carry out its job, to avoid hassle and to be nearly inexpensive.

Up to three times lower than the competition.

ECOLOGY, MEANS LOVE AND RESPECT FOR THE ENVIRONMENT

It is not only a matter of smoke

For sure, smoke is the most evident form of pollution, but to understand how a unit is eco-sustainable, in few words "modern", the following points have to be considered:

- Noise level
- Refrigerant leaks
- Oil waste
- Exhaust emissions (CO₂, NoX, particulate, etc.)

Eurofrigo D-Range have the lowest emissions:

- It is the quietest thanks to low engine rpm, absence of belts and low speed fan motors
- It has no refrigerant leaks thanks to its semi-hermetic compressor technology
- It uses less oil
- It has the lowest exhaust emission thanks to its lower fuel consumption and its high technology fuel injection system.
- It does not smoke.

SAFETY

It is not only a matter of accidents

If extreme cases are the most serious ones, in reality the so called "inconvenient" can be filed as the most frequent ones, cases which may cause annoyance, costs, fear, embarrassment.

A reliable unit may avoid a good part of them and to bring us out of the others.

For example: to transport a load of high temperature sensitive product giving peace of mind to the owner of the product; to be able to start a new trip fast and in every ambient condition; to be in a position to count on good performance margins even if some detail have been omitted; to have nearly 100% certainty that a failure is not going to happen (think: to loose Your product because of a broken belt, vehicle down time, the belts is not on stock)

Safety is designed like this

D-Range have been kept running in our labs for 2 years before getting the green light for the production in series. Every single component have been stressed out till it has broken to understand life cycle capabilities, and if a component did not last enough it has been re-designed, again, again till it does satisfy the minimum design requirement.

In the production line every single D-Range unit is operated in cooling mode with maximum load at +45°C (113°F) ambient temperature till compartment reach 0°C (32°F), than it is switch to heat mode till compartment reaches +20°C (68°F) and than back to cool. All valves and controls are factory set.

WHY TO CHOOSE AND EUROFRIGO D-RANGE

Are You planning to buy a new refrigeration unit ?

If You are planning to buy a new refrigeration unit you'll have to think your choice will influence for a certain period of time your job, but not only.

You should ask yourself:

- Am I buying the most modern unit available, the one technologically most advanced ?
Or something overcome or which is going to be ?
- Am I buying the easiest to be serviced and to be maintained refrigeration unit, which should give me less headaches ?
Or something, which I already know, will complicate my life ?
- Am I buying the most reliable, robust and easy going refrigeration unit ?
Or something I know will cost me a lot of money ?
- Am I buying the lowest total life cycle cost refrigeration unit ?
Or something, which I already know, will cause me to be charged for everything I do.
- Am I buying the most economical to be owned refrigeration unit, considering everything: fuel consumption, ordinary maintenance and repairs ?
Or something for which, I already know, I'll have to pay for this and that ?
- Am I buying the most environmentally friendly refrigeration unit which overcome all parameters required by the international legislations ?
Or something which gets there thanks to a miracle ?

WHY TO CHOOSE AND EUROFRIGO D-RANGE

Are You planning to buy a new refrigeration unit ?

Eurofrigo D-Range is not the only good system available on the market.
But it is the only one to have all these qualities all together and at the maximum level.

If You did not buy Your new refrigeration unit yet, why to renounce to what is the best ?

THE UNIT YOU NEED

A complete range

Here You can find the refrigeration unit which better adapt to Your needs.
Without approximation and compromises.

Eurofrigo D-Range offers a complete range of transport refrigeration units:

- 4 model for ever-cab installation
- 3 models for under-mount installation
- 1 model for trailer installation (available in 2009)

WARRANTY

The competitors offers 2 years also

But Eurofrigo D-Range warranty is complete and constant, and this formula has a precise value. It means the components are all covered (complete) and for 2 years/2000 hours (constant).

The competitors does not do this.

Some of them offers a "declining" warranty meaning some of the components are covered for 6, 12 or 18 months only, somebody else does not cover labor, or.....

What does this mean ?

We suppose the manufacturer does not feel confident on all the components, or frequent break downs have been noticed after that period of time and it may become too onerous for the manufacturer to assume the risk.

Otherwise why should not be they covering the entire system ???

And we go back to sturdiness, again.

Eurofrigo offers the maximum in terms of warranty because the D-Range are robust, and the risk of break-down is very limited.

But sturdiness of a refrigeration unit is first of all an advantage for the one who has to use it.

No other brand offers a better warranty than Eurofrigo D-Range.

Think about the reason.