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# WELCOME
## TO OUR WORLD

Engas Pty Ltd 2026

# Who Is Engas ?





THE COMPANY ENGAS WAS FORMED IN 2009 PURELY TO DEVELOP AND PROMOTE BLENDED HYDROCARBON REFRIGERANTS FOR AIR-CONDITIONERS & REFRIGERATION

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We operate from Perth, Western Australia.

We have Licensees/Users in most States in Australia.

We have many selected international Distributors throughout the world.
















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We have trained many 100's of technicians /air conditioning engineers both in Australia and Overseas.

We have carried out numerous Chiller conversions for larger clients – again both in Australia and overseas.

Each of our blended refrigerants have been developed and perfected in Perth, Western Australia.

We have been conducting Research and Development over the many years and are continuing to develop more products for the future.

# Who are the main Leadership Team ?





**Selwyn Wallace** – Managing Director

- A fully trained, experienced refrigeration and air conditioning engineer with over 40 years experience in the industry. With over 17 years experience working with hydrocarbon refrigerants.

**Darrell Crouch** *C.R.E.M. Reg. Build* – Administration and Marketing Director

- Darrell is qualified in three professions and has a strong commitment to value adding businesses and is and has been an owner and a substantial shareholder and company Director to many public and private companies over the past 40 years.

**Philip Fawkes**, Director, (Non-Executive Director)

- Phil has been involved in his own multi-million dollar businesses for over 40 years and has been involved with Engas for over 8 years now. His vast experience is invaluable to our team.

**Dr Ladas Taylor**. *B.Sc., PhD*.

- Has been in the refrigeration and air conditioning industry for over 45 years – having studied mechanical engineering both at Bachelor level and going on to Philosophy level later in life. Both disciplines include specialised hydrocarbon refrigerant development and enhancement.
- Overviewed by Engas Advisory Board, (Darrell Crouch - Chairman)
- Complimented by Sales Management and Office Manager, Staff and Employees.

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# HISTORY OF HC REFRIGERANTS





- Widely used between 1830 - 1930
- In 1930 – Du Pont introduced CFC known as R12 (non-flammable and efficient)
- After a few years, they introduced R22, R502 (HCFCs) and several other chemical refrigerants. (All Hydrofluorocarbons).
- These refrigerants were widely used throughout the world until the 1980s
- 1980s – World's Scientists called a meeting to discuss the discovery of the damage to the Ozone Layer (Montreal Protocol). An agreement was reached to phase out CFCs and HCFCs
- Chemical Refrigerant companies began developing new chemical refrigerants – HFCs
- Around 1990 – World's Scientists called for another meeting to discuss another Climate Crisis – Global Warming. They requested an immediate phase down of chemical refrigerants, (Hydrofluorocarbons – HFCs).

# What are “Engas” Hydrocarbon Refrigerants ?





- They are all Natural, Non Toxic and Climate friendly,
- They have minimal Ozone Depleting Properties,
- Engas registers almost Zero GWP (Global Warming Potential)
- Engas has higher Efficiency with substantial Energy Savings,
- It is recognised by ***ASHRAE (American Society of Heating Refrigerating and Air Conditioning Engineers)*** & ***AIRAH***
- Engas products are easy to install into existing refrigeration units and air-conditioners by way of a Retrofit,
- The retrofit for an existing air-conditioner must be conducted by a qualified fully trained air-conditioning Technician.

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# Advantages of Using Engas Refrigerants





- **Designed as a direct replacement for all existing Air-conditioning & Refrigeration Equipment,**
- **Highly Efficient Conductors of Heat,**
- **15% to 40% Savings on Electricity Consumption,** (Depending on Refrigerant)
- **High Critical Temperatures,**
- **Lower Operating Pressures,** (Less Stress On Equipment)
- **Only 40 - 50% Quantity of Refrigerant needed to Convert.**

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# Hydrocarbon Refrigerant Safety





- Hydrocarbons are used daily and safely throughout the world today for **Cooking, Heating, Powering Vehicles, and as Aerosol Propellants for Fly Spray, Deodorants, Whipped Cream and Cooking Sprays etc.,**
- The Application of Flammable Hydrocarbon Refrigerants can be done safely as with any other type of refrigerant.
- All Refrigeration & Air Conditioning Systems using Chemical Refrigerants can become flammable due to the oil mixing with the refrigerant as it travels around the system.
- Most Chemical Refrigerants produce **toxic by-products and poisonous gases** when they are burnt or over heated.
- Hydrocarbons **DO NOT** spontaneously combust on contact when mixed with air

# FLAMMABILITY

- All Refrigerants Burn,
- Lubricant Oil is the first Fluid to Ignite,
- When Lubricant Burns the Temperature produced is in the region of **1,600'C,**
- When Hydrocarbons Refrigerant burns the by-product is Carbon and Steam,
- When Chemical Refrigerants burn (CFC, HCFC, HFC,HFO) the fumes and the by-products produced are **Highly Toxic,**

| Chemical Refrigerant | °C |
|---|---|
| R22 | 740ºC |
| R410a | 750ºC |
| R134a | 647ºC |
| R290 | 475ºC |
| R600a | 480ºC |
| R32 | 530ºC |
| **Lubricant (Oil)** | **262ºC** |

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# Refrigerant R32



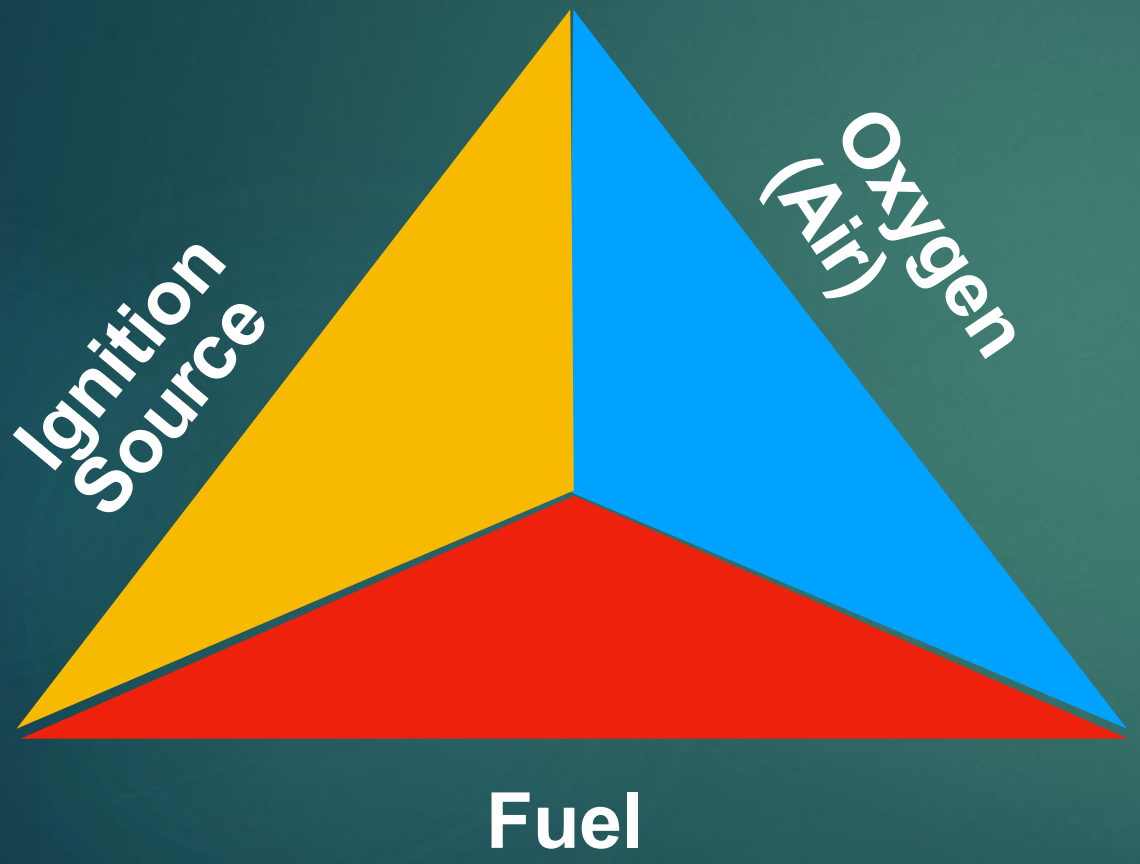


- Highly Flammable
  - Exactly the same international safety classification as Engas HC's ( Class 2.1)
  - Produces one of the worlds most lethal, if over-heated or burnt, (hydrogen fluoride),
  - The ASHREA classification – A2L – is the industry speak – lobbied by deep pocketed chemical companies,

Please be free to view any of the manufacturers MSDS's – they all state Highly Flammable Class 2.1

# The Flammability Triangle






- Here we have **all 3 elements** in place to have the potential for a fire or ignition
- You **MUST** have **ALL THREE** for any risk to occur

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# Where do we have daily uses of Flammable Hydrocarbons








**Average LNG Carrier**
**73,440,000Kgs Of Hydrocarbon**




**Airbus A380**
**320,000 Litres Of Hydrocarbon**



**Autogas Refuelling Station**
**20,000Kgs of Hydrocarbon**



**Home Gas Supply**
**2 x 45Kgs Hydrocarbon**

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# Where do we have daily uses of Flammable Hydrocarbons





LETS NOT FORGET OUR KITCHENS AND BATHROOMS ???




The approximate hydrocarbon contents of the above thirteen cans is over 1 kg basically double what you would find in a typical household split system

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| DAILY USE | Hydrocarbon QTY |
|---|---|
| LNG CARRIER | 74,440,000Kgs |
| PLANE | 320,000Kgs |
| REFUELLING STATION | 20,000 - 40,000Kgs |
| HOME GAS BOTTLES | 45 - 320Kgs |
| VEHICLE TANK | 50Kgs |
| BBQ | 4.5 - 15Kgs |
| HOUSEHOLD SPRAYS | 1.0Kgs > |
| AIR CONDITIONER | 0.40Kgs |
| REFRIGERATOR | 0.05Kgs |

# So if I can use Flammable Hydrocarbons Safely For ?



- Air Transport
- Vehicle Transport
- Cooking Food
- Deodorant and Fly Spray Cans
- Heating Water
- Heating Homes



## Why can I not use Hydrocarbons for cooling homes, restaurants, offices and hotels, etc.. ?

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# AUSTRALIAN STANDARDS





- AS 1677 has been in place since 1998. It has recently been superseded by AS 5149.
- AS 5149 includes comprehensive procedures for the safe use of all refrigerants including HCs.
- It is not legislation, it is a voluntary industry standard.
- All states treat the use of hydrocarbon refrigerant in much the same manner under Work Cover or Work Safe legislation.
- The legislation is outcome based and deals more with the duty of care to provide a safe workplace.
- It is essential to understand the current applicable Australian Standards for the safe use and correct application of HC refrigerants.
- AS 5149 is a minimum requirement for safety.

# Heads of Workplace Safety Authorities Australia





- A Position Paper was recently developed and released by the Heads of Workplace Safety Authorities, Australia. (HWSA) It provides information on the obligations of work health and safety duty holders with respect to the use of flammable refrigerant gases at workplaces.
- This paper concerns refrigerant gases classified as Division 2.1, flammable gases under the Australian Dangerous Goods Code.
- It covers the use of flammable refrigerant gases, such as hydrocarbons, flammable hydrofluoroolefins (HFOs, e.g. R1234yf) and R32.
- **It treats them equally.**
- Refrigerant R32 has the same dangerous goods safety classification as Engas hydrocarbon refrigerants, which is class 2.1 – flammable.
- In law, the rules set by legislation always take priority over those set by Standards.

# Heads of Workplace Safety Authorities





- Continued…
- Refrigerant gases must be compatible with the refrigeration or Air-conditioning system.
- This determination must be made by a competent person, who has experience in this matter and who may have undertaken relevant formal training.
- **A competent person,** is one who has acquired through training, qualifications or experience the knowledge and skills to conduct the task safely.
- Converting a refrigeration system to use an alternative refrigerant must only be conducted in accordance with advice from the original equipment manufacturer or a competent person.
- A refrigerant should only be used in equipment that is designed **or** re-designed for its use.

# BASIC PRINCIPLES AND WARNINGS





When applying a flammable refrigerant to a system that ordinarily uses a non-flammable refrigerant, the term “conversion” is applied. This is important, as it distinguishes from other phrases such as “re-fill”, “drop-in” and “retrofit”.

The reason for this is that when a non-flammable refrigerant (such as R12) is replaced by another non-flammable refrigerant (such as R134a), if any changes are required to the system, then they relate to performance (e.g., change of capillary tube length) or compatibility (e.g., change in oil type).

However, when changing from a non-flammable refrigerant (such as R22) to a HC refrigerant (such as R290), additional considerations must be taken into account. These include identifying whether or not the HC can be applied given the particular circumstances from a safety perspective, and if so, carrying out the required changes to the equipment that are related to mitigating the flammability risk.

A switch from a non-flammable to a flammable refrigerant should be considered in terms of an entire conversion of the equipment, not just a change of refrigerant.

## BASIC PRINCIPLES AND WARNINGS / cont

It must be emphasised that carrying out a system conversion to use flammable refrigerant necessitates careful consideration of the implications and it is essential to carefully assess the risks and benefits.

If a conversion is to take place, then it should be done comprehensively, with care and with attention to detail.

It must be understood that the conversion can only take place provided that the final product meets the requirements of the relevant safety standards and national regulations for the Country or Region or State where the equipment is located.

# ENGAS BUSINESS PROFILE





- We do not 'retail' our products,
- We do not sell our products to the general public,
- We will only sell to qualified refrigerant Technicians who have undergone hydrocarbon installation training – either direct with Engas or through the various Education Facility organisations throughout Australia who offer these courses.
- We do distribute through 'preferred' refrigeration trade outlets – on the understanding that they will never sell directly to the public.

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# CALCULATING FOR A SAFE CHARGE RATE

To ensure complete safety it is imperative to carry out detailed site calculations to ensure safety.
There are basic scientific rules we must adhere to when making these calculations
We must know the proposed HC refrigerant charge, and we must know the volume ($M^3$) of the area the unit is providing cooling/heating to.

# CALCULATING FOR A SAFE CHARGE RATE

The basic calculations to ascertain the volume of expanded vapour refrigerant from a known weight of liquid refrigerant are quite simple.

Hydrocarbon refrigerants are much less dense than most chemical refrigerants in current use.

For example 1kg of R410a is equal to 0.994 ltrs in liquid form
Whereas 1kg of hydrocarbon refrigerants is equal to 2 ltrs in liquid form

Additionally the expansion ration (from liquid to vapour) for hydrocarbon refrigerants is also much higher – being 270:1

# CALCULATING FOR A SAFE CHARGE RATE



To calculate the expanded volume of hydrocarbon refrigerants we take the following steps – let's use 1kg as an example

0.48kg x 2 (to bring it to ltrs) = 0.96 ltrs

0.96 ltrs x 270 (the expansion ratio) = 259.2 ltrs

259.2 ltrs divided by 1,000 (to obtain $M^3$) = 0.2592 $M^3$

# CALCULATING FOR A SAFE CHARGE RATE



Amount of hydrocarbon refrigerant charge compared to the chemical refrigerant they replace

## ENGAS REFRIGERANTS CHARGE WEIGHT GUIDE

| Engas Product Name | Composition | Replaces | Percent of original charge |
|---|---|---|---|
| M10 | R600a | - | 100% |
| M20 | R1270/R290/R170/R600a | R32 | 48 – 52 % |
| M30 | R290/R600a/R1270 | R12, R134a | 33 – 38% |
| M40 | R290 | - | 100% |
| **M40** | R290 | R22 R502 | 35 – 40% |
| M50 | R290/R170/R1270 | R22 R404 R407 R500 R502 | 33 – 38% |
| M60 | R1270/R290/R170/R600a | R410a | 48 – 52% |

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# CALCULATING FOR A SAFE CHARGE RATE

So now lets work out the room volume

Basic volume calculation of L x W x H – minus a small percentage due to the contents of the room (generally 5%)

7 m x 6m x 2.4 $m^1$ = 100.8 $m^3$

[1]This is the amount of space a 6kw unit/using 1kg of R410a would cool/heat

# CALCULATING FOR A SAFE CHARGE RATE

We have a room volume of 100.8 $m^3$

The 2% LFL threshold limit would be 2.016 $m^3$

So we have 1 kg of R410a providing cooling/heating for this area

Same unit, same room, would use 0.48 kg of Engas hydrocarbon refrigerant – and as seen on the previous calculation that equals

**0.2592 $M^3$**

**WHICH IS 12.857% OF THE LFL**

**20% of LFL = 0.4032%**

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# SUMMARY





- All existing Fluorocarbon Refrigerants will be phased out in the near future.
- Hydrocarbon Refrigerants can be applied correctly and safely just like all other refrigerants.
- By choosing Natural Refrigerants over Chemical Refrigerants you can gain an immediate financial benefit.
- You will also help our children and grandchildren to have a cleaner and brighter future.
- You will be contributing to the welfare of many future generations.




# THANK YOU FOR LISTENING!