



27th May 2007

Department of the Environment and Water Resources
Ozone and Synthetic Gas Team

PO Box 787
Canberra ACT 2601

Attention: Mr. Chris Young

Dear Sir,

Response to Discussion paper

“Ensuring the licenced installation of split system air conditioners in Australia”

AREMA members would like to thank the Department for extending the lodgement date for the above paper. The extension has allowed members additional time to consult with other industry groups and to analyse the comments made during the Department’s Australia wide public consultation meetings.

The enclosed submission represents a coordinated effort by both local and overseas manufacturers, importers & their technical staff.

AREMA members agree that, while some of the options 1 ~ 5 may improve compliance with the regulations, their negative effects outweigh the benefits of potential improved compliance.

AREMA is particularly concerned that Option 4 (nitrogen charging) is supported by some respondents. AREMA considers that adoption of this option would have serious environmental effects, impair safety in the industry and increase costs to consumers.

AREMA members strongly believe that those responsible for air-conditioning installation works, specifically the installer, must be made to take responsibility for their own actions. Manufacturers, importers & retailers can assist in the compliance process by collecting and providing audit information, but cannot control or be responsible for the final installation.

If the current regulations do not allow enforcement of that responsibility then they should be amended. To be effective regulations need to be publicised and enforced.

AREMA’s submission presents some alternative policy options. These include a proposed code of practice developed in consultation with other industry and retail associations. AREMA remains available to assist the Department in refining any possible policy options which could improve the quality of split system air-conditioner installations in Australia.

Yours faithfully.

A handwritten signature in black ink, appearing to read 'Bill Robertson', is written over a faint, illegible printed name.

Bill Robertson
President

Enc : Response paper



**Air-conditioning & Refrigeration Equipment
Manufacturers Association of Australia Inc**

**Response to the Department of Environment
& Water Resources Discussion paper**

**“Ensuring the licenced installation of split
system air conditioners in Australia”**

May 2007

Table of Contents

<u>EXECUTIVE SUMMARY</u>	3
<u>INTRODUCTION</u>	4
<u>THE PROBLEM</u>	4
WHY ARE INSTALLERS UNLICENCED?	4
WHY ARE INSTALLATIONS BEING PERFORMED BY UNLICENCED PERSONS?	5
<u>OPTION 1 – PAYMENT FOR INSTALLATION AT THE TIME OF PURCHASE</u>	5
<u>OPTION 2 – RESTRICTED SPECIALIST RETAILERS</u>	5
<u>OPTION 3 – VOIDING WARRANTIES FOR UNLICENCED INSTALLATIONS</u>	5
<u>OPTION 4 – NITROGEN CHARGE REGULATION</u>	6
NITROGEN CHARGING & THE ENVIRONMENT	7
COST TO CONSUMERS	9
OH&S CONSEQUENCES IF UNREGULATED GASES ARE USED AS REFRIGERANTS	10
NITROGEN CHARGING SUMMARY	10
<u>OPTION 5 – PRE-PAID INSTALLATION FUND</u>	10
<u>SOME IDEAS TO CONSIDER</u>	10
RETAILERS AND MANUFACTURE’S CODE OF PRACTICE	10
ESTABLISH A REGISTER OF ALL INSTALLATIONS:	11
AUDIT OF REFRIGERANT HANDLING LICENCE HOLDERS	11
CONSUMER ACCESS TO THE IDENTITY OF INSTALLERS WITH REFRIGERANT HANDLING LICENCES	12
VIA THE INTERNET	12
<u>CONCLUSION</u>	12

Executive Summary

The Department of Environment and Water Resources (DEWR) has produced a paper which proposes five options to improve the level of licenced installations of split system air-conditioners in Australia. The paper assumes that unlicenced installers will carry out poor quality installations which will lead to worse environmental outcomes for Australia.

The members of the Air-conditioning & Refrigeration Equipment Manufacturers Association (AREMA) represent the manufacturers and importers of most of the established brands of split system air-conditioners sold in Australia. In AREMA members' experience, poor quality installations are carried out by both licenced and unlicenced installers. Any further regulation should focus on establishing a process to provide for the auditing of individual installers.

AREMA considers that the number of unlicenced installations is unacceptable but will fall once the licensing system matures. Existing regulations do not offer strong incentives for installers to become licenced and with low unemployment and a resources boom, many installers with other trade qualifications rather than refrigeration / air-conditioning qualifications, are reluctant to go through the process of proving their competencies in refrigeration / air conditioning, or being trained in these competencies in order to become licenced.

Because of the severe shortage of licenced installers, employers are reluctant to enforce a requirement for air-conditioning qualifications. However, the initiation of enforcement action under the refrigerant handling licensing regulations by authorities would see a reduction in the number of unlicenced installers.

This paper examines each of the proposed options and offers comments on each. Of most concern to AREMA is the option which proposes that the refrigerant be removed from the outdoor unit of the split system after testing at the factory and the unit shipped with a nitrogen or other type of holding charge, which must then be removed and replaced with refrigerant by the installer at the installation site.

AREMA considers that if implemented, this option would produce far worse environmental outcomes than presently exist and increase costs to consumers.

Finally AREMA proposes some additional options which our members believe will improve the operation of the current regulations.

Introduction

This paper sets out the Air-conditioning & Refrigeration Equipment Manufacturers Association (AREMA) submission to the Department of Environment and Water Resources (DEWR) options paper on ensuring the licenced installation of split system air-conditioners in Australia. The paper follows the format of the (DEWR) options paper examining the extent of the problem, the environmental consequences, and then addresses each of the options before proposing an alternative package which AREMA members consider would provide the optimum environmental outcome.

AREMA was established in 1980 and is the primary industry association representing manufacturers and importers of air-conditioners in Australia. Its members are responsible for the majority of the 750,000 plus, single split system air-conditioners imported & sold annually in Australia. These units are generally the well known established brands sold through specialist dealers or electrical retailers. Importers of brands sold through hardware stores, supermarkets, weekend markets, etc, are generally not members of AREMA.

The Problem

Poor workmanship at the time of installation can lead to direct emissions and may result in the air-conditioner operating at less than rated output. It will therefore either never achieve the desired indoor comfort level, and/or consume more energy to achieve the desired comfort level.

There is little data on the number of installations which lead to direct emissions and/or an increase in indirect emissions in Australia and it is difficult to gauge how severe a problem it is until a mechanism for the audit or certification of installers and possibly their work is implemented. However, just because the extent of the problem is unknown doesn't mean that steps to alleviate it should be delayed. The primary concern should be the costs imposed on consumers and industry versus the benefits accruing to the environment.

In AREMA members' experience, the most common reasons for a potential increase in direct emissions are:

- Improper brazing processes which leads to system leaks & contamination.
- Improper flaring techniques on connecting pipes which lead to refrigerant leaks.
- Inadequate leak testing procedure before evacuation & charging.
- Inadequate or no evacuation of the interconnecting piping & indoor unit.

Why are Installers Unlicenced?

- The current licence regime is relatively new. AREMA campaigned for its introduction but did not expect it to fix the industry overnight, especially in light of

the differing requirement of the state licensing authorities.

- In addition to this confusion, many of the current installers who have come into the industry from other trades already consider themselves licenced “electricians”, “plumbers” or “motor mechanics” and hesitate to undertake the additional effort to become a licenced refrigeration and air-conditioning technician until they see some economic imperative (for example, dismissal) or some enforcement action. The fact that these installers are unlicenced does not mean they are poor tradesmen or poor installers.
- A reluctance of installers to invest in the educational or assessment process due to the additional financial burden and perceived time needed to become licenced.
- Lack of consumer awareness in the broader community of the legislation & the requirement to use a licenced person.
- Lack of enforcement of the legislation.

Why are installations being performed by unlicenced persons?

- Lack of licenced technicians to meet the demand.
- Ease of purchasing by the consumer of split systems and in some cases the material to do the installation.
- Consumers are often unaware of the need for the installation to be done by a licenced person.
- Cost of the unit in comparison to the cost of a licenced installation.

Option 1 – Payment for installation at the time of purchase

AREMA acknowledges the benefits and drawbacks outlined in the DEWR paper. AREMA considers the drawbacks and problems outweigh the benefits.

Option 2 – restricted specialist retailers

AREMA does not support this option as it would seriously lessen competition and reduce consumer choice. It also suffers from high compliance and enforcement costs.

Option 3 – voiding warranties for unlicenced installations

AREMA acknowledges the benefits and drawbacks outlined in the DEWR paper. While the option as described in the paper cannot be implemented, AREMA supports the concept in principle.

Implementation in its current form is not possible because warranty cannot be "voided" as it is given as a right at law under the Trade Practices Act & various State laws. The ACCC may allow "conditional warranty" under some circumstances after application to the ACCC.

A manufacturer can decline to pay any "claim under warranty" where the failure cannot be evidenced to a failure of the product or components supplied by that manufacturer.

Option 4 – nitrogen charge regulation

AREMA does not support this option and believes it would lead to a worse environmental outcome than the current practice of importing & installing pre charged equipment.

In addition, it would increase the cost of the installed system to the consumer and may lead to the use of refrigerants for which the systems are not designed. While there have been claims made that there is a need in many cases to add or remove refrigerant from a pre charged system, the experience of manufacturers, retailers and qualified installers is that as long as the manufacturer's guidelines are followed, there is never a need to remove refrigerant.

In cases where the installation has a longer run of pipes than the standard length, the installer will have to add refrigerant according to the manufacturer's instruction. The adding of refrigerant to a pre charged system does not lead to direct emissions as long as the installer ensures any refrigerant left in the charging lines is not emitted.

The effects of nitrogen charging can be broken into three areas.

1. Worse environmental outcomes due to the far greater chance of:
 - a. Direct emissions due to venting the nitrogen which may have entrained refrigerant left from the manufacturing process.
 - b. Direct emissions during a more complicated and less controlled field charging process.
 - c. Direct emission due to multiple decanting from bulk supply to field use cylinders
 - d. Direct emissions due to a higher failure rate vs precharged equipment requiring the refrigerant to be reclaimed, the system evacuated and the system recharged. (see annexure 1)
 - e. Increased indirect emissions because the factory production processes require the units to be charged with the refrigerant for which it was designed and then run tested to ensure compliance with specification & minimum performance standards. If nitrogen is the shipping charge then the original refrigerant has to be recovered, if the refrigerant charge is a HFC blend it will have to be destroyed or reprocessed. Both of these processes require additional energy consumption in the manufacturing process.

- f. Increase indirect greenhouse emissions because even with longer evacuation times, field evacuation will not easily remove nitrogen from the compressor oil. The remaining entrained nitrogen will reduce system performance.
 - g. Increased indirect emissions because of the difficulty of accurately charging the system with the correct refrigerant and/or the correct amount of refrigerant in the field leading to less than optimal performance.
 - h. Increased indirect emission in collection, transport & disposal of refrigerant recovered due to incorrect charging processes.
2. Higher costs to the consumer.
- a. Increased installation time due to increased time for evacuation and recharging. This can be up to three times as long compared with pre charged equipment. (see annexure 1)
 - b. Higher cost of the refrigerant at the consumer level.
 - c. Higher cost of manufacturing due to added processes in the factory.
 - d. Potential increased energy consumption due to incorrect amount of refrigerant or the incorrect refrigerant.
 - e. Unclear warranty responsibility for the refrigerant in the system leading to denial of warranty on the system by both the installer and the manufacture.
3. Incorrect refrigerants being used.
- a. OH&S consequences if incorrect refrigerants are used e.g.
 - i. R-410A in R22 systems
 - ii. HCs in any system.
 - b. Premature failure of systems.
 - c. System will not operate as designed and rated.

Nitrogen charging & the environment

Modern air-conditioners are complex machines requiring proper evacuation of the system and a very accurate refrigerant charge. It is not technically nor economically practical to replicate factory levels of quality for processes performed in the field during installation.

Additional atmospheric refrigerant discharges during installation and service

For pre-charged equipment, a vacuum needs only to be pulled on the interconnecting pipe work and indoor unit. A good vacuum can normally be pulled in less than an hour with good quality equipment, correctly maintained. Having a holding charge of nitrogen in the outdoor unit would dramatically increase the time required to properly evacuate the complete system of nitrogen.

The outdoor unit is designed & mass produced for a world market where equipment is sold pre-charged. It has compressor oil, components and other control devices that make it difficult to fully evacuate the nitrogen in a reasonable time using field quality equipment & work practices.

To achieve a comparable level of evacuation purity as achieved in a factory, an installer's vacuum pump would need to run for many hours. This is mainly due to nitrogen being entrained in the oil and the fact that field vacuum pumps can't match the quality or capacity of vacuum pumps used in a factory environment.

Few installers would be prepared to leave their equipment connected and running overnight at most sites. The result is that installers will cut corners and leave some nitrogen in the outdoor unit or they will attempt to flush the remaining nitrogen out by overcharging and atmospheric discharge of the refrigerant may result.

Modern air-conditioners are sensitive to the charge amount. If over charging or short charging of even a few grams occurs, the failure rate of the air conditioning system increases, resulting in increased risk of atmospheric refrigerant release when outdoor units are recharged, replaced or repaired.

Notwithstanding the fact that most field equipment would have trouble dispensing a refrigerant charge of sufficient accuracy, many outdoor units are often located in difficult locations where installers will find it difficult to use their charging equipment as it was designed. With pre-charged equipment there is rarely a need to have dial-a-charge /scale equipment and refrigerant bottles on site during installation.

Data from a leading Japanese manufacturer shows that field charging results in failure rates approximately 100 times higher than factory charging. This is not just due to the accuracy of factory equipment but also to the reduction in the human failure rate due to the systematised processes used in the factory where double and triple checking are normal mass manufacturing processes.

Finally, nitrogen charging will result in a small but measurable increase in atmospheric discharges because the refrigerant left in the installer's charge hose at the end of each installation could be released to the atmosphere but the refrigerant left in the factory charge hose is never discharged into the atmosphere.

Additional atmospheric refrigerant discharges during manufacture

HFC cannot be recycled because it is a blended refrigerant and changes composition in contact with refrigerant oil and on removal from the system. The charge added to machines overseas for testing would need to be evacuated and destroyed before shipment to Australia. As destruction is more costly than atmospheric release, it is probable this refrigerant will be released to the atmosphere in countries with less stringent regulation than Australia.

Even after each unit destined for Australia is evacuated on a high performance energy intensive vacuum pump, sufficient HFC may have dissolved into the refrigerant oil and threaten contamination of the new refrigerant on recharge. In addition, any of the HFC that remains in the unit may be released with any holding charge. The units cannot be shipped without oil.

Removing this HFC contaminated oil in the field will be difficult and installation staff could resort to flushing the system with new HFC and oil resulting in atmospheric discharge of HFC, HFC contaminated nitrogen and HFC contaminated oil.

Switch to HCFC

The difficulty in achieving a satisfactory installation with machines using HFC's may result in independent installers switching to HCFC machines in order to minimise installation difficulty and subsequent warranty reworks. While HCFC is an easier refrigerant for installation, requiring less complex equipment and operating at lower pressures, it is far more damaging if released. It is also only manufactured in developing countries where the release of waste products produced during its manufacture are producing an ozone depletion effect as well as greenhouse effect.

AREMA considers that any policy which leads to an increase in the use of HCFC refrigerants should be avoided.

Inefficient installations

As covered earlier, for a number of reasons, it is difficult for installers to completely evacuate all the nitrogen from the outdoor unit and to accurately inject the exact quantity of refrigerant. If they get one or the other wrong the machine won't operate satisfactorily and will need to be fixed. If one or the other is slightly off the machine may operate but not at its design efficiency.

The consumer may not notice this reduced performance or if they do, they will put it down to optimistic advertising by the manufacturer or installer. So the machine will run harder and use more energy for its installed life leading to more indirect emissions.

Cost to consumers

Additional costs to the consumer can be divided into the additional costs of production and installation and the additional costs to operate a system with a less than optimal installation.

The cost of evacuating and disposing of the refrigerant used at the time of manufacture plus the cost of separate production facilities for the small Australian output of the overseas manufacturers will add to the cost of the unit.

For the average split system, the differential in the cost to the consumer of the HFC R410A or HCFC R-22 (if available) from the factory vs being supplied by the installer would be approximately \$110 or \$75 respectively. The extra time taken to properly evacuate and charge the unit in the field would add approximately \$100 to the installation cost.

Based on 1 million units being installed per year and an average increased cost of \$200, the direct increased cost to the consumers would be \$200 million dollars per year. Further, the increased cost of energy consumption because of the improper installation due to equipment being pre charged with nitrogen must be added to the annual running costs over the life of the equipment.

OH&S consequences if Flammable gases are used as refrigerants

Flammable HC (Hydrocarbon) gases have been marketed as replacement refrigerants to DIY motor mechanics in the past. Although now prohibited for motor vehicles under some state OH&S legislation, DIY and unlicensed installers may turn to HC gases if access to safer gases becomes difficult due to authorisation & licence requirements.

Many air-conditioners may operate on HC refrigerants but are not rated for MEPS or approved by manufacturers for safety using HC. Because the units and interconnecting piping have not been designed for a flammable refrigerant, any refrigerant leaks could result in an explosion. There have been reports of serious injury in the past when RAC technicians have attempted to repair commercial refrigeration equipment which was retrofitted with a HC refrigerant contrary to the manufacture's instructions...

Nitrogen charging summary

AREMA concedes that nitrogen charging may reduce unlicensed installations but it considers the environmental, safety and other risks are too great a cost when other options are available. It is only a responsible option if the goal is to reduce the number of unlicensed installations regardless of the cost to the environment and consumers and the effect on public safety.

It is our belief that most installations are already undertaken by licenced technicians or by unlicensed installers (with the skills to be licenced if they took the time to go through the processes) who achieve a good quality installation. Nitrogen charging would result in a significant proportion of their installations becoming "less than optimal" with the resulting unintended consequences.

Option 5 – pre-paid installation fund

AREMA considers this option is unworkable and is open to fraud and misuse.

Some ideas for consideration by government.

Retailers, sellers and Manufacture's Code of Practice

Retailers sell approximately 60% of split systems of less than 18kW capacity. Their direct involvement in a future regulatory process is critical. As a starting point, a code of practice covering the sale of split systems of less than 18kW capacity would strengthen the operation of the regulations.

Items that may be considered for inclusion in the code:

- A requirement that retailers & sellers have purchasers sign documents that:
 - Clearly point out the legal requirement that the unit be installed by a licenced technician;

- Advise the customer that they may void the manufacturer's warranty if the unit is not installed by a licenced technician;
- Give the retailer / seller the right to divulge details of the purchaser and the installation to the regulator and the equipment manufacturer.
- The purchaser agrees to register the installation with the manufacturer/importer.
- Retailers to keep a register of the serial number of each unit sold and the purchaser's details.
- Advertising to include the need for licenced installation.
- Manufacturers/importers to:
 - Highlight on all documentation, including packaging, that unlicenced installations are illegal and may void the warranty.
 - Notify the appropriate authority of any installation, done by an unlicenced person
 - Require the licence number of the installer before processing a warranty claim.
 - Keep model & serial number records of shipments to resellers.
 - Give to authorised parties or regulators details of shipments & installation details without breaching privacy laws.

Establish a register of all installations:

A national register of all installations would assist in the compliance process. The register could incorporate, or be modelled on current state based reporting systems in the electrical trades.

The Victorian Plumbing Industry Commission requires that a record of every air conditioning installation carried out in Victoria be lodged with the Commission. Random inspections of installations are carried out. If the installation is on the Commission's database the auditor can assess the tradesman's work. If not, the auditor can follow up the identity of the installer with the building owner.

Audit of refrigerant handling licence holders

The Australian Refrigeration Council must have the ability to audit refrigerant handling licence holders. To be effective the regulations must be changed to allow ARC to audit refrigerant handling licence holders.

Consumer access to the identity of installers with Refrigerant Handling Licences via the internet

If consumers could check whether their installer was licenced, they would quickly put pressure on unlicenced installers by cancelling installations or demanding significant discounts. Easy access to a database of licenced installers along with a minimal consumer awareness campaign would quickly reduce the number of unlicenced installations.

Conclusion

AREMA believes the DEWR discussion paper has made a good start in addressing problems with the current licensing regime. But AREMA is concerned that some of the solutions proposed do not address the failings in the current system but seek to apply a technological fix that will lead to unintended outcomes detrimental to the environment and consumer welfare.

AREMA remains ready to discuss these views expressed in this paper with the Department or other stakeholders.

14th May 2007

PRE-CHARGED VERSUS NITROGEN CHARGE

As a local manufacturer of split ducted units, we have compared our range of 7kw-20kw units that were shipped pre-charged with refrigerant versus our units that were shipped with a nitrogen charge.

Based on the total number of service calls placed and carried out over a five year period, we found that units that were **not** pre-charged with refrigerant were **200%** more likely to have failed on comparison to the units that **were** pre-charged.

The types of service calls investigated were based on the following faults;

- Undercharged units
- Overcharged units
- Units with non condensables in system
- Compressors failed due to overcharge
- Compressors failed due to undercharge

Further concerns related to shipping units with nitrogen only charge are outlined below;

- From the installers / commissioning technicians perspective
 - Difficult to charge up with refrigerant in extreme conditions
 - Having to carry and pay for the refrigerant
 - Evacuation procedure taking 3 times longer
 - A risk to the environment should also be considered due to a higher possibility of gas emissions from the fact that the commissioning technician now needs to connect a refrigerant bottle to the system to charge the unit.
 - Jobs taking longer to complete due to the concerns above
- From the consumers perspective
 - Energy wastage of units operating either undercharged or overcharged
 - Extra cost due to the installer spending more time on the installation
- From the manufacturers perspective
 - The risk of contaminating POE oil in R410A compressors due to the system being potentially open to the atmosphere
 - Increase in warranty costs due to the increase in service warranty calls

Kind Regards



Jim Barlas
National Service Manager