Requirements for water heating activities and space heating and cooling activity - Consultation Response

Emerald

November 2024

EXECUTIVE SUMMARY

1. Proposed changes to guidance and record-keeping requirements for decommissioning and disposal

In general Emerald agrees with the record keeping requirement for decommissioning and disposal of systems. Emerald requests that the ESC give clear guidelines on when a Gas ducted systems can be left on site.

2. Proposed changes to record-keeping and VEEC assignment/creation form requirements relating to space heating and cooling product sizing and pricing

Emerald agrees with the record keeping requirements however, the current VEU sizing guide does not account for advanced AC technologies like VRF systems, which maintain high capacity with lower input power and greater efficiency at partial loads. Emerald's VRF ducted systems, sized for peak load but operating efficiently at part loads, provide higher Coefficients of Performance (COP), reducing energy use and extending equipment lifespan. Compared to VEU RAC-approved products, Emerald VRF systems offer 55% more heating capacity with lower input power, achieving 44% greater efficiency. A cost analysis on 10,000 installations shows that Emerald's system could save over $10 million in annual energy bills in Victoria due to its superior efficiency, positioning it as a leading energy-efficient HVAC solution.

3. Replacement of existing ductwork when replacing ducted gas heaters with ducted reverse cycle air-conditioners

Replacing all existing ducting in homes is costly, environmentally wasteful, and impractical, making ducted systems less viable compared to multi-head alternatives. Multi-head systems are intrusive, prone to refrigerant leaks, and are not like-for-like replacements, leading to suboptimal customer experiences. Replacing ducting has minimal energy savings benefits and requires costly structural changes, particularly in older Victorian homes. Reusing existing ducting, as demonstrated by Emerald's successful VRF AC ducted installations, offers a cost-effective, efficient, and eco-friendly solution, with positive feedback from installers and end users. Competing retrofit-friendly products, like those from Braemar/Sealy, highlight the viability of using existing ducting, enhancing the retrofit HVAC market where ducting is suitable for reuse.

RESPONSE TO QUESTIONS

1. Do you have any feedback on the proposed decommissioning guidance for water heating and space heating and cooling activities? Do you consider the guidance to be practical and achievable? If not, why?

None

2. Do you have suggestions for alternative steps installers should be taking to decommission water heating and/or space heating and cooling products?

None

3. Do you have feedback on the proposed records that accredited persons must collect and maintain to evidence the decommissioning of water heating and/or space heating and cooling products? Do you consider the requirements to be practical and achievable? If not, why?

We support requiring accredited persons to provide geo-tagged photographic evidence confirming that the baseline product has been permanently disabled. This aligns with proposed changes to prevent the reuse of replaced products, ensuring they are properly decommissioned and replaced with more efficient alternatives. This measure reinforces our commitment to maintaining robust decommissioning practices

4. Do you have suggestions for alternative or additional forms of records that could be provided to verify the decommissioning of water heating and/or space heating and cooling products?

None

5. Do you have feedback on the proposed removal of records that accredited persons must collect to evidence the disposal of water heating and/or space heating and cooling products in compliance with the EP Act and its regulations?

None

6. Do you have any feedback on the proposed record-keeping requirements for space heating and cooling activity in relation to appropriate sizing of products? Do you consider the requirements to be practical and achievable? If not, why?

a. Provide the energy consumer with a copy of the current VEU Space Heating and Cooling Consumer Fact Sheet, as published on the department's website; and

Emerald agrees with customer receiving the VEU Space Heating and Cooling Consumer Fact Sheet.

The sizing guidelines in the consumer fact sheet are based on a kW per square meter value. This is fine for a high-level sizing guideline but does not take the variance in AC technologies available. For example, there are VRF (Variable Refrigerant Flow) systems which have high capacities with lower input power required. These systems also have higher COP (Co-efficient of Performance) at part loads. A detailed description can be seen in appendix A.

Emerald recommends that the VEU Fact Sheet should be continued to be used as information for homeowners but not enforced as an installation requirement.

b. Give clear and accurate information to the energy consumer about the suitability of the product to be installed for the heating and cooling needs of the consumer having regard to the consumer's premises; and

Emerald agrees with this requirement. This information can be supplied easily through in documentation form. 1 pager product explanation or specs or brochure.

c. Advise the energy consumer on whether the size of the product to be installed is consistent with the size recommended in the VEU Space Heating and Cooling Consumer Fact Sheet

Emerald agrees, but not only the size based on kW should be considered. The efficiency of the product should be supplied. Recommended information to be provided is the information on the VEU register such as the ACOP, AEER and THPF & TCSPF for the respective climate zone. This information is constant across products and is easily available on the VEU register of products.

7. Do you have suggestions for alternative or additional forms of records that could be provided to evidence that products installed have been appropriately sized to meet the heating and cooling needs of the consumer having regard to the consumer's premises?

Emerald agrees that under sizing AC systems is a poor outcome for consumers due to the heating and cooling demands not being met.

Oversizing of AC systems can lead to higher energy bills for certain AC technologies. There is a range of technologies available for AC systems. These range from VRF, RAC, muti-split systems. These products also vary with quality and performance within these categories.

The current VEU sizing guide does not account for advanced AC technologies like VRF systems, which maintain high capacity with lower input power and greater efficiency at partial loads. Emerald's VRF ducted systems, sized for peak load but operating efficiently at part loads, provide higher Coefficients of Performance (COP), reducing energy use and extending equipment lifespan. Compared to VEU RAC-approved products, Emerald VRF systems offer 55% more heating capacity with lower input power, achieving 44% greater efficiency. A cost analysis on 10,000 installations shows that Emerald's system could save over $10 million in annual energy bills in Victoria due to its superior efficiency, positioning it as a leading energy-efficient HVAC solution.

Full details of the above can be seen in Appendix A.

8. Do you have any feedback on the proposed record-keeping requirements for the space heating and cooling activity in relation to the pricing of upgrades? Do you consider the requirements to be practical and achievable? If not, why?

Emerald agrees with the record keeping method.

9. Do you have a position on whether installers should be required to replace existing gas ductwork and duct fittings when upgrading from a ducted gas heater to ducted RCAC under the VEU program?

Currently, consumers are not given a choice between ducted and multi-head systems, with the market gravitating toward multi-head systems as they are simpler to sell. While multi-head systems have a place in the market, ducted systems are often the preferred option for a like-for-like replacement. Allowing the reuse of existing ducting would improve the commercial viability of ducted systems, enabling installers to offer both options.

Replacing all the existing ducting is wasteful, costly and impractical.

The energy saving benefits of replacing all the existing ducting are negligible when compared to the capital costs to replace all the ducting.

The customers options are kimited to multi-head system which are more intrusive in homeowners' houses, not a like for like replacement and prone to issues mainly due to increased risks of refrigerant leaks.

1. **Wasteful**
   Flexible ducting has a typical lifespan of 20–25 years. Mandating the replacement of all existing ducting would lead to significant waste.
   - **Environmental Impact**: Replacing good ducting unnecessarily would add to landfill waste and increase the burden on local recycling facilities.
2. **Cost Considerations**
   Installing a ducted air conditioning (AC) system is already more costly than a multi-head system. The estimated cost to replacing all the exiting ducting is estimated at approximately $3,000. This makes ducted systems unfeasible compared to multi-head alternatives. These costs are due to:
   - **Labour Costs**: Additional time and expenses are incurred in ductwork removal and transporting the materials to waste management sites.
   - **Material Costs**: Replacing ducting requires new materials, further adding to project costs.
3. **Practicality**
   In many Victorian homes, particularly double-story houses, existing ductwork cannot be replaced without extensive structural changes, such as removing walls or ceilings. It would be unreasonable to replace the ducting in risers and hard to reach places. This requirement would make it impossible to install ducted systems in these properties.

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existing ducting would improve the commercial viability of ducted systems, enabling installers to offer both options.

<u>Multi heads vs Ducted systems:</u>

- Replacing the existing gas ducted system with a multi-head system is not a like for like replacement.
- The multi-heads are more intrusive in the home. An indoor unit gets mounted on the wall in every space in the house that requires conditioning.
- The multi-head systems have higher probability of refrigerant leaks due to more refrigerant piping runs required.
- It is unclear how replacements will work for multi-head systems in the future.

Energy Efficiency Considerations

Results: See Appendix B for full explanation.

The annual energy bill increases due to higher pressure on the systems due to smaller ducts is $55 per year.

The annual energy bill increases due to insulation rating R0.6 to R1.0 is $10 per year. (Mild Zone)

The annual energy bill increases due to insulation rating R0.6 to R1.5 is $24 per year. (Cold zone)

Total energy bill increase over 1 year in a cold climate zone = $79 per year.

10. Are you familiar with these "easy replacement" ducted RCAC products that are being marketed as being suitable for connection to existing gas ductwork? Do you have views

Installation Experience and Product Performance

Emerald has successfully installed approximately 15-20 of the 20 kW Cooling VRF AC Ducted systems, with the majority of these installations reusing a portion of the existing ductwork. Feedback from both installers and end users has been positive, highlighting the practicality and effectiveness of using existing infrastructure where feasible.

Installer and End User Satisfaction

- **Installers**: Feedback has been consistently positive, with installers noting the efficiency and ease of retrofitting Emerald's VRF systems with existing ductwork.
- **Consumers**: Satisfied with the system's performance, particularly with its ability to meet heating and cooling demands.

Product Performance

- **Adequate Pressure and Air Volume**: The system's pressure and airflow capacity (250 Pa) are sufficient to meet heating and cooling demands.
- **Adjustable fan speed**: Users can adjust airflow to manage high airflows, enhancing comfort and efficiency.

Market Comparison

Emerald is also aware of competing products, such as those offered by Bramer/Sealy, that are marketed as suitable for reuse with existing ducting. Bramer/Sealy has over 52 years of experience, establishing a strong reputation for reliable retrofit solutions in the industry. These systems, like Emerald's, are well-suited for the retrofit market, offering viable solutions for homeowners and commercial properties looking to upgrade their HVAC systems without incurring extensive duct replacement costs.

Reusing existing ducting design checklist

Emerald has provided the recommend design checklist when reusing a portion of the existing ducting. See Appendix C

SUMMARY

Emerald would like to thank the ESC for the opportunity to respond to this consultation. The engagement through the consultation has been excellent and is well received by Emerald and industry.

If you have any further questions in relation to our response, we welcome the opportunity to further elaborate on our key points.

Regards,

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Appendix A – AC Systems performance

VRF (Variable Refrigerant Flow) systems which have high capacities with lower input power required. These systems also have higher COP (Co-efficient of Performance) at part loads.

AC systems are sized for peak load, often referred to as the "design day," which represents the highest anticipated cooling demand. This peak load generally occurs in the late afternoon, around 4 pm, when the sun's angle intensifies solar gain through windows, and the building has absorbed the most heat. Additionally, it's typically when household appliances and occupants contribute to the indoor heat load. The system is therefore sized to handle this maximum capacity.

However, the system will rarely need to operate at full capacity and will run at part loads, typically ranging from 40–60%, for most of the year. This is critical because under sizing would force the unit to operate at or near maximum capacity more often, which reduces both efficiency and equipment lifespan.

COP Variation with Load Levels

The Coefficient of Performance (COP) of AC systems, including fans, generally decreases as they approach full capacity due to increased energy demands for cooling or heating. Emerald's self-adapting system logic adjusts according to demand, offering flexibility and responsiveness to varying load conditions. Here's how COP typically changes with load:

1. **Higher COP at Partial Loads**: Operating below maximum capacity (e.g., 40–60%) allows the system to run more efficiently. The fans and compressors consume less energy for the output produced, resulting in a higher COP and improved energy use per unit of cooling or heating.
2. **Lower COP at Full Capacity**: As the system nears 100% capacity, COP decreases. At this level, both fan and compressor motors run at maximum effort, increasing energy consumption but without a proportionate increase in output. This decrease in efficiency occurs due to the additional strain on components, which demands more energy to maintain peak performance.

Example of COP Variation by Load

For a ducted AC system:

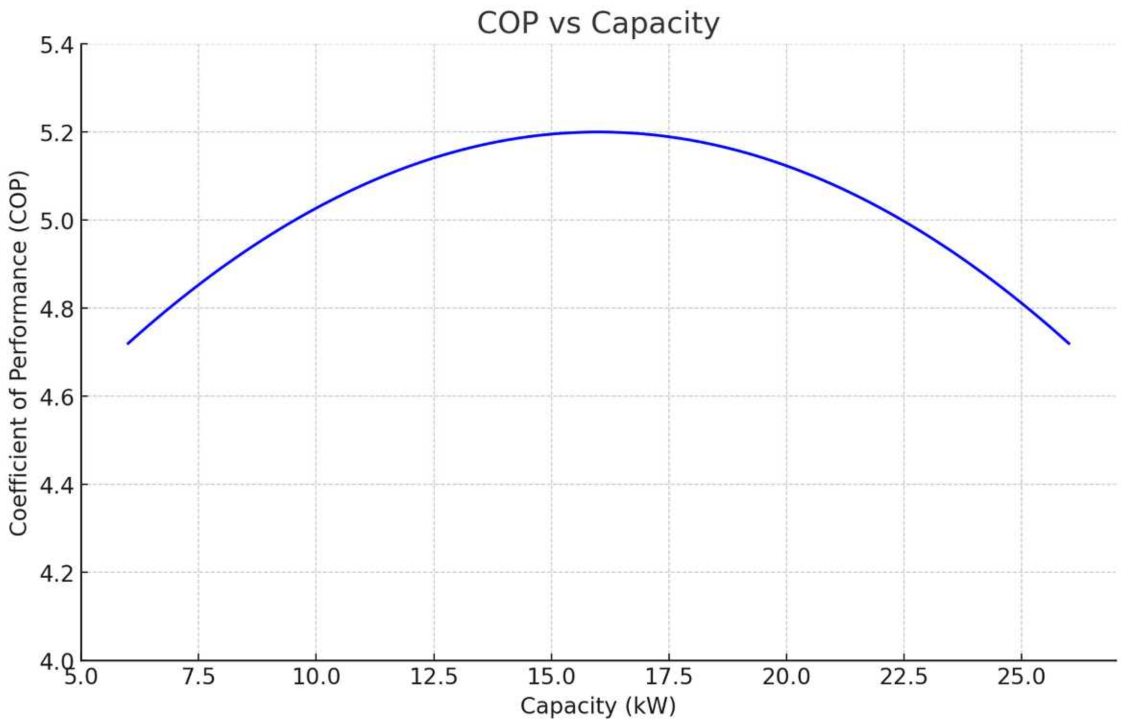
- **At 50% load**: COP might be around 5.7, indicating high efficiency.
- **At 100% load**: COP could drop to approximately 4.2, reflecting the increased energy demands at full capacity.

VRF Systems and Part-Load Efficiency

Variable Refrigerant Flow (VRF) systems are designed to maintain higher COPs at lower capacities, enhancing efficiency during partial load operations. Since these systems adapt to changing conditions, they prevent the unnecessary replacement of equipment that can still perform effectively.

In summary, sizing HVAC systems based on peak load, rather than average running costs, is crucial. Properly sized equipment reduces the need for high-capacity operation, maintains a higher COP over time, and extends the overall system lifespan.

<u>Typical COP vs Capacity curve for AC Ducted VRF systems:</u>



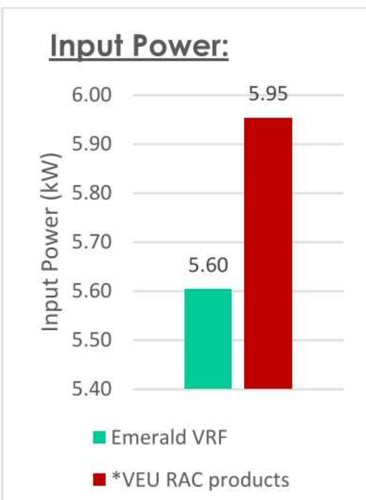
Comparison: Emerald VRF vs VEU RAC Approved products

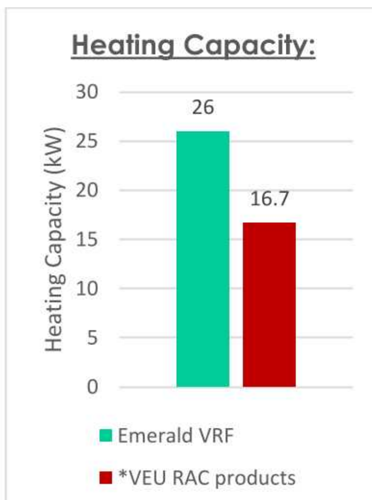
Emerald's Ducted VRF systems and similar products approved on the Victoria Energy Upgrades (VEU) register as of Q3 2024. The products compared have a heating capacity ranging from 18kW to 22.4kW. The analysis includes all relevant products within this range without exclusions. The VEU register information is publicly accessible.

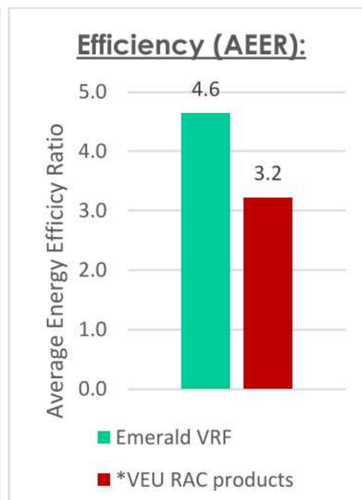
Comparison Data:

	Heating kW	Input Power	AEER
Emerald VRF	26	5.60	4.6
VEU RAC products	16.7	5.95	3.2

The following graphs illustrate the differences in heating capacity, input power, and AEER between Emerald VRF systems and VEU RAC approved products.



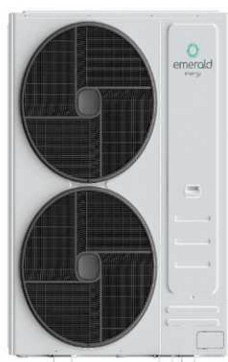




- **Input Power:** VEU RAC systems require more input power to achieve a lower heating capacity.
- **Heating Capacity:** Emerald VRF systems provide 55% more heating capacity with a lower input power compared to VEU RAC products.
- **Efficiency:** The AEER shows that Emerald VRF systems are 44% more efficient than VEU RAC products.

Emerald VRF (H2 half capacity) vs Mitsubishi (H1 full capacity)

Based on the VEU sizing guide, a 100m² house typically requires around 14 kW of heating capacity, and this comparison provides insight into how the Emerald VRF system, operating at half capacity, stacks up against a Mitsubishi 14 kW system at full capacity. Here, the Emerald system's ability to maintain efficiency while operating at half load offers a strong advantage over the Mitsubishi's full-load operation.

Model	**Emerald VRF (Half Load)**	**Mitsubishi (Full Load)**
Coefficient of Performance (COP)	5.7	3.82
Heating Capacity (kW)	13	14
Energy Calculations:		
Rated Power (kW)	2.260	4.1900
Annual Consumption (1819 hours)	4,110.94 kWh	7,621.61 kWh
Annual Cost (@ $0.3/kWh)	$1,233	$2,286
Annual Cost for 10,000 Units	$12,332,820	$22,864,830
Image		

Extract from AS/NZS 3823 Performance test report:

Report No. 240416020GZU-001

MEPS

Item		Tested	Rated	MEPS	Verdict
AEER	Full capacity at T1	4.5327	4.6402	3.10	Pass
ACOP	Full capacity at H1	4.0905	4.2622	3.10	Pass

Condition	Item	Unit	Tested	Rated	Ratio	Limit	Veridict
T1, Full capacity	Power Input	W	4148.8	4200	0.988	<=1.05	Pass
	Capacity	W	19304.6	20000	0.965	>=0.95	Pass
	AEER	W/W	4.5327	4.6402	0.977	-	-
T1, Half capacity	Power Input	W	1617.9	1600	1.011	<=1.05	Pass
	Capacity	W	10147.7	10000	1.015	>=0.95	Pass
	EER	W/W	6.2721	6.2500	1.004	-	-
Low Temperature Cooling, Half capacity	Power Input	W	1366.4	1350	1.012	<=1.05	Pass
	Capacity	W	11491.2	11400	1.008	>=0.95	Pass
	EER	W/W	8.4098	8.4444	0.996	-	-
H1, Full capacity	Power Input	W	6043.1	5990	1.009	<=1.05	Pass
	Capacity	W	25170.1	26000	0.968	>=0.95	Pass
	ACOP	W/W	4.0905	4.2622	0.960	-	-
H1, Half capacity	Power Input	W	2298.4	2260	1.017	<=1.05	Pass
	Capacity	W	12788.7	13000	0.984	>=0.95	Pass
	COP	W/W	5.5642	5.7522	0.967	-	-
H1, Minimum capacity	Power Input	W	1223.7	1210	1.011	<=1.05	Pass
	Capacity	W	7020.5	7060	0.994	>=0.95	Pass
	COP	W/W	5.7371	5.8347	0.983	-	-
H2, Extended capacity	Power Input	W	7498.4	7390	1.015	<=1.05	Pass
	Capacity	W	23494.3	23700	0.991	>=0.95	Pass
	COP	W/W	3.1332	3.2070	0.977	-	-

At Heating Half Capacity:

COP = 5.75

Rated power = 2260 W

Half capacity = 13 kW

Extract from ESS rule:

Table D16.1 – Equivalent Cooling and Heating Hours (h/y) as derived from AS/NZS 3823.4

	Equivalent Cooling Hours (h/y)	Equivalent Heating Hours (h/y)
Hot Zone	1274	109
Average Zone	429	648
Cold Zone	285	1534

Estimated total run hours in a cold climate zone = 285 + 1534

= 1819 hours

Results

1. **Efficiency**: The Emerald VRF system achieves a higher Coefficient of Performance (COP) of 5.7 at half load, showing greater efficiency compared to the Mitsubishi's COP of 3.82 at full load.

2. **Annual Energy Consumption**: The reduced power demand of the Emerald VRF system at half load significantly decreases energy consumption to 4,110.94 kWh per year, compared to 7,621.61 kWh for the Mitsubishi system.

3. **Annual Cost**: This efficiency translates to substantial cost savings. At $0.3/kWh, the annual operating cost for an Emerald VRF system is about $1,233 while the Mitsubishi system incurs $2,286 annually.

4. **Total Cost Savings**: For installations of 10,000 units, the Emerald VRF system could save approximately $10 million annually compared to the Mitsubishi system.

Appendix B – Reusing a portion of the ducting energy calculations:

When reusing existing ducting, two main factors can impact energy efficiency: increased fan pressure due to smaller ducts and heat loss differences due to duct insulation ratings.

<u>Reusing Existing Ducting – Calculation due to additional duct pressure:</u>

- Fan pressure increase due to using smaller ducts is 18.1 Pa
- 18.1 Pa is estimated to add 100W to the fan 980W fan motor

<u>Duct Design Spreadsheet:</u>

- Based on ASHRAE Standards
- This spreadsheet has been user to design ducting around the world including building in Australia, notably Monash Unit, Macquarie Uni Arts precinct, Newcastle Unit Honeysuckle campus.
- Resultant pressure difference in 6m of 150mm ducting vs 200mm ducting **= 18.1 Pa**

<u>Extract from duct design spreadsheet:</u>

- 6m of flexible ducting 200mm (8inch) static pressure drop = 7.1 Pa

Ducting absolute roughness	0.15	mm
Supply Air Density	1.2	kg/m^3
Unit Design Supply Temp.	14.0	°C
Void Temp	24.0	°C
Room design temperature	22.0	°C
Insulation Thickness	25	mm
Correct vol's for duct heat gain	N	(Y or N)
Total duct pressure at start	100	Pa
Design static pressure at duct spigots	35	Pa

Project
FCU
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Date
Note: Typical Loss Coefficients have been used. Detailed Duct design still required for Construction

Total vol's	Duct Length	Duct Area
l/s	m	m^2
80	6.0	3.8

Branch vol's	Branch Length	Fric. Loss	Fitting Loss	Duct Area
l/s	m	Pa	Pa	m^2
80	6.0	2.61	0.6	3.8

Branch1 (Main Duct Run)

Duct Section Number	Design spigot vol. branch=0	Duct Width (or diam.)	Duct Height	Duct Length	ASHRAE loss coefficients: Line	ASHRAE loss coefficients: Branch	Duct Diam.	Duct Area $A_{c,s}$	Area Ratio A_s/A_c	Volume Flow Ratio Q_s/Q_c	Adjusted Branch/ Spigot Vol	Duct Vol	Duct Velocity	Friction Loss	Friction Loss	Fitting Loss	Velocity Pressure	Static Pressure	Total Pressure	Duct Area
	Q_b = l/s	mm	mm	m	C_o	$C_{c,b}$	mm				l/s	l/s	m/s	Pa/m	Pa	Pa	Pa	Pa	Pa	m^2
																	Inlet total pressure		100	
1.01	80	200		6.0	0.15		200	31416			80	80	2.5	0.4	2.61	0.6	3.9	92.9	96.8	3.8
1.02							0	0												0.0
Totals	80			6.0																

- 6m of flexible ducting 150mm (6 inch) static pressure drop = 25.2 Pa

Ducting absolute roughness	0.15	mm
Supply Air Density	1.2	kg/m^3
Unit Design Supply Temp.	14.0	°C
Void Temp	24.0	°C
Room design temperature	22.0	°C
Insulation Thickness	25	mm
Correct vol's for duct heat gain	N	(Y or N)
Total duct pressure at start	100	Pa
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Total vol's	Duct Length	Duct Area
l/s	m	m^2
80	6.0	2.8

Branch vol's	Branch Length	Fric. Loss	Fitting Loss	Duct Area
l/s	m	Pa	Pa	m^2
80	6.0	11.07	1.8	2.8

Branch1 (Main Duct Run)

Duct Section Number	Design spigot vol. branch=0	Duct Width (or diam.)	Duct Height	Duct Length	ASHRAE loss coefficients Line	ASHRAE loss coefficients Branch	Duct Diam.	Duct Area $A_{c,s}$	Area Ratio A_s/A_c	Volume Flow Ratio Q_s/Q_c	Adjusted Branch/ Spigot Vol	Duct Vol	Duct Velocity	Friction Loss	Friction Loss	Fitting Loss	Velocity Pressure	Static Pressure	Total Pressure	Duct Area
	Q_b = l/s	mm	mm	m	C_o	$C_{c,b}$	mm				l/s	l/s	m/s	Pa/m	Pa	Pa	Pa	Pa	Pa	m^2
																	Inlet total pressure		100	
1.01	80	150		6.0	0.15		150	17671			80	80	4.5	1.8	11.07	1.8	12.3	74.8	87.1	2.8
1.02							0	0												0.0
Totals	80			6.0																

Difference in static pressure loss 150mm to 200mm flex = 25.2- 7.1 = **18.1 Pa**

DC fan motor specifications:

Below is the typical DC fan motor used in a AC ducted VRF systems.

- Fan speed: 1300r.min
- Rated power: 980W
- Current 3.9 A

By reducing the fan pressure on this motor, the estimated rated power is expected to drop by approximately 100 W.

18 Pa additional fan pressure	
Rated Power decrease	100
NSW run hours/y (cold)	1819
1 year	1
Watt/h	181900
kW/h	181.9
Rate ($30/kWh)	**$54.57**

The annual energy bill increases due to higher pressure on the systems due to smaller ducts is $55 per year.

Reusing Existing Ducting – Calculation due to R rating of ducting

Formula:

$$Q = \frac{\Delta T \times A}{R}$$

- **Duct Dimensions**: 150mm (R0.6) vs. 200mm (R1.0)
- **Length per Duct**: 6 meters
- **Surface Area Difference**: 2.83 m² (R0.6) vs. 3.77 m² (R1.0)
- **Temperature Difference (ΔT)**: 20°C
- **Heat Loss Difference per 6m Duct Section**: 19 Watts
- **Total Duct Sections per House**: 8

150mm R0.6 insulation vs 200mm of 1R insulation

Ducting

mm	inch	Length (m)	Surface Area (m2)	R	Delta T	Energy (Watt)
150	6	6	2.83	0.6	20	94.2
200	8	6	3.77	1	20	75.4
					Result	**19**

Heat loss 150mm R0.6 vs 200mm R1.0	
Watt lost per 6m duct	19
Total duct per house	8
Power (watt total)	19
NSW run hours	1819
1 year	1
Watt/h	34561
kW/h	34.561
Rate ($30/kWh)	**$10.37**

150mm R0.6 insulation vs 200mm of 1.5R insulation

Ducting

mm	inch	Length (m)	Surface Area (m2)	R	Delta T	Energy (Watt)
150	6	6	2.83	0.6	20	94.2
200	8	6	3.77	1.5	20	50.3
					Result	**44**

Heat loss 150mm R0.6 vs 200mm R1.0	
Watt lost per 6m duct	19
Total duct per house	8
Power (watt total)	44
NSW run hours	1819
1 year	1
Watt/h	80036
kW/h	80.036
Rate ($30/kWh)	**$24.01**

Results:

The annual energy bill increases due to insulation rating R0.6 to R1.0 is $10 per year.

The annual energy bill increases due to insulation rating R0.6 to R1.5 is $24 per year.

Appendix C – Ducting installation

When retrofitting a ducted AC system to replace an existing gas ducted system, it's recommended to replace the main duct runs that connect directly to the indoor unit. This ensures that the indoor unit's duct connections match the main duct runs and that most of the ductwork complies with current requirements. Small ducts and the final sections of the ducting can be retained if the following conditions are met:

Requirements for Reusing Ducting:

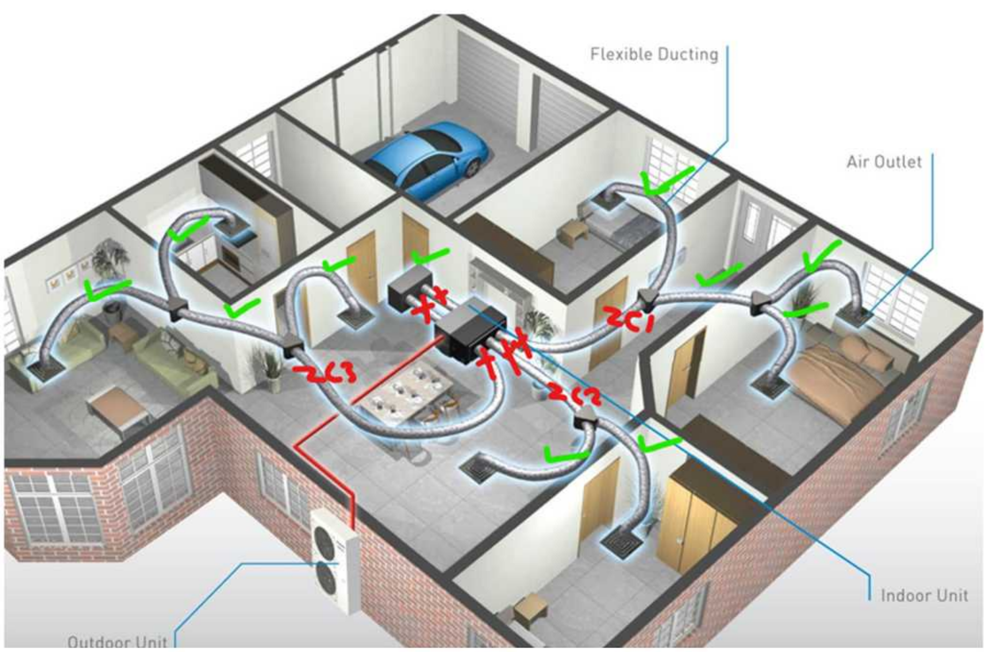
1. **Condition**: Final duct runs can be reused if the ducting is in good condition.
2. **Age**: Ducting should be no older than 5–10 years to ensure it remains durable throughout the AC system's expected lifetime.
3. **Duct Sizing and Compatibility**: Verify that the existing duct sizing is appropriate for the airflow capacity of the new AC system as per manufacturers guidelines.
4. **Sealing**: All connections between new and existing ductwork must be airtight. Installers should thoroughly inspect and seal any leaks, documenting the connections with photos as evidence.

By following these simple guidelines, you can ensure an efficient and long-lasting AC retrofit installation.

Image of typical retrofit scenario:

Red cross – replace ducting

Green tick – reuse existing ducting if in good condition



Possible Compliance/record keeping:

- Photos of duct connections form new ducting to reused ducting.
- Singed declaration from AC installer
- Signed declaration for homeowner explaining that a portion of the existing ducting will be reused
- Photos of existing ducting to be reused to validate quality
- A ducting diagram complete by the AC installer