



CLADE

LARCH CASCADE HEAT PUMP //
R290 & R600A //

May 2022.2 //



THE LARCH //



LOW CARBON HEATING TECHNOLOGY

Clade Larch cascade heat pumps is a combination of our r290 ASHP and r600a WSHP.

The benefits of this system are the close matching of flow and return temperatures to those of traditional boiler system of 82°C / 71°C



COMBINATIONS TO MEET CASCADE CAPACITIES //

In order to achieve the cascade temperatures of 80/70C an air source r290 and water source r600a heat pump combination must be selected.

To avoid any issues we have put together the table shown which can be used to determine the required size of R290/R600a system to achieve a desired system demand in kW.

The number of units is the number of each unit required on the low and high temp side. E.g. 1.7MW would need 5no R290 units and the R600a is then the same number to match making 10 units in total.

This is a good estimate for first stage specification and pricing which will need confirmation as the design and project progress.

Required Output/Load (kW)	R600a	R290	Number of HP's on each side of cascade
100	100	50	0
150	150	100	0
200	150	150	1
250	200	150	1
300	250	200	1
350	300	200	1
400	300	300	1
500	400	300	2
600	500	400	2
700	600	400	2
800	600	500	3
900	700	500	3
1000	800	600	3
1100	800	600	3
1200	900	700	4
1300	1000	700	4
1400	1100	800	4
1500	1100	800	5
1600	1200	900	5
1700	1300	900	5
1800	1300	1000	6
1900	1400	1000	6
2000	1500	1100	6
2100	1600	1100	7
2200	1600	1200	7



EXAMPLE TECHNICAL INFORMATION //

Clade Rowan R290 ASHP & Willow R600 WSHP		R290 Rowan - 224 kW	R600 Willow - 336 kW
Refrigerant		R290	R600a
Evaporator Duty		170 kW	224 kW
Heating Duty		224 kW	336 kW
Nominal conditions: Water side Heating		flow 45 °C to 40 °C Return temperature	flow 80 °C to 70 °C Return
Nominal conditions: Evaporator		Ambient Air	flow 45 °C to 40 °C Return temperature
Compressor Manufacturer		Dorin	
Compressor Heating Qty	Pcs.	2	2
Compressor Power @ Design total	kW	70.1	83.1
Evaporator fans Power at design	kW	11.7	N/A
Total	kW	81.7	86.1
Heat Pump Compressor Design Run Amps DRA	A	144.3	152.8
Ancillary Controls Amps	A	10.0	10.0
Maximum operating current	A	284.0	346.0
Total Design Run Amps	A	154.0	162.0
MCCB Rating Amps	A	200.0	200.0
Variable speed drive (VSD)	Pcs.	2	2
Refrigerant charge (estimated)	kg	22	9
Electrical supply	-	3~ 400V 50 HZ	
Weight (empty)	kg	3,460	2,640
Weight (operational)	kg	3,480	2,720
Sound Power	dB(A)	82	76
Connections waterside Heating flow	DN	100	100
Connections waterside Heating Return	DN	100	100
Connections waterside Load flow	DN	N/A	100
Connections waterside Load Return	DN	N/A	100
Connections waterside Pressure Rating	PN	10	10

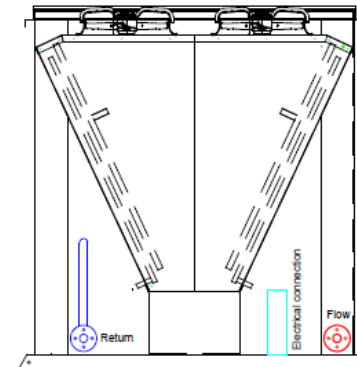
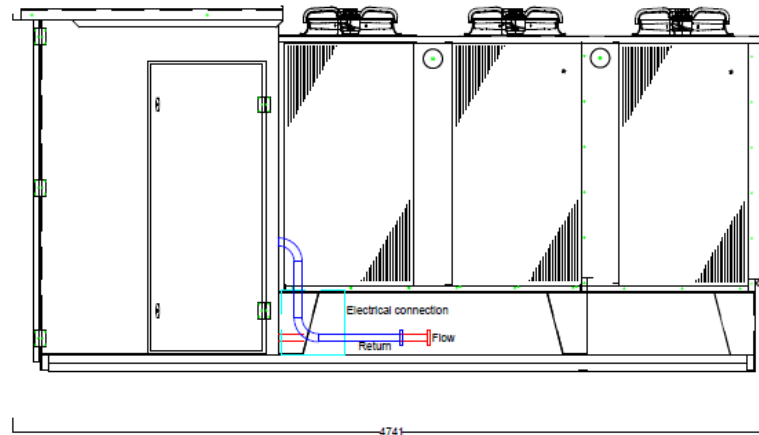
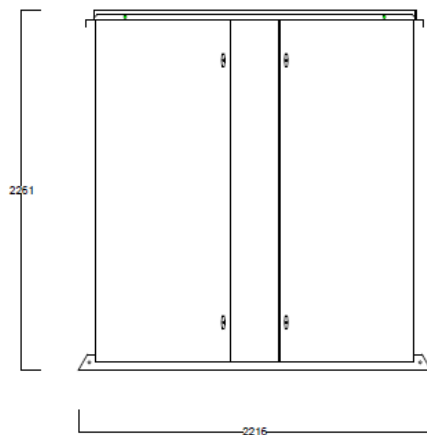
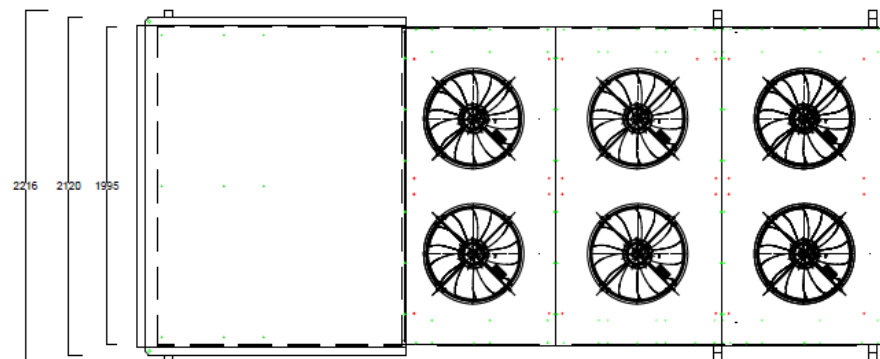


EXAMPLE TECHNICAL INFORMATION //

Clade Rowan R290 ASHP & Willow R600 WSHP		R290 Rowan - 224 kW	R600 Willow - 336 kW
Waterside Burst Disk	PN	10	10
Communication protocol	-	MODBUS/BACNET	
IP-Class	-	IP54	
Evaporators Type		V Block	Plate
No. evaporators	Pcs.	2	1
Fin Material	-	AL/MG	SS/CU
Defrost Type	-	Hot Gas / Heaters	N/A
Defrost medium	-	R290	N/A
Defrost design/condition	-	> +6c ambient Off Cycle / < +6c ambient Cool Gas	N/A
Fan regulation	-	0-10v	N/A
Pump Manufacturer		Grundfoss	
Pump Control		VSD 0-10v	
Colour	-	RAL6035 Forest Green	
Heating Pump Included		Yes	
Load Pump Included		No	
Dimention Length		4741	3116
Dimention Width		2210	2288
Dimention Height		2261	2261

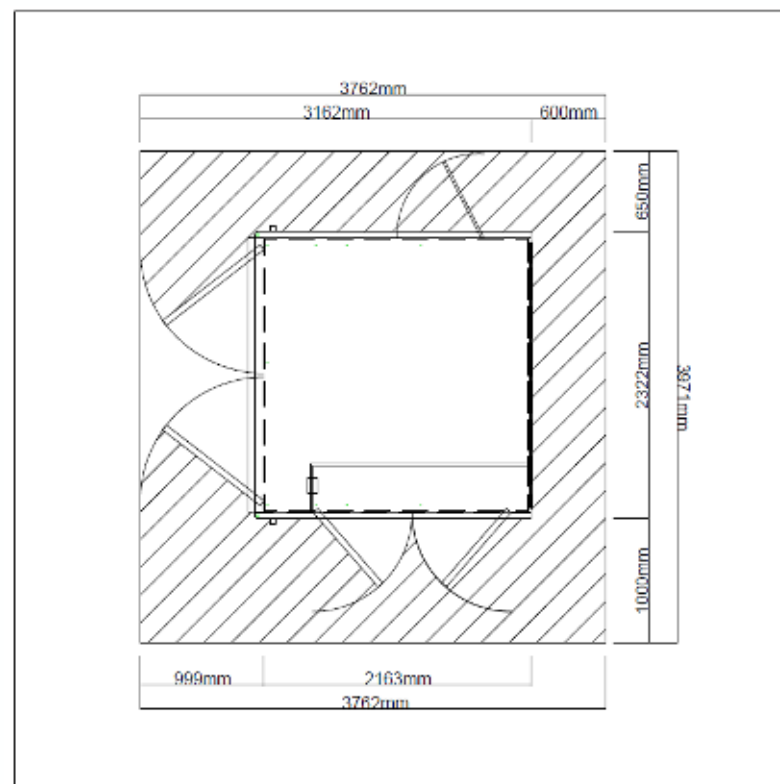


EXAMPLE DIMENSIONAL DRAWINGS LT //



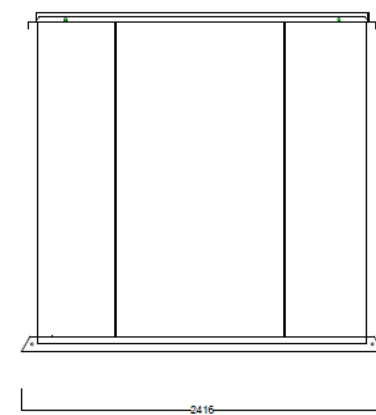
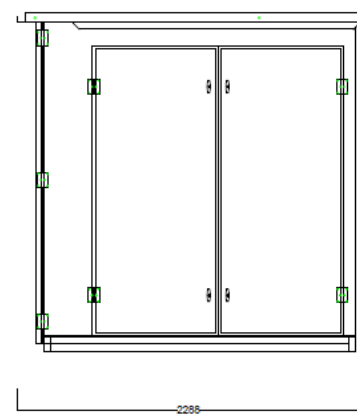
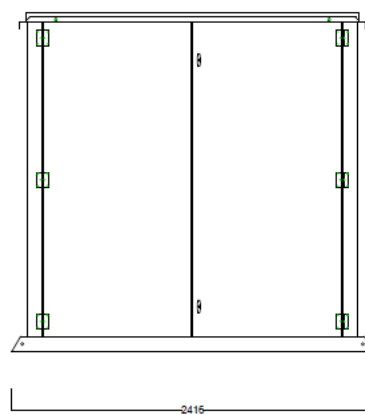
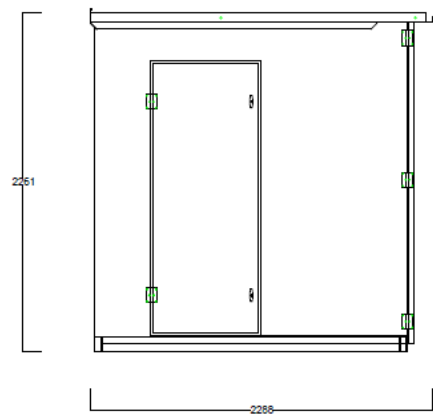
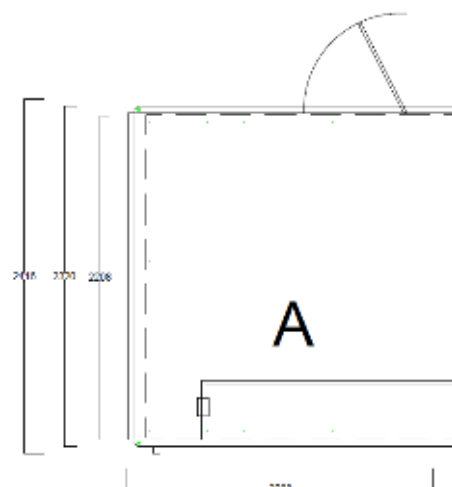


EXAMPLE DIMENSIONAL DRAWINGS HT //



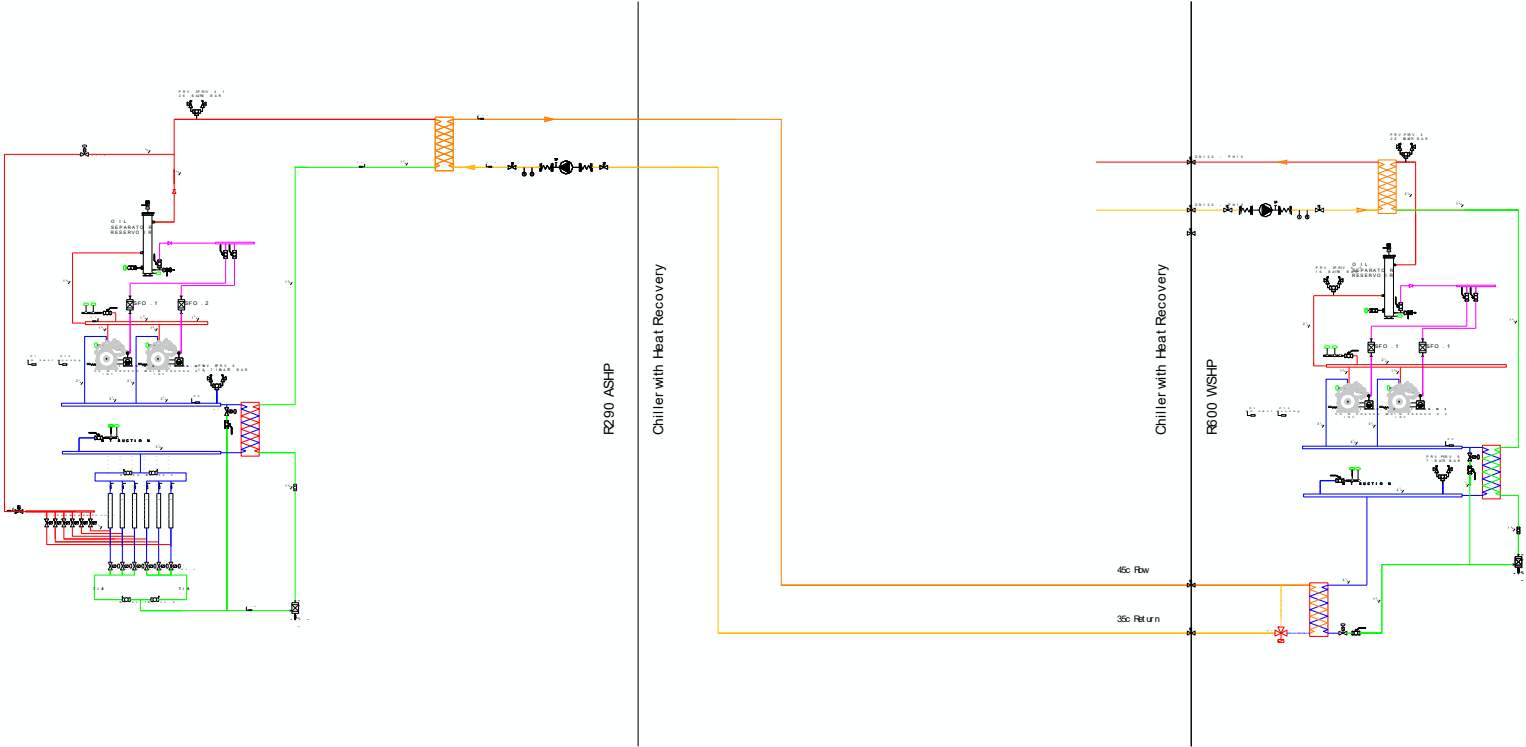


EXAMPLE DIMENSIONAL DRAWINGS HT //





FLUID ISOMETRIC DRAWINGS //





COMPLETE TECHNICAL SUPPORT BASED IN UK //



Clade offer full technical support from our Leeds Technology Centre.

- **Design assistance** – we have an in house design team who are experts in heat pump system design.
- **Product** – our products are developed by our selves from metal frames to the digital controls. Our experts are on hand to assist with any issues or adaptations required.
- **Installation support** – Our full service installation team can arrange delivery, install and carry out specialist services to ensure a successful project.
- **Commissioning** – Our own commissioning Engineers will set up, test and handover your heat pumps. Our team are some of the UK's leading experts in this field.
- **Aftercare** – All servicing and repairs are taken care of, we use online tools and field technicians to ensure maximum availability and reliability.





CLADE INDUSTRIAL CONTROLS //

The future value of heat pumps will largely depend on rewards for providing grid flexibility and on optimal efficiency in all conditions.



Clade heat pumps are fitted with high specification PLC controls that are networked to cloud services. Delivering multiple benefits

The Clade digital platform enables continuous operational improvements and lower service and maintenance costs.

- Data is captured, analysed and insights generated to improve performance
- Alerts and alarms can be raised automatically
- Online diagnostics save call out time and charges

The Clade digital platform provides dispatch services via pre-built access to the flexibility market or time of day tariff control.

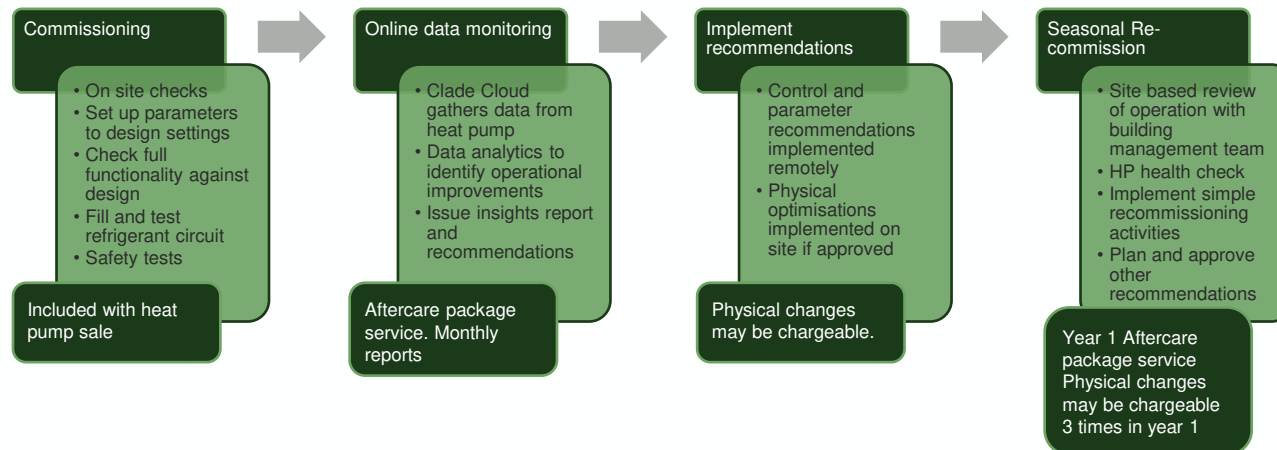
- Time and control of thermal storage for tariff and timing optimisation
- Access to grid flexibility platforms
- Safe operation of the heat pump in response to market signals that maintains warranty
- Performance and data analytics, reporting in multiple formats

AFTERCARE OPTIMISATION SERVICES //

Heat pump performance is dependent on four major sets of variables; the ambient conditions, the demand conditions, the physical health of the heat pump and the controls.

The ambient and demand conditions are variable across the day, week, season and year. This means that optimal year round performance is only achieved over a period of time.

Clade Aftercare package provides the basic maintenance services which maintain the physical health of the heat pump and a series of services that optimise heat pump operation over time. These optimisation services are provided by Clades expert Engineers who are on hand to analyse and assist improvements throughout the contract.





ABOUT CLADE //



- UK based
- 35 years of engineering experience
- Leeds manufacturing division
- Committed to sustainable business and sustainable products
- Investing in people, diversity & inclusion
- Non leveraged, owner operated



ACCREDITATIONS
ISO 9001: 2015
ISO14001: 2015
OHSAS ISO 18001: 2007



CERTIFICATIONS
Altius Assured Vendor Award
Altius CDM Vendor Award
CHAS
Sales Contractor



THANK YOU //

www.clade-es.com

Sales@clade-es.com

Aftersales@clade-es.com

Head Office & Registered Office //
Bristol & Bath Science Park,
Dirac Crescent, Emersons Green,
BRISTOL BS16 7FR

The Technology Centre //
Unit R3 Gildersome Spur Industrial Estate,
Stone Pits Lane, Morley,
LEEDS LS27 7JZ

