



Point of use Argon Recycle System



Recycle up to 95%
of vacuum furnace
argon purge



Gas Recovery & Recycle Limited

www.GR2L.co.uk

Recover and recycle up to 95% of vacuum furnace purge gas

ArgonØ™ is a unique, closed loop, purge gas recovery and recycle system jointly developed by UK based GR2L and Cambridge University.

The ArgonØ™ operates with both oil lubricated and dry vacuum pumped furnaces. It recovers up to 95% of the available purge gas at purities of 99.9998%, i.e. N5.8, delivering process cost reduction, reduced CO₂ footprint and productivity enhancement as well as reduced reliance on transport deliveries.

The system is Point of Use and can connect to multiple vacuum furnaces, dependant on a total average gas flow of 340slm. A straightforward retrofit to current CZ or DS installations and a simple payback of 18-30 months, dependent of geographic argon pricing, makes for a compelling business proposition. In addition, the ArgonØ™ reduces the CO₂ footprint of a typical vacuum furnace by 3-5 tonnes CO₂ per annum along with improvements to the security of supply.



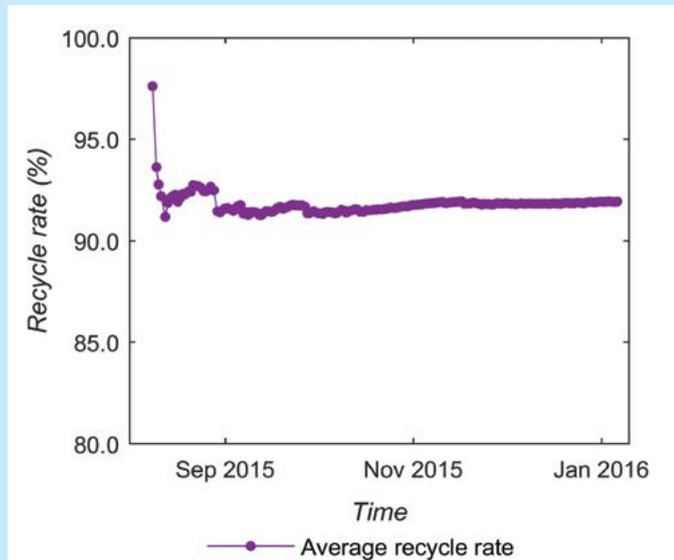


Control and Monitoring

The ArgonØ™ system is controlled via an on-board PLC and the systems can be networked to enable centralised monitoring of the recycle gas flows and the ArgonØ™ status. Data is automatically uploaded to the Cloud where regular performance, management and maintenance reports can be generated. Over the warranty period the connection to the Internet allows GR2L to provide remote service.

The heart of the system

The heart of the system is a patented chemical looping combustion (CLC) reactor that utilises a solid state oxygen carrier to combust the impurities in the gas to CO₂ and moisture; these are subsequently removed via molecular sieve traps. The solid state oxygen carrier ensures the reacted gas is oxygen free as



Average recycle rate for an ArgonØ™ connected to eight DS furnaces

no gas phase oxygen is admitted during the purification process.

The oxygen carrier is regenerated using atmospheric air in a separate step and then purged with argon to remove residual air prior to entering a standby mode.

The molecular sieve columns are regenerated via a combination of purging and temperature steps, overall the system operates on a 14-16 hour cycle dependant on the levels of contamination in the exhaust gas. This gives an ArgonØ™ system recycle rate better than 95%.

Factory cost reductions in the range of 90-95% are to be expected once argon losses to the environment are taken into account such as:

- Venting the vacuum furnace to atmosphere
- Additional purging during CZ puller recharge pumped through an auxiliary vacuum pump
- Extra high flow purges to atmosphere

Flow capacity and recovery

The ArgonØ™ has a flow capacity of up to 20 Nm³/hr allowing connection to multiple vacuum furnaces, typically 4 to 8, dependant on the total gas flow.

Gas is recovered from the vacuum pump exhaust via a three-port valve that routes vacuum pump exhaust gas to a recovery compressor module and on to the ArgonØ™ purification system.



ArgonØs installed at a facility in Asia

	PROCESS	UTILITIES	MAXIMUM DIMENSIONS		
	Argon Flowrate	Power	Width	Depth	Height
ArgonØ™	250-340NI/min	380-440V 3ph 32amp	2000mm	900mm	1800mm
Compressor Module	250-340NI/min	380-440V 3ph 10amp	650mm	650mm	1800mm

