



APPLICATION NOTE

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This application note provides an overview of the successful use of hydraulically flexed diaphragm pumps for the capture and recovery of CO₂ gas in coal fired power station flue gases.

THE INDUSTRY

A contractor involved in designing, supplying and constructing advanced steam generation technologies for the power industry has developed some of the cleanest and most energy efficient coal powered plants in the world. This contractor designs advanced steam generation plants for nuclear, oil, gas, coal and thermal power generation plants as well as the petro-chemical industries. Innovation has provided for the contractor to develop a unique technology to extract and capture CO₂ from exhaust flue gas using Post Combustion and OxyCoal based solutions.

THE APPLICATION

The Post Combustion Carbon Capture (PCCC) solution involves absorbing CO₂ from flue gas emissions into a solvent, pumping the solvent into a regeneration column where it is heated and the CO₂ is released and then vented into a compressor where it is dried and compressed for storage. This solution can be fully integrated into existing power plants to optimize processes, to provide high energy efficiency with reductions in energy consumption, to produce less corrosive solvents and to lower cooling water requirements. These process improvements reduce the overall operating cost of the plant over its life cycle. The Oxycoal Firing solution separates air into two components: oxygen and nitrogen. Coal is fired in the oxygen and the resulting flue gas is compressed to remove the water vapor and capture the CO₂. This solution provides for carbon capture with only minimal inert gases vented into the atmosphere.

THE PUMP SOLUTION

Three Hydra Cell pumps are used to pump reagents (room-temperature ionic liquids (RTILs), amine solution, solvents, wash water and reflux liquids) in the CO₂ gas recovery and capture processes. *Hydra Cell G25 and G10 Series* hydraulically flexed diaphragm pumps are long coupled to variable speed AC inverter controlled motors. The *Hydra Cell P400 Series* hydraulically flexed diaphragm pump is close coupled to a three-phase inverter controlled motor.

FEATURE	ADVANTAGE	BENEFIT
Hydraulically flexed diaphragm pump design	<ul style="list-style-type: none"> • Hermetically sealed diaphragms • Near pulseless flows • Near pulseless flows • Accurate output 	<ul style="list-style-type: none"> • No process fluid leaks • Consistent chemical addition • Easy to monitor • No wastage or overdosing
Hydraulically flexed diaphragm	<ul style="list-style-type: none"> • Minimal differential pressure between the actuating and process face of the diaphragm 	<ul style="list-style-type: none"> • Reduced stress on diaphragms gives extended life and maximizes time between servicing
Inverter controlled AC motors	<ul style="list-style-type: none"> • Easy adjustment of the pump output 	<ul style="list-style-type: none"> • Chemical addition can be optimised for the process