

ACCELERATED TRANSITION TO NET ZERO

Engineered Filtration
For CCUS



TRANSITIONING TO NET ZERO WITH CCUS

Transform emissions into opportunities

Intercept carbon dioxide emissions at their source.

Carbon Capture, Utilisation, and Storage (CCUS) is a set of technologies capturing CO₂ emissions at their source for reuse or storage to reduce atmospheric pollution.

Both pathways necessitate filtration technology at critical junctures to guarantee the final CO₂ quality.

Cleanova.C-CLEAN facilitates the co-development of customised carbon capture solutions using filtration solutions specifically designed for CCUS applications.

**Cleanova is driving
global decarbonisation
with customised
filtration solutions for
CCUS projects.**

Optimise CCUS with advanced filtration

CCUS is a foundational component of the global strategy to achieve net-zero emissions by 2050.

As industries and governments commit to reducing their carbon footprints, adoption of these technologies is set for exponential growth in the coming years.

Match the right method to the right source

Given the diversity of industrial processes and emissions, a variety of effective CO₂ capture methods have been developed and customised to specific parameters, including CO₂ concentration, emission source traits, contaminant presence, temperature, and pressure.

CHEMICAL ABSORPTION

Employs a chemical solvent to react with the CO₂.

PHYSICAL ABSORPTION

Utilises liquid solvents to remove the CO₂ via interfacial mass transfer.

ADSORPTION

Involves adhesion of CO₂ molecules onto solid surfaces.

MEMBRANE SEPARATION

Uses selective membranes to separate CO₂ from a gas mixture.



YOUR PARTNER IN CARBON CAPTURE FILTRATION

Revolutionise carbon capture with Cleanova.C-CLEAN

Deploy CCUS tech with customised carbon capture solutions.

Through close collaboration, we co-develop innovative filtration products specifically designed to meet the unique CCUS application requirements of customers.

Engineered for profitable results

ACHIEVE PEAK PERFORMANCE

Solutions are designed to meet the specific needs of your application, ensuring optimal performance and efficiency.

MAXIMIZE PERFORMANCE, MINIMIZE IMPACT

Our custom designs minimise equipment footprint, reducing space requirements and carbon emissions.

OPTIMISE FOR SUPERIOR RESULTS

Filters are engineered for maximum efficiency, significantly reducing waste and extending equipment life.

BOOST YOUR BOTTOM LINE

By enhancing equipment durability and efficiency, our approach lowers CapEx and delivers long-term cost savings.

Use our Cleanova.C-CLEAN approach to ensure a sustainable and environmentally responsible operation.



FILTRATION REQUIREMENTS FOR CCUS

Chemical Absorption

During chemical absorption, a gas stream is sent to an absorber where a chemical solvent, like amine, captures the CO₂ content. The resultant CO₂-rich solution is transferred to a stripper for CO₂ regeneration at elevated temperatures.

High-purity CO₂ gas exits the stripper, and depleted solvent returns to the absorber.

FILTRATION BENEFITS IN CHEMICAL ABSORPTION PROCESSES

UPSTREAM

- Remove contaminants from feed gases.
- Prevent impurities reaching the absorber.
- Ensure process integrity and efficient operation.
- Extend equipment lifespan.
- Lower total cost of ownership.

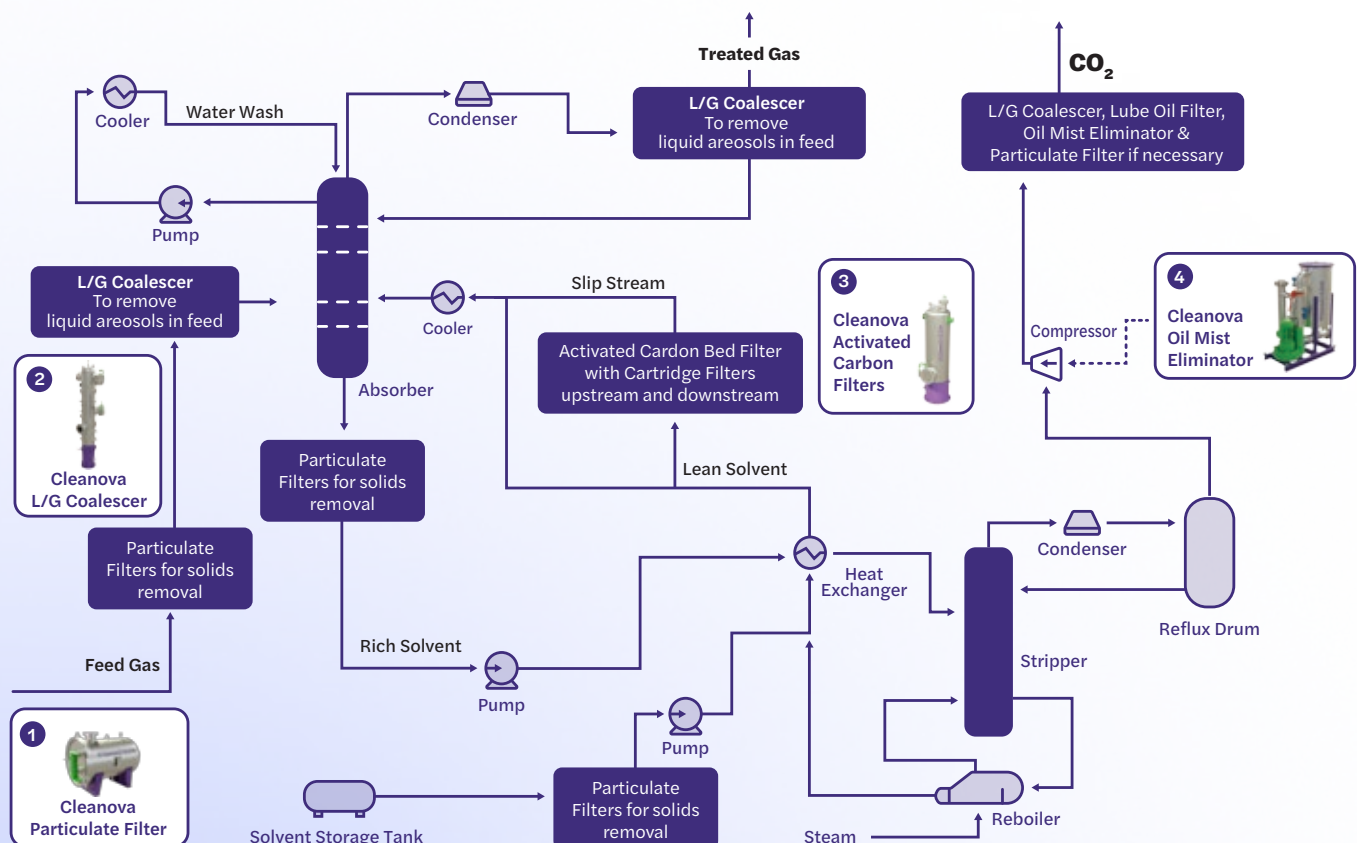
DOWNSTREAM

- Remove any solvent carryover.
- Reduce solvent losses.
- Protect downstream equipment.
- Enhance process efficiency.
- Drive down operating costs.

Cleanova.C-CLEAN filtration is critical throughout the chemical absorption process.

1. Cleanova UNIQ-MAX high-capacity filters shield downstream equipment by removing suspended particles from feed gas.
2. Cleanova Coalescers remove liquid aerosols from gases to prevent solvent contamination, carryover, and equipment fouling.
3. Cleanova Activated Carbon Filters eliminate organic contaminants and hydrocarbons to prevent foaming.
4. Cleanova Oil Mist Eliminators guarantee clean and oil-free exhaust air from high-speed rotating equipment, ensuring compliance with air quality standards.

FILTRATION EQUIPMENT IN CARBON CAPTURE PROCESS (ABSORPTION)



EFFICIENTLY TRANSPORT CO₂

CO₂ Compression and Dehydration

The most efficient method for CO₂ transport involves pipelines or ships carrying the gas in a supercritical or dense phase, which requires multi-stage compression and cooling along with a dehydration process using glycol to remove residual water.

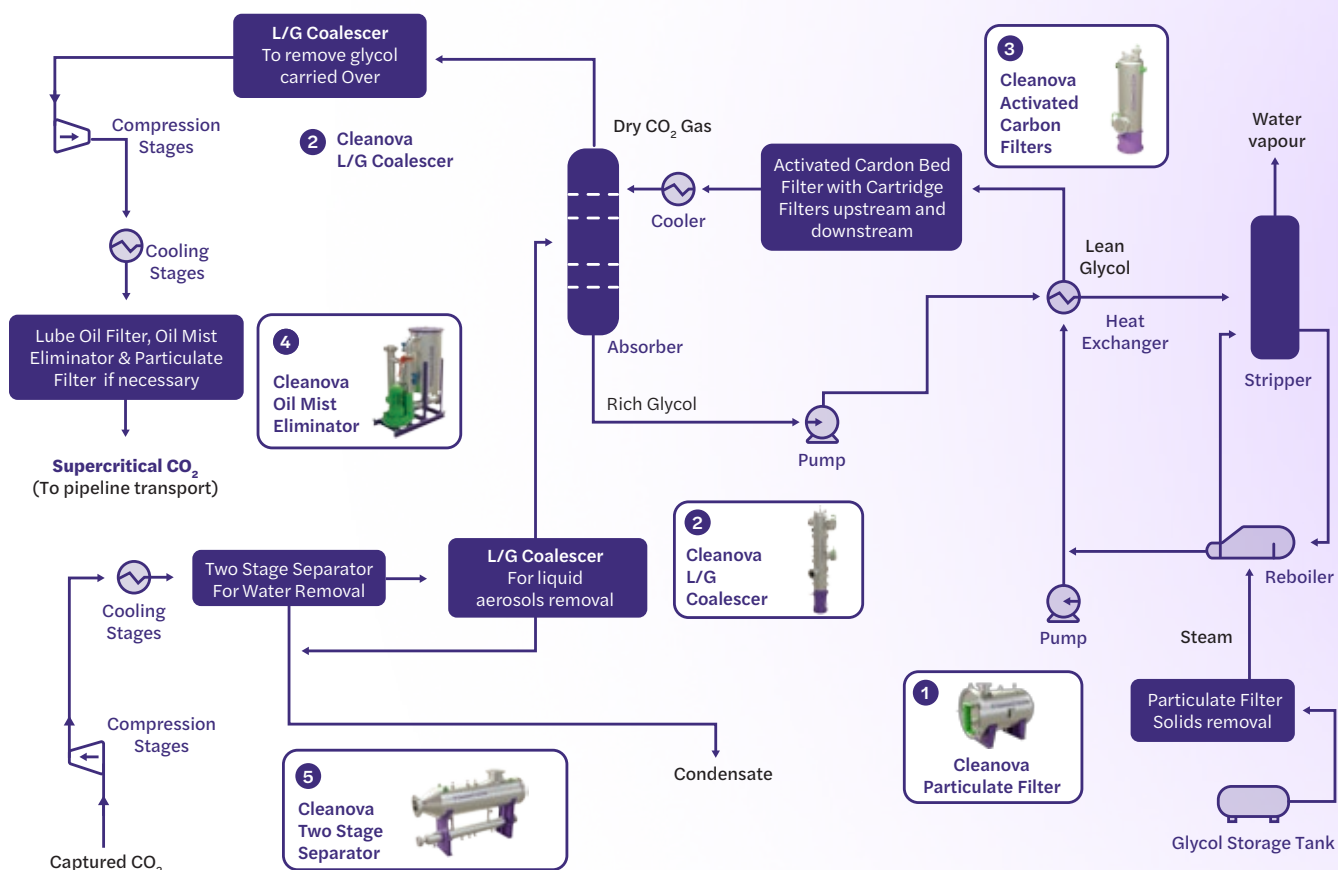
FILTRATION IS INDISPENSABLE IN CO₂ COMPRESSION

- Effectively remove contaminants.
- Prevent glycol carryover.
- Avoid corrosion and pipeline damage.
- Protect sensitive equipment.

C-CLEAN filtration supports CO₂ compression and dehydration.

1. Cleanova UNIQ-Max high-capacity filters remove suspended particles from the glycol, helping to maintain downstream equipment throughputs.
2. Cleanova Coalescers remove liquid aerosols from the CO₂ stream, protecting downstream equipment, such as compressors and absorber.
3. Cleanova Activated Carbon Filters eliminate organic contaminants and hydrocarbons to prevent foaming.
4. Cleanova Oil Mist Eliminators guarantee clean and oil-free exhaust air from high-speed rotating equipment, ensuring compliance with air quality standards.
5. Cleanova Two-Stage Separators remove particles and condensate released during the compression and cooling stages.

FILTRATION EQUIPMENT IN COMPRESSION AND DEHYDRATION PROCESS



ENGINEERED FILTRATION FOR CCUS

Each CCUS application presents distinct operating parameters.

UNIQ-MAX High-Capacity Filters

UNIQ-MAX filters excel in amine and glycol systems, handling high volumes of solid contaminants up to 90 microns with 99.98% efficiency and no process disruption.



Housing Design and Construction

Carbon steel, stainless steel, or alloy steels.

Specifications

UNIQ-MAX High Capacity Filters are designed specifically to meet individual order requirements, in accordance with ASME VIII Div. 1 Pressure Vessel construction code.

Liquid/Gas Coalescers

Cleanova GP-198 Coalescing Filters effectively remove entrained oil, water mist, other liquids and solid particles from gas streams to achieve a removal efficiency of 99.99% at 0.3 micron when operating within their rated design parameters. Their unique pleated design maximises surface area, minimising pressure drop while enhancing dirt-loading capacity and extending service life.



Housing Design and Construction

Stainless or carbon steel, with optional materials based on application. For high liquid loads, pre-separators can precede the coalescing filter to create a two-stage system.

Specifications

Filter housings meet ASME VIII Div.1 standards, with additional options include BS 5500 and AS 1210 codes.

Oil Mist Eliminators

These advanced filtration systems are designed to capture mist generated by high-speed rotating machinery.

Non-blower and blower-assisted models for positive and negative pressure lubricating oil systems achieve 99.97% removal of droplets and particles exceeding 0.3 microns, limiting oil mist carryover to under 5 ppm by weight.



Specifications

All Cleanova Oil Mist Eliminator models conform to OSHA standards and Directive 86/188/EEC.

Activated Carbon Bed Filters

These filters prevent foaming tendency by removing organic contaminants and hydrocarbons from the lean solvent streams.

Fluid enters through a top distributor, passing through the loose fill carbon bed. Activated carbon removes organics, preserving product quality, and a bottom collector channels cleaned fluid to the outlet. Pre and post cartridge filtration to 5µm is required to safeguard the bed and process.



Housing Design and Construction

8x30 mesh carbon adheres to optimal solvent contact standards, and carbon production and washing processes exclude phosphoric acid. A graded Silex base of inert, nonmetallic material supports the carbon bed. Stainless steel laterals channel fluid distribution and collection.

Specifications

Filter beds adhere to ASME VIII Div. 1 standards and project specifications in design, procurement, manufacturing, testing, painting, and delivery.

Two Stage Separators

Cleanova.C-CLEAN Two Stage Separators efficiently remove particles and condensate released during CO₂ compression and cooling.

Employing coalescing elements in the first stage and a direct impingement vane type mist elimination in the second stage of filtration, a removal rate of up to 99% efficiency at 3 microns can be achieved.



Housing Design and Construction

Carbon or stainless steel, with options for low-temperature or NACE-compliant designs.

Specifications

These separators are horizontally mounted fabricated units adhering to ASME VIII Div.1, PD5500 Cat 1, PED (for European markets), and customer-specific standards.



ACCELERATED TRANSITION TO NET ZERO

Cleanova.C-CLEAN optimises any CCUS project, ensuring sustainability and cost-efficiency.



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