

DUSTLESS – EXTREME SEPARATION (DXS)

T₂E DXS Cyclones - Maximum Separation Efficiency

T₂E DXS cyclones are ultra-high-efficiency **separators** designed to deliver the best operating performance with superior compactness and stability.

Today, DXS models represent the highest performance category among the centrifugal separators developed by T₂E, being among the most advanced available on the market.

Each unit is custom-designed and individually optimized through CFD (Computational Fluid Dynamics) simulations. This approach ensures comparable efficiency to international benchmark cyclones, but with a shorter overall length, making them ideal for installations with layout constraints or retrofit projects.

>> Performance and Advanced Engineering

Based on **refined geometry** and **optimized dimensional ratios**, DXS cyclones promote:

- Efficient agglomeration of fine particles.
- Better use of centrifugal force.
- Stable and controlled internal flow.

Each project is adjusted as follows:

- Type of powder and its density.
- Predominant particle size curve.
- Specific operating conditions.

This flexibility allows geometric tuning according to the process, resulting in high collection efficiency and low energy consumption, while maintaining controlled head loss.

>> DXS differentials:

Deep Boundary Layer Analysis

The boundary layer – the region close to the interior walls – plays a crucial role in the efficiency of high-performance cyclones.

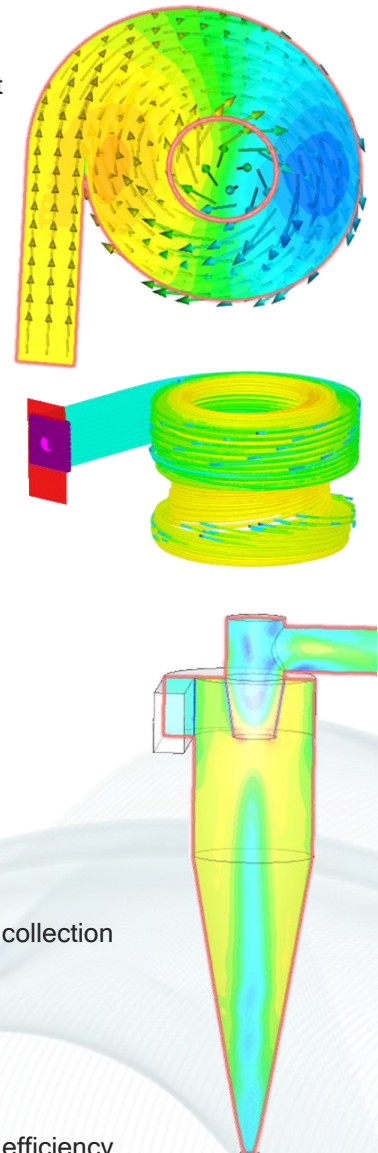
Through three-dimensional CFD analysis, T₂E understands and controls the behavior of this flow, minimizing:

- Unwanted turbulence.
- Friction losses.
- Particle recirculation.

Efficient agglomeration of fine particles

With adequate velocity profile, some particles collide and agglomerate, increasing their average size and in turn increasing the separation efficiency. This study is included in the scope of our cyclone sizing.

The result is a cyclone with **cleaner internal flow**, **lower energy dissipation**, and **superior separation efficiency** while maintaining **low energy consumption**.



DUSTLESS – EXTREME SEPARATION (DXS)

>> Key features:

- CFD-customized design, ensuring tailored performance.
- Superior separation efficiency ($\eta > 99\%$), even for particles $< 5 \mu\text{m}$.
- Optimized geometry, with shorter taper and highly stable flow.
- Reduced particle re-entry and controlled axial flow.
- Robust construction, available in carbon steel, stainless steel or special materials.

>> Typical Applications:

- High purity drying and granulation processes.
- Ultrafine particulate exhaust systems.
- Product recovery in food, chemical and pharmaceutical industries.
- Replacement of conventional cyclones in existing systems.

>> Efficiency and Validation:

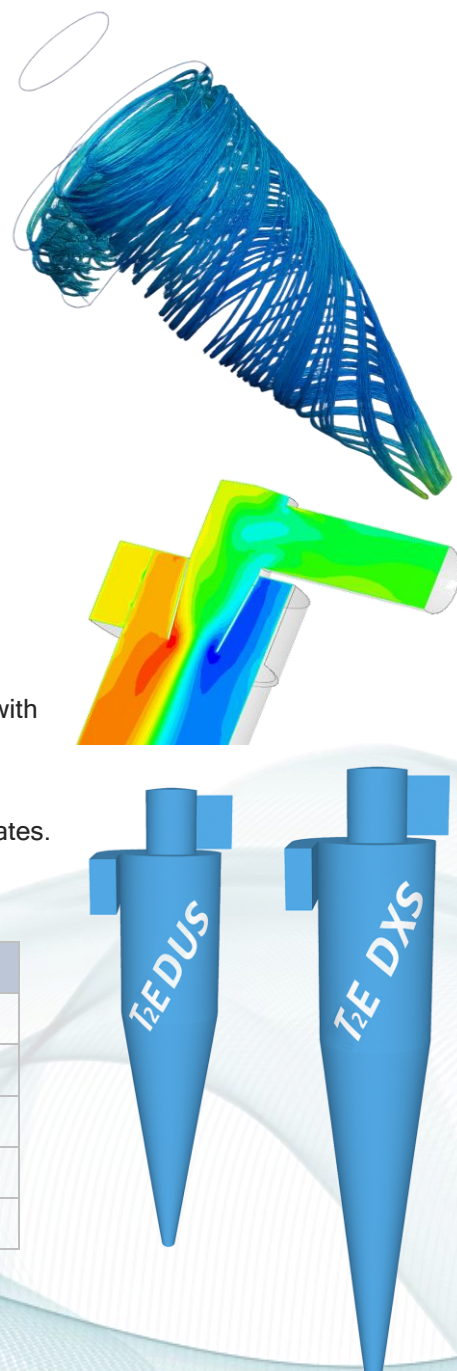
- Results obtained by experimentally validated 3D CFD simulations.
- Performance equivalent to the most efficient cyclones on the market, with a lower overall height.
- Optimized speed distribution, minimizing recirculation and turbulence.
- Multiparallel configurations (clusters) available for high industrial flow rates.

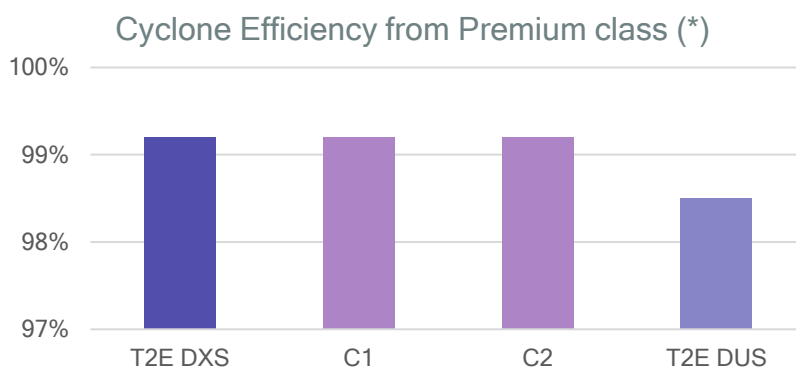
>> DUS x DXS comparison:

CHARACTERISTIC	DUS	DXS (PREMIUM)
Separation efficiency	High ($\eta \approx 97-99\%$)	Very High ($\eta > 99\%$)
Overall Length	Short	Bigger
Cost	\$	\$\$
Pressure Loss	=	=
Typical Application	High efficiency	High performance

>> Design Features

- Design Temperature: 120oC
- Design vacuum pressure: -500mm AC



DUSTLESS – EXTREME SEPARATION (DXS)

(*) Whereas: 15,000 m³/h of air at 85oC (30 g/kg AS) with particle size distribution: d50: 30µm d85: 50µm and d15: 10µm, with *AirLock device* and pressure loss of 2,000 Pa.



T2E DXS has the lowest height compared to its very High Efficiency competitors.

DUSTLESS – EXTREME SEPARATION (DXS)

Safety Instruction:

Area Classification:

DUS cyclones must be evaluated for the risk of explosion of combustible dust, according to NFPA 68, NFPA 69, NFPA 652 and ABNT NBR ISO 80079-10-2 standards.

Power and Utilities Shutdown:

Before beginning any maintenance or adjustment procedures, make sure that the equipment involved is turned off and disconnected from the power supply and utilities, whether water, steam, or any other type of fluid involved.

Rotary Valve:

Cyclones usually have an associated rotary valve, attention with this equipment.

Cleaning Routine:

Cyclones can operate under a cleaning routine. Before starting any operation or maintenance, make sure the routine is disabled;

Pressure and Vacuum Check:

Cyclones can operate under pressure. Before beginning any operation or maintenance, check that the internal pressure of the equipment has been completely relieved. Avoid releasing pressure quickly or abruptly, as this can create a risk of injury.

Temperature Check:

Cyclones can operate under high temperature. Before starting any operation or maintenance, wait for the temperature of the equipment to return to temperatures suitable for handling.

Safety Valve:

The equipment may under no circumstances be operated in a condition of temperature/pressure higher than that indicated as the design temperature/pressure. If there is a risk of overpressure on the equipment, whether due to an incorrectly held valve, pump *shutoff* pressure or any other reason, the equipment needs to be protected by safety devices.

Maintenance:

Replacement of all gaskets is necessary in order to avoid leakage of product and/or chemical elements. The standard service life of the gaskets is 1 (one) year. Depending on the type of material being used, the lifespan can be reduced.



During the operation and maintenance of the air ejector, it is mandatory to use appropriate PPE (Personal Protective Equipment), such as:

- Safety helmet;
- Goggles;
- Key money;
- Safety boots;
- Ear protector;
- Among others;