

ATFD – Agitated Thin Film Dryer

PRECISION DRYING for Critical Industrial Applications



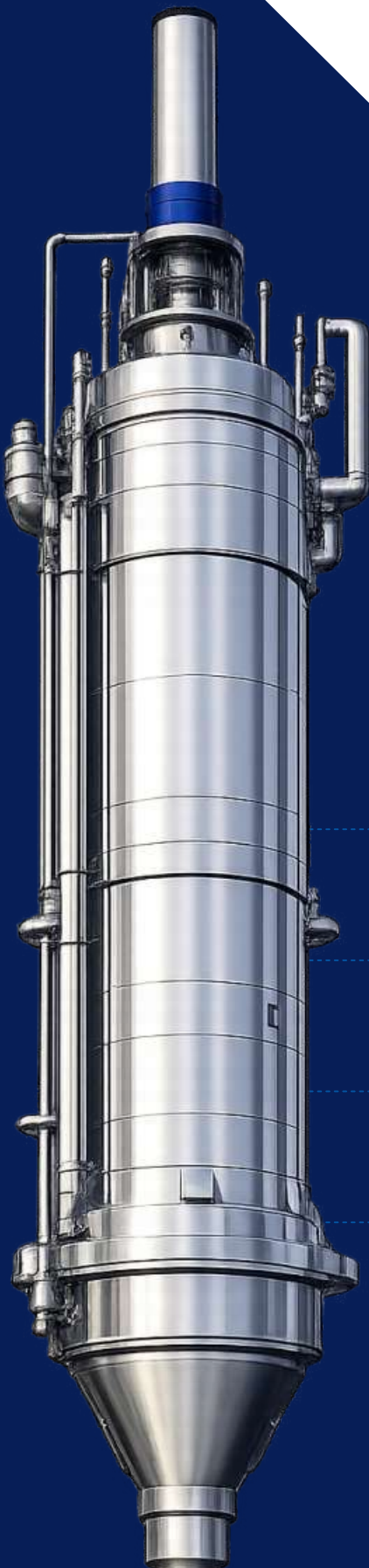
Proven ZLD & Pharma Performance



High-Viscosity & Heat-Sensitive Materials



Continuous | Reliable | Scalable



ATFD CATALOGUE

www.vzld.in

OVERVIEW

The Agitated Thin Film Dryer (ATFD) operates on the principle of thin-film evaporation combined with mechanical agitation, ensuring rapid heat transfer and controlled drying of high-viscosity and heat-sensitive materials.

Feed material enters the ATFD and is distributed as a **uniform thin film** over the heated inner surface of the cylindrical shell. A high-speed rotor equipped with specially designed blades continuously agitates the product, renewing the film and preventing fouling or localized overheating.

STEP-BY-STEP WORKING PRINCIPLE – VZLD ATFD

1. Feed Introduction

The feed slurry or paste is continuously introduced into the ATFD through a top or side feed inlet, depending on process requirements.

3. Agitation & Heat Transfer

Continuous agitation ensures:

- Uniform residence time
- High evaporation rates
- Prevention of scaling & fouling
- Heating medium

(steam, hot oil, or thermic fluid) circulates through the jacket, supplying controlled thermal energy

KEY DESIGN FEATURES

- Precision-engineered rotor and blade assembly
- Short and controllable residence time
- High turbulence for effective film renewal
- Vertical cylindrical heating chamber
- Designed for continuous industrial operation

2. Thin Film Formation

The rotating blades spread the material into a thin, uniform film over the heated wall, maximizing heat transfer efficiency.

4. Moisture Evaporation

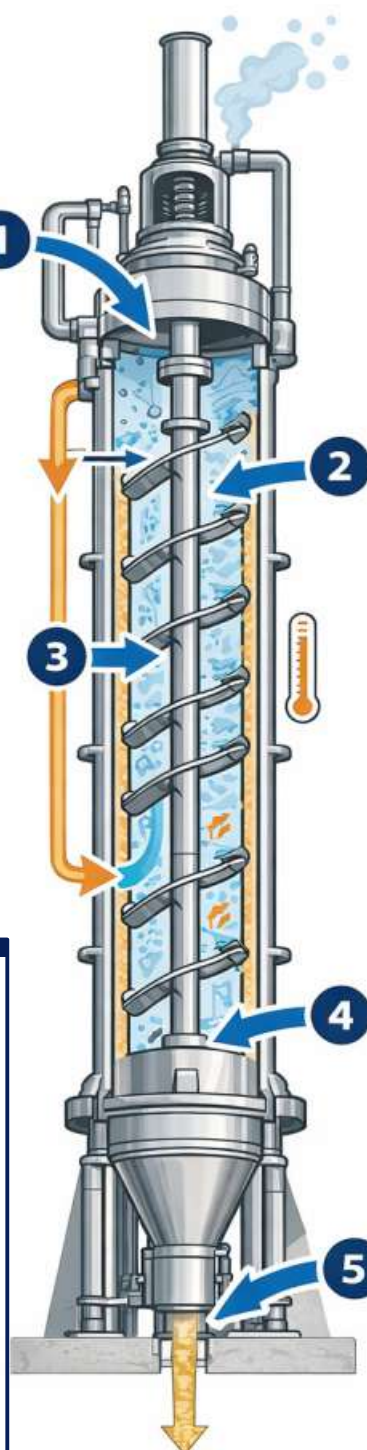
Moisture evaporates rapidly due to:

- Large heat transfer area
- Minimal film thickness
- Controlled operating temperature

Generated vapors are directed to a downstream condenser or vapor handling system.

5. Product Discharge

The dried or semi-dried product is conveyed downward by gravity and agitation and discharged continuously through the bottom outlet.



WHY VZLD ATFD?

Engineered for Demanding Industrial & Pharma Applications

VZLD's Agitated Thin Film Dryers are engineered to handle the most challenging drying duties—applications where conventional dryers fail due to fouling, degradation, or inconsistent product quality.

Our ATFD systems combine precision mechanical design with proven thermal efficiency to deliver reliable, continuous performance across ZLD, pharmaceutical, chemical, and specialty process industries.

CORE ADVANTAGES OF VZLD ATFD



1. Superior Heat Transfer Efficiency

- Ultra-thin film formation ensures maximum heat transfer area
- Rapid evaporation at controlled temperatures
- Ideal for heat-sensitive and shear-sensitive products



2. Handles High-Viscosity & Difficult Materials

- Suitable for slurries, pastes, sticky residues, and concentrates
- Proven performance with high TDS & high solids streams
- No product build-up or choking during continuous operation



3. Minimal Fouling & Easy Cleaning

- Precision-engineered rotor blades continuously renew the film
- Prevents scaling, burning, and localized overheating
- Designed for CIP-friendly and low-maintenance operation



4. Consistent Product Quality

- Uniform residence time across the drying zone
- Controlled moisture removal without product degradation
- Suitable for downstream crystallization, packaging, or disposal



5. Energy-Efficient & ZLD-Optimized

- Low residence time reduces energy consumption
- Seamless integration with MEE, MVR, and condenser systems
- Designed specifically for Zero Liquid Discharge applications

WHY EPCs & PHARMA CLIENTS TRUST VZLD

- ✓ Robust mechanical construction
- ✓ Indian manufacturing with global engineering standards
- ✓ Custom-designed for each application
- ✓ Long operational life with low lifecycle cost

DESIGNED FOR CONTINUOUS INDUSTRIAL OPERATION

VZLD ATFD systems are engineered for continuous, round-the-clock operation in harsh industrial environments—ensuring process stability, maximum plant uptime, and predictable performance, batch after batch, year after year.

Typical Applications:

ZLD Residue Drying | Pharma Intermediates | Chemical Sludges | Effluent Concentrates | Herbal Extracts

VZLD AGITATED THIN FILM DRYER (ATFD)

Designed for Process Accuracy, Reliability & Compliance

DESIGN CONFIGURATION

VZLD ATFD systems are engineered as vertical, jacketed units designed for continuous drying of high-viscosity, heat-sensitive and fouling-prone materials. Each

system is custom-configured based on feed characteristics, throughput requirement, and downstream integration.



STANDARD TECHNICAL PARAMETERS	
Parameter	Typical Range
Feed Type	Slurry / Paste / Concentrate
Operating Mode	Continuous
Throughput Capacity	Customized as per process
Effective Area Range	0.5 m ² to 40 m ²
Moisture Removal	Controlled evaporation
Operating Temperature	As per product sensitivity
Residence Time	Short & controllable
Heating Medium	Steam / Hot Oil / Thermic Fluid
Operating Pressure	Atmospheric / Vacuum
Product Discharge	Continuous bottom discharge
Vapor Handling	Condenser / Scrubber / MVR / MEE

MECHANICAL DESIGN DETAILS

- ✔ Vertical cylindrical heating chamber
- ✔ Precision-balanced rotor assembly
- ✔ Specially designed agitation blades
- ✔ Uniform film distribution across heated surface
- ✔ Heavy-duty bearings & seals for extended operational life

INSTRUMENTATION & CONTROLS

- ✔ Temperature monitoring & control
- ✔ Feed flow regulation
- ✔ Rotor speed control (VFD)
- ✔ Pressure & safety interlocks
- ✔ PLC/SCADA integration (optional)

MATERIAL OF CONSTRUCTION (MOC)

- SS 304 / SS 316 / SS 316L
- Duplex / Special alloys (on request)
- Product contact parts as per process compatibility

COMPLIANCE & QUALITY ASSURANCE

- Designed and manufactured as per relevant industrial standards
- Suitable for pharmaceutical & chemical applications
- Documentation support for EPC & QA requirements
- Manufactured under ISO 9001, ISO 14001 & ISO 45001 certified systems.

DESIGN FLEXIBILITY

VZLD ATFD is not a standard off-the-shelf unit. The system is engineered to match specific:

- Feed characteristics
- Dryness requirement
- Space constraints
- Integration with ZLD systems

Designed for reliability, repeatability, and long-term industrial performance.

ABOUT VZLD

Engineered for Processes Where Failure Is Not an Option

Vikrama Innovative Technologies Pvt. Ltd. (VZLD) is a **process-focused engineering and manufacturing company** specializing in **advanced wastewater treatment, Zero Liquid Discharge (ZLD) and critical process equipment** for continuous industrial operations.

VZLD is trusted in applications where **process inconsistency, downtime or regulatory non-compliance** carry serious consequences. Our

systems are engineered to perform reliably under demanding operating conditions — not just during commissioning, but throughout their operating life.

Certified to ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018, VZLD operates with a strong emphasis on **engineering discipline, operational safety and environmental responsibility**.

Focused on What Truly Matters in Operation

Unlike conventional equipment suppliers, VZLD concentrates on **process challenges that require deep engineering involvement**, including:

- High-viscosity, heat-sensitive and fouling-prone materials
- ZLD-driven concentration and residue drying applications
- Continuous operations with minimal tolerance for deviation

Our solutions are developed for **real plant behaviour**, variable feeds and long-duration runs — where theoretical performance alone is insufficient.

From Equipment Supplier to Process Partner

At VZLD, every system is designed as part of an **integrated process solution**.

Our approach combines:

- Process understanding and thermal engineering
- Robust mechanical design and fabrication
- Manufacturing control and quality assurance
- EPC-compatible documentation and execution

This allows our equipment to integrate seamlessly into complex ZLD, pharma and specialty process environments — **without operational surprises**.

Proven Across ZLD, Pharma & Specialty Industries

Unlike conventional equipment suppliers, VZLD concentrates on **process challenges that require deep engineering involvement**, including:

- Pharmaceutical and API manufacturing
- Chemical and specialty process industries
- ZLD-intensive effluent treatment facilities

Clients engage with VZLD when they require a partner who understands that true performance is proven on the plant floor — and sustained through disciplined engineering and execution.



VZLD engineers process equipment for industries that cannot afford inconsistency.

APPLICATIONS & PROCESS INTEGRATION

Where VZLD ATFD Systems Deliver Reliable, Plant-Proven Performance

VZLD Agitated Thin Film Dryers are deployed in applications where process complexity, material behaviour and compliance requirements demand precise control and dependable performance.

Designed for continuous operation, VZLD ATFD systems integrate effectively into upstream and downstream process equipment, ensuring stable plant operation across varying feed conditions.





KEY APPLICATION AREAS

Zero Liquid Discharge (ZLD) Systems

- Final-stage residue drying of high-TDS effluent concentrates
- Concentration and drying of RO / MEE / MVR reject streams
- Handling of high-salt, scaling and fouling-prone residues
- Reliable operation under fluctuating feed characteristics

VZLD ATFD systems play a critical role in achieving **stable, compliant ZLD operation** while minimizing downtime and maintenance intervention.

Chemical & Specialty Process Industries

- Drying of sticky, viscous and shear-sensitive materials
- Concentration of difficult-to-handle chemical slurries
- Processing of materials with variable solids content
- Continuous operation in demanding industrial environments

VZLD ATFDs are engineered to maintain performance where **conventional drying technologies face operational limitations**.

Process Integration Capability

VZLD ATFD systems are engineered for seamless integration with:

- Multiple Effect Evaporators (MEE)
- Mechanical Vapor Recompression (MVR) systems
- Condensers, scrubbers and vapor handling systems
- Upstream reactors, separators and filtration units

This ensures smooth process continuity, optimized energy utilization and predictable plant performance.

Pharmaceutical & API Manufacturing

- Drying of heat-sensitive intermediates and active compounds
- Concentration of high-viscosity reaction residues
- Solvent recovery and downstream waste reduction
- Applications requiring controlled residence time & uniform heat transfer

Designed to meet stringent pharma operating expectations, VZLD ATFDs support **consistent product quality and process reproducibility**.

Effluent Sludge & Concentrate Drying

- De-watered sludge with high organic or inorganic content
- Concentrates from chemical, pharma and specialty plants
- Applications with high fouling or charring potential

The controlled thin-film mechanism ensures **uniform drying without localized overheating**, even for challenging feed materials.

Designed for Long-Term Operational Stability

Across applications, VZLD ATFD systems are selected for:

- Continuous, round-the-clock operation
- Minimal process deviation under variable feed conditions
- Reduced fouling and predictable maintenance cycles
- Stable performance throughout the equipment lifecycle

VZLD ATFD systems are applied where process reliability directly impacts plant performance, compliance and operational confidence.

ENGINEERED FOR REAL PLANT CONDITIONS

Designed for Predictable, Long-Term Operational Reliability

VZLD ATFD systems are engineered with a clear understanding of actual plant behaviour, not idealized assumptions.

Design decisions are driven by operating variability, material characteristics and long-term performance requirements.

What This Means in Operation

- Stable performance under fluctuating feed rates and thermal loads
- Reduced fouling and predictable maintenance intervals
- Consistent output quality across continuous operating cycles

Lifecycle-Focused Engineering

From commissioning to long-term operation, VZLD ATFD systems are designed to deliver repeatable, dependable performance with minimal operational uncertainty.

Performance is proven on the plant floor — and sustained through disciplined engineering and execution.



ENGINEERING TRUST. DELIVERING CONFIDENCE.

Built for operations where reliability, compliance and continuity define success.

VZLD engineers process systems for industrial environments where operational failure, inconsistency or non-compliance carry serious consequences.

Our approach combines deep process understanding, robust mechanical design and disciplined execution to deliver equipment that performs reliably—not just during commissioning, but throughout its operating life.

From ZLD and pharmaceutical operations to complex specialty process applications, VZLD systems are trusted where plant-floor performance, regulatory confidence and long-term operational stability matter most.

Because true confidence is earned on the plant floor — every day.



ENGINEERING TRUST. DELIVERING CONFIDENCE.

*Partnering industries with reliable, compliant
and performance-driven ATFD solutions –
built to perform, built to last.*

From concept to commissioning —
and through years of continuous operation,
VZLD systems deliver confidence where it
matters most.

Vikrama Innovative Technologies Pvt. Ltd.

Jeedimetla, Hyderabad – 500100

Telangana, India

Phone : +91 9515101060

Email : info@vzld.in

Web : www.vzld.in

