HEFEI KOYINTA TECHNOLOGY CO., LTD.

Technical Whitepaper:
High-Performance Digital Inkjet Capsule Filters

Optimized Fluid Dynamics, Filtration Kinetics, and Absolute Photophobic Mechanics for Packaging and Industrial Corrugated Printing Infrastructure

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Classification: Engineering Specifications & Validation Reference
Target Systems: Industrial Single-Pass & Scanning UV / Solvent Inkjet Engines

1. Executive Summary & Product Architecture

In high-speed, industrial single-pass and scanning digital inkjet systems—particularly those deployed within the corrugated packaging and industrial printing sectors—maintaining fluidic integrity is paramount to prevent drop-on-demand nozzle failure. KOYINTA's latest high-performance capsule filters are engineered specifically to handle the challenging fluid dynamics and complex formulations of modern industrial inkjet inks.

The product portfolio presents a side-by-side material strategy engineered to fulfill diverse process demands. It integrates standard translucent clear fluidic housings alongside proprietary, absolute photophobic deepblack configurations optimized for sensitive UV-curable chemistries to protect against premature intra-capsule polymerization.

2. Core Technical Specifications

The following table contains certified engineering limits and specifications validated under stringent laboratory and operational protocols.

Engineering Parameter	Certified Specifications
Materials of Construction: Filter Media	Hydrophobic PTFE / Polypropylene (PP) / Polyethersulfone (PES) / Nylon 66 (N66)
Capsule Housing & Support Hardware	100% Virgin Polypropylene (PP) / Proprietary Absolute UV-Block Deep-Black Composite
Removal Ratings (µm)	**≥ 99.8% Absolute Efficiency (β ≥ 500) via modified ISO 16889 protocols**
Available Nominal Micron Sizes	1.5 µm, 2.0 µm, 3.0 µm, 5.0 µm, 10 µm, 20 µm, 50 µm
Effective Filtration Area (EFA)	80 cm^2 to 532 cm^2 (Model dependent)
Maximum Operating Temperature	50°C at ΔP ≤ 0.10 MPa
Maximum Forward Differential Pressure	5.5 bar at 25°C
Recommended Change-out Limit (ΔP)	**1.5 bar at 25°C (To avert flow attenuation & pump overloading)**
Chemical pH Compatibility Range	pH 1 - 14
Bio-Safety & Cleanliness Standards	Meets **USP Class VI Plastics Biological Test**; 18 MΩ·cm UPW flushed

3. High-Asymmetry Pleat Geometry & Hydrodynamics

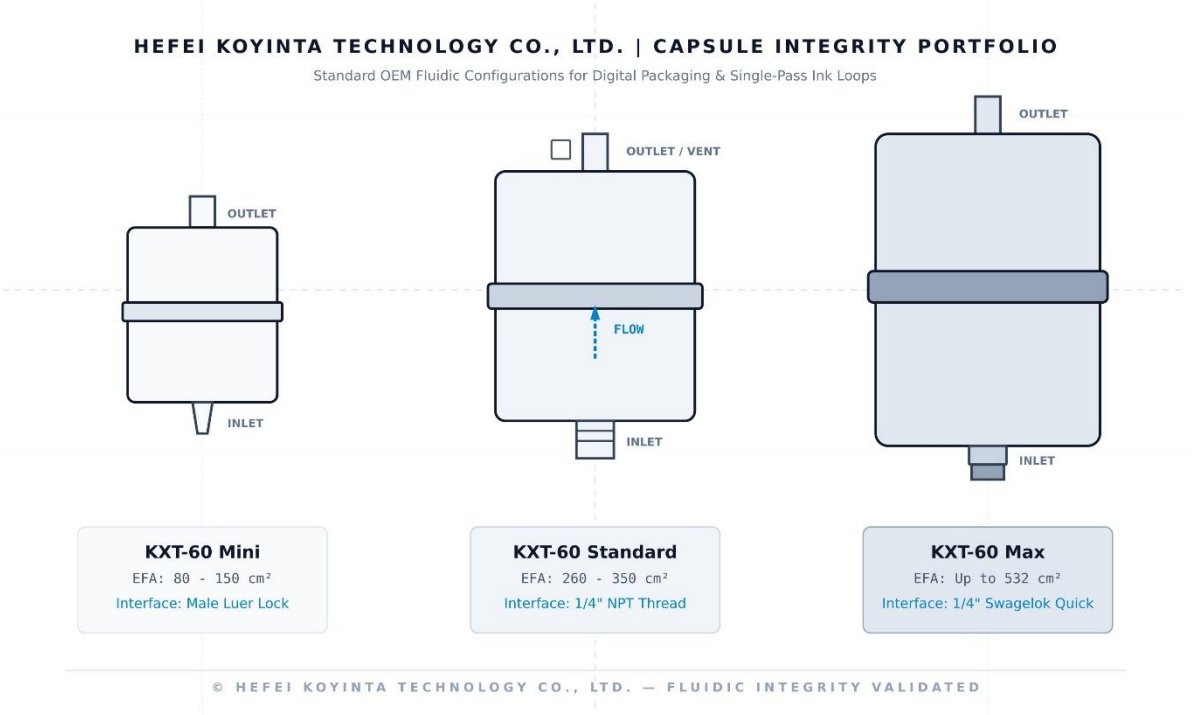
- **Maximizing Surface Area:** Packaged in a compact **60 mm** structural diameter, the internal membrane utilizes high-density pleating to achieve up to **532 cm^2** of effective filtration area. This dense geometric configuration yields an optimized flow-to-volume ratio, facilitating high volumetric throughput while minimizing the physical footprint within printhead carriage assemblies.
- **Shear Stress Mitigation:** The architectural channel layout yields a low initial differential pressure (**ΔP**), significantly minimizing fluid shear stress. This protection prevents pigment de-stabilization, polymer chains shearing, or dispersion dropouts common in high-viscosity or volatile digital ink systems.
- **Upward Fluidics Logic:** All configurations support standard bottom-inlet (INLET) and top-outlet (OUTLET) plumbing, leveraging thermodynamic buoyancy to naturally channel micro-bubbles upward, away from the printhead rows, easing complete system venting during initialization loops.

4. Process Mechanical Interfaces

To support high-vibration environments, our capsule housings feature reinforced, leak-proof connective plumbing options ensuring cross-platform mechanical adaptability:

- **Threaded Ports:** Standard **1/4" NPT** connections for rugged, high-torque leak-proof main ink loop coupling.

- **Quick Couplings:** Fully compatible with industrial standard Swagelok connectors (**1/4"**) and Luer Lock systems to ensure rapid, tool-free field replacement cycles and minimum preventive maintenance downtime.



5. Engineering Field Notes & Guarantees

⚠️ **Note 1: Viscous Scaling**

All hydraulic flow characterization curves are benchmarked against clean water (**1 cP**) at **25°C**. For industrial packaging inks exceeding **8 cP** (such as heavy pigment loads, high-viscosity textile formulations, or high-density white inks), the initial pressure drop will scale proportionally. System designers must compute pump torque limits and hydraulic delivery pressures based on dynamic viscosity scaling.

📝 **Note 2: Contractual Validation Guarantee**

Acknowledging the extreme sensitivities of high-density micro-nozzle rows, KOYINTA stands behind its **β ≥ 500** absolute rating. **HEFEI KOYINTA TECHNOLOGY CO., LTD.** offers **batch-specific contractual validation** agreements and laser particle-counting challenge logs to OEM systems integrators upon custom contract finalization.

HEFEI KOYINTA TECHNOLOGY CO., LTD.

Configuring Fluid Integrity, Securing Long-Term Coordinates.

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