

Thermo Scientific Finnpiquette F2 – durability you can rely on

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Key words

- **Reliability testing** – Testing that provides confidence that the system meets its reliability requirements. The ability of a system or component to perform its required functions under stated conditions for a specified period of time.
- **Tolerance** – The permissible limit of variation in physical dimension. May also be used for other measurable values.
- **Polyvinylidene fluoride (PVDF)** – Speciality resin that exhibits its highest purity, toughness and resistance to chemicals.
- **Ethylene propylene diene rubber (EPDM)** – Elastomer that shows excellent steam resistance.
- **ISO 8655** – Calibration standard for the piston operated volumetric devices.
- **ISO 9001** – Standard for Quality management systems.
- **ISO 13485** – Quality management standard for medical devices.

Goal

Thermo Scientific™ Finnpiquettes™ are built using over 40 years of pipetting experience. The Finnpiquettes are renowned for achieving optimal performance in all areas valued in today's research environments. With extensive research and stringent quality control, Finnpiquettes are designed and made to deliver value, and ensure reliability and precision over the lifetime of the pipette. This application note describes what makes the Finnpiquette F2 the optimal pipette to meet the exacting rigors of everyday use and abuse in a laboratory environment.

Durable construction

The Finnpiquette F2 has been designed to suit highly demanding applications where robustness and durability are essential. The materials used in the Finnpiquette F2 are able to withstand a higher level of temperature, UV light, chemical and wear resistance than materials used in standard pipettes. The pipette enables secure decontamination – it is fully steam autoclavable at 121°C and can be sterilized with UV even for prolonged periods without visible discoloration or the deterioration of the material. Tight manufacturing tolerances to 0.01 mm used for critical dimensions further contribute to the ruggedness of the design while also ensuring accuracy and precision.



The F2 features polyvinylidene fluoride (PVDF) shafts ensuring increased chemical and mechanical durability of the product. The excellent mechanical toughness of PVDF together with the rugged construction protect against accidental breakage. There are no protruding parts to break or metal components that can be damaged if dropped.

The internal components further ensure optimal resistance to wear and chemicals. The use of highest grade acid-proof steel renders the product suitable even for extreme applications. Special attention is also paid to seals and O-rings which are subject to wear, deterioration and contamination. Ethylene propylene diene rubber (EPDM) has been chosen as the elastomer as it withstands the demands and enables autoclaving without impacting the pipetting performance.

The design together with the materials also limits the transfer of heat from the hand to the pipette. When pipetting for an extended period of time, the air inside the pipette may warm up, leading to expansion of the air volume and inaccurate results. In FinnpiPETTE F2, even the volume gearing mechanism is thermally isolated from the pipette body, eliminating the effects of warming by hand.

Reliability testing

In addition to extensive material research, thorough testing ensures that the product development process is comprehensive. The products go through stringent testing, simulating use in extreme laboratory environments. The endurance of critical parts, including tip ejectors, tip cones and volume adjustment wheels, have been tested. Specifically, the following durability tests have been performed with the FinnpiPETTE F2 product line:

- 10,000 ejection movements with simulated tip attachment were performed to verify the durability of the tip ejection mechanism. The tip ejection mechanism was also shown to remain intact when using five times more force than is required to get the tips to attach.
- The tip ejector attachment system including the tip ejector sleeve (lower part) and the tip ejection plunger (upper part) was tested by detaching the system repeatedly. 500 and 200 cycles were performed on the single and multichannel models, respectively, without failures. With one cycle equivalent to a service visit, the amount exceeds average laboratory use.
- The volume adjustment was tested by repeatedly turning the adjustment knob for at least one full revolution back and forth. The mechanism remained intact during the entire 90,000 cycle test period, equivalent to about three years of use.
- Pipetting endurance was tested by performing 25,000 pipetting movements followed by a calibration check. The pipettes were shown to be within the acceptance limits after the test period.
- Single and multi-channel pipettes were treated in autoclaving conditions (121°C/2atm (abs)) to test steam sterilization endurance. The pipettes remained functional and defect-free after 100 test cycles.

The results show that the F2 pipettes continue to perform to the highest standards even in heavy-duty applications.

Quality

Our production strategy compliments this comprehensive design approach. Strict quality control is an essential element of the pipette manufacturing process.

Each individual FinnpiPETTE is inspected, validated and calibrated according to procedures based on the ISO 8655 standard. ISO 8655 standards form a guideline for the industry concerning the entire calibration process of piston operated volumetric devices.

The FinnpiPETTE F2 pipettes are manufactured in facilities certified to ISO 9001 and ISO 13485 standards. Audits conducted by independent third parties ensure well-defined and controlled processes. Products and processes are also continuously being developed to ensure that the demands of customers are met. The end result is all the steps from product design to manufacturing to quality assurance and is focused on producing a robust pipette that meets the exacting demands of extreme applications.



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