



## Semi Automatic Melt Flow Indexer (MFI)



## STANDARDS

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ASTM D1238

EN 61010-1

EN 61326-1

IEC 61010-1

ISO 1133

ISO 9001

### **Semi Automatic Melt Flow Indexer (MFI) - QualiFi™ 6000SA**

QualiFi™ 6000SA is a semi-automatic, safety-enhanced melt flow indexer built for B2B plastics testing laboratories that require higher throughput, reduced operator involvement, and improved safety over a standard automatic weight-loading instrument. Measuring MFR across 0.1–100 g/10min and MVR up to 3000 cm<sup>3</sup>/10min at temperatures from 50 to 450 °C, this melt flow index tester adds pneumatic material compaction, pneumatic residual extrusion, pneumatic barrel cleaning, and a weight fall-prevention guard to the core QualiFi™ Series platform — delivering a measurably safer, faster, and more repeatable testing workflow than the QualiFi™ 5000. CE certified and CNAS proficiency-verified, the QualiFi™ 6000SA is a dependable step-up melt flow index tester for high-frequency QC and production monitoring environments across North America.

The QualiFi™ 6000SA is a pneumatic-assisted semi-automatic melt flow indexer designed for plastics testing environments where test throughput, operator safety, and measurement repeatability are higher priorities than a compact benchtop footprint. Built on the QualiFi™ Series platform, it retains all the core measurement precision, dual PID temperature control, and software capabilities of the QualiFi™ 5000 while adding a suite of pneumatic-assisted functions and a weight fall-prevention guard that together reduce manual intervention, minimize human error, and protect the operator during high-frequency testing campaigns.

The weight is manually pre-selected by the operator but automatically lifted and lowered without physical handling once selected, the same approach used on the QualiFi™ 5000 for the lifting phase. A weight fall-prevention guard is added to the 6000SA, physically securing the weight stack and reducing the risk of uncontrolled weight descent during test operation. Material compaction is handled pneumatically with adjustable compaction time and load (10–50 kg), removing the variability introduced by manually applied compaction force and improving the reproducibility of high-viscosity material tests.

Pneumatic residual material extrusion uses adjustable pneumatic load (10–50 kg) to push remaining polymer out of the barrel after each test, significantly reducing the time and effort required for between-test cleaning. Pneumatic barrel cleaning completes the post-test cycle using compressed air to clear residual material from the barrel interior, a step that on conventional melt flow index testers requires manual rod cleaning between every run. These three pneumatic operations together reduce the total between-test turnaround time and make the QualiFi™ 6000SA well-suited to high-frequency QC environments where dozens of tests are run per shift.

All core QualiFi™ Series platform capabilities are retained: the 10.1-inch HD touch screen, 50–450 °C dual PID temperature control, ±0.2 °C temperature accuracy, 0.002 mm piston displacement resolution, 8 customizable test plans, 5,000-group USB data storage with DMS software, optional PC two-way control, and multi-language interface support. The taller floor-standing form factor (580×480×1450 mm) compared to the QualiFi™ 5000 benchtop design accommodates the pneumatic cylinder assembly and weight guard hardware, and requires a compressed air supply of more than 0.6 MPa.

## **APPLICATIONS**

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### **Semi Automatic Melt Flow Indexer (MFI) - QualiFi™ 6000SA Applications**

The QualiFi™ 6000SA melt flow indexer is suited to B2B plastics testing environments where test frequency, safety, and throughput are the primary operational drivers — and where the manual compaction variability of a standard melt flow index tester is a measurable source of result inconsistency.

- High-Frequency Production QC: Incoming and outgoing material inspection of polyolefin, engineering plastic, and specialty resin batches at high test frequency — pneumatic cleaning and residual extrusion minimize between-test turnaround time.
- High-Viscosity Polymer Testing: MFR/MVR testing of nylon, polycarbonate, fluoroplastics, and other engineering resins requiring consistent compaction force — pneumatic compaction removes the operator variability inherent to manual loading.
- Petrochemical & Compounding Lines: Process monitoring and product qualification of polymer melts and compound formulations requiring reproducible test conditions and rapid between-sample changeover without barrel disassembly.
- Plastics Product Manufacturing: Lot-to-lot supplier qualification, production batch release testing, and extrusion/injection process monitoring against defined MFR specification limits per ISO 1133 and ASTM D1238.
- Regulated & Accredited Laboratories: Third-party testing, commodity inspection, and certification work requiring audit-trail data export, user authority management, and CNAS-verified measurement accuracy across test runs.
- Academic & Applied Research: Polymer characterization, blend and additive screening, and comparative melt flow index testing across material series requiring precise, reproducible measurement with full data logging capability.



## Standards

The QualiFi™ 6000SA melt flow indexer is designed and verified to comply with the following internationally recognized standards for thermoplastic melt flow rate testing and laboratory instrument safety.

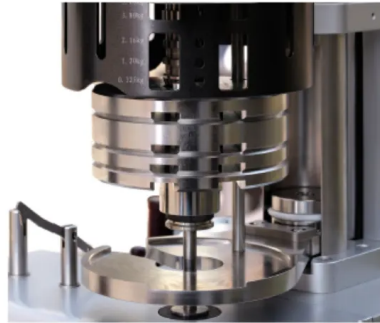
- ISO 1133-1:2011 — Plastics: Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard procedure
- ISO 1133-2:2011 — Plastics: Determination of MFR and MVR of thermoplastics — Part 2: Method for materials sensitive to time-temperature history and/or moisture
- ASTM D1238 — Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer (Procedures A and B)
- IEC 61010-1 / EN 61010-1:2010+A1:2019 — Safety requirements for electrical equipment for measurement, control, and laboratory use (CE certified)
- EN 61326-1:2013 — Electrical equipment for measurement, control and laboratory use: EMC requirements (CE certified)
- ISO 9001:2015 — Quality management system standard applicable to laboratory instrument manufacturing

## Certifications and Proficiency Verification

The QualiFi™ 6000SA shares the same core QualiFi™ Series platform qualification as the broader product family, including CE certification and consecutive CNAS proficiency testing validation.

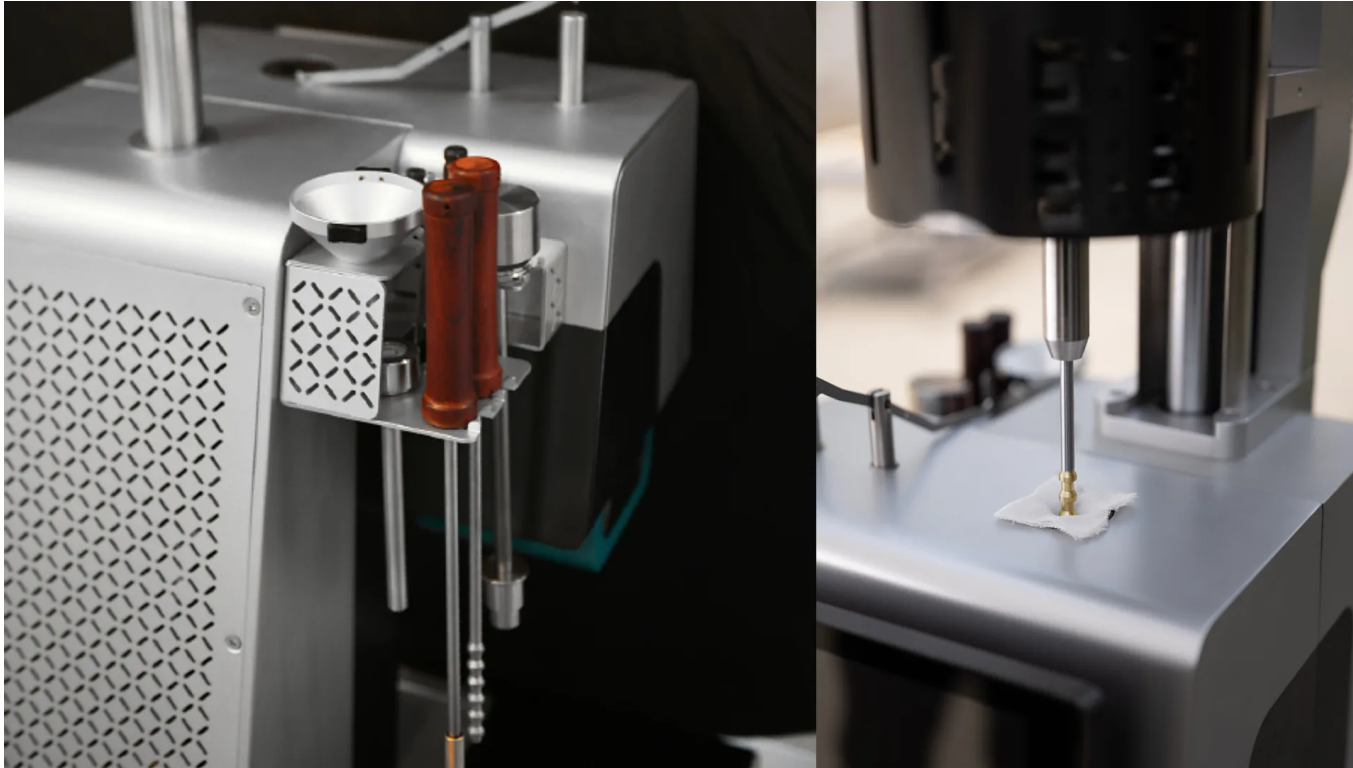
- CE Certification: EN 61010-1:2010+A1:2019 (Low Voltage) and EN 61326-1:2013 (EMC) — confirmed by ECM Certificate of Compliance.
- CNAS Proficiency Testing: Consecutive CNAS inter-laboratory proficiency comparisons — all results satisfactory; Z-scores within  $-0.07$  to  $+0.11$  across all rounds.
- Multiple Technical Patents: QualiFi™ Series instruments hold multiple registered technical patents covering core measurement, thermal management, and design innovations.

## Semi Automatic Melt Flow Indexer (MFI) - QualiFi™ 6000SA Key Features



### Pneumatic Systems and Safety Step-up from QualiFi™ 5000

- Pneumatic material compaction with adjustable compaction time and load (10-50 kg) — removes operator variability from the compaction step and improves run-to-run MFR/MVR repeatability
- Pneumatic residual material extrusion with adjustable load (10-50 kg) — pushes post-test polymer from the barrel rapidly without manual rod operation
- Pneumatic barrel cleaning uses compressed air to clear residual material from the barrel interior — significantly reducing between-test preparation time in high-frequency testing workflows



- Weight fall-prevention guard physically constrains the weight stack to prevent uncontrolled descent events during test setup, weight changes, or loading — a hardware safety addition over the QualiFi™ 5000
- Preloading supports two modes: calibration weight load (0.325–21.6 kg) and additional load (10–50 kg) with adjustable positions for precise test condition reproduction across diverse material requirements
- Preheating supports both no-load and loaded modes to accommodate different material types and testing protocol requirements

## **Core Measurement Platform**



- Core components (oven, die, and piston) from low-thermal-expansion, corrosion-resistant alloys meeting ISO 1133 dimensional and hardness requirements
- Temperature range 50–450 °C; resolution 0.01 °C; maximum indication error  $\leq 0.2$  °C; fluctuation  $\leq \pm 0.2$  °C; distance gradient  $\leq \pm 0.1$  °C
- Dual PID temperature control — fast, overshoot-free rise; temperature recovery after material loading  $\leq 2$  min
- Piston displacement resolution 0.002 mm; maximum indication error  $\pm 0.02$  mm; timer resolution 0.001 s
- Maximum measurable flow rate up to 3000 cm<sup>3</sup>/10min — extended by the lever-operated die plug device
- Automatic weight lifting and lowering without manual handling; weight pre-selected manually before test start
- 10.1-inch HD full-color touch screen at the front of the oven; variable-angle metal observation mirror with 15° free-angle adjustment and shatter-resistant surface
- Movable protective cover shields the zone between furnace body and loading mechanism during high-temperature operation

## Software and Data Management

- Supports mass method (A), volume method A, and volume method B tests with automatic ISO/ASTM test interval identification and automated test start
- 8 customizable test plans for direct pre-test selection — eliminates repetitive parameter entry for routine measurement workflows

- Real-time temperature-time and MVR-number curves displayed on screen for immediate visual assessment of temperature stability and result discreteness
- USB flash drive storage: 5,000 groups of test results; DMS data management software for export and formatted report generation
- Optional PC software for two-way control and remote database upload; multi-language support: English, French, German, Italian, Russian, Chinese
- User authority management — configurable role-based access rights to protect measurement data and prevent accidental parameter changes in shared laboratory environments

## **THEORY & METHOD**

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### **Theory and Method**

#### **Melt Flow Rate Measurement Principle**

The QualiFi™ 6000SA operates on the extrusion plastometer principle defined in ISO 1133 and ASTM D1238. A thermoplastic resin sample is loaded into a heated barrel and brought to the defined test temperature. A piston under a defined load forces the molten polymer through a standard die ( $\Phi 2.095$  mm) at the base of the barrel. MFR (mass method, Procedure A) is calculated from the mass of extrudate cut at timed intervals; MVR (volume method, Procedures A and B) is calculated from piston displacement over a defined time interval. The QualiFi™ 6000SA automates weight lifting, timing, cutting, and result calculation — and additionally automates compaction, residual extrusion, and barrel cleaning through its pneumatic systems reducing the total number of manual steps per test cycle compared to the QualiFi™ 5000.

#### **Pneumatic Compaction System**

Material compaction (the process of pressing the loaded polymer charge down into the barrel before the test begins) is performed pneumatically on the QualiFi™ 6000SA with adjustable compaction time and compaction load from 10 to 50 kg.

On conventional melt flow index testers, compaction is applied manually with a feeding rod, introducing operator-to-operator variability in applied force and compaction duration. The pneumatic approach delivers a defined, repeatable compaction force on every test cycle regardless of operator technique, directly improving the run-to-run repeatability of MFR/MVR results particularly for high-viscosity materials and powders that are sensitive to void content and density variation in the pre-test charge.

## **Pneumatic Residual Extrusion and Barrel Cleaning**

After each test, residual polymer remaining in the barrel must be removed before the next sample is loaded. The QualiFi™ 6000SA performs this in two pneumatic steps. First, residual material extrusion uses an adjustable pneumatic load (10-50 kg) to push remaining polymer out of the barrel and die rapidly replacing the manual push-rod operation required on standard melt flow index testers. Second, pneumatic barrel cleaning uses compressed air to clear remaining residue from the barrel interior. Together these two operations reduce post-test cleaning time substantially and minimize the physical effort and contact with high-temperature components that the manual cleaning process requires, contributing to the safety-enhanced positioning of the 6000SA.

## **Weight Fall-Prevention Guard**

The weight stack on a floor-standing melt flow indexer operates at a height that makes uncontrolled weight descent a realistic operator safety concern particularly during test setup, weight changes, or if a mechanical failure occurs during loading. The QualiFi™ 6000SA adds a dedicated weight fall-prevention guard that physically constrains the weight stack and prevents uncontrolled descent events. This is a hardware-level safety feature not present on the QualiFi™ 5000, and its inclusion reflects the taller, floor-standing form factor of the QualiFi™ 6000SA where the weight stack operates at greater height above the work surface.

## **Dual PID Temperature Control and High-Precision Displacement**

Temperature control, displacement measurement, and software operation are identical to the QualiFi™ 5000 platform. A specially customized high-temperature heater and sensor rated for continuous operation from 50 to 450 °C are governed by an intelligent dual PID algorithm — delivering fast, overshoot-free temperature rise, multi-stage balanced heat distribution

with distance gradient less than  $\pm 0.1$  °C, and post-loading temperature recovery within 2 minutes. Piston displacement is measured at 0.002 mm resolution with a maximum indication error of  $\pm 0.02$  mm, and the timer resolution is 0.001 s — enabling accurate MVR calculation across the full 0.01–3000 cm<sup>3</sup>/10min measurement range.

## TECHNICAL SPECIFICATIONS

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### Semi Automatic Melt Flow Indexer (MFI) - QualiFi™ 6000SA Technical Specifications

Parameter	QualiFi™ 6000SA
Measurement Method	MFR (mass method) / MVR (volume method A & B)
MFR Measurement Range	0.1-100 g/10min
MVR Measurement Range	0.01-3000 cm <sup>3</sup> /10min
Display Mode	Full-color touch screen (10.1-inch HD)
Cutting Method	Automatic cutting
Timer Resolution	0.001 s
Temperature Control Range	50-450 °C
Temperature Resolution	0.01 °C
Temperature Indication Error	$\leq 0.2$ °C
Temperature Fluctuation	$\leq \pm 0.2$ °C
Temperature Gradient (0-75 mm above die)	$\leq \pm 0.3$ °C

Parameter	QualiFi™ 6000SA
Temperature Recovery Time (after loading)	≤ 2 min
Loading Mode	Electric loading — weight preset manually, auto lifted/lowered
Weight Selection Mode	Manual pre-selection
Preloading Range	Calibration weight: 0.325–21.6 kg; Additional load: 10–50 kg
Pneumatic Compaction Load	10–50 kg (adjustable), pneumatic operation
Pneumatic Residual Extrusion Load	10–50 kg (adjustable), pneumatic operation
Pneumatic Barrel Cleaning	Yes — compressed air assisted
Weight Fall-Prevention Guard	Yes — hardware fitted
Piston Displacement Indication Error	± 0.02 mm
Piston Displacement Resolution	0.002 mm
Standard Die Diameter	Φ2.095 mm
Data Storage Capacity	5,000 groups (USB flash drive)
Test Plans	8 configurable and saveable test plans
Air Source Requirement	> 0.6 MPa (required for pneumatic functions)
Voltage	220V (-15% / +10%) VAC, 50Hz, 0.5 kVA (110V is also available)
Dimensions L×W×H	580 × 480 × 1450 mm
Host Weight	100 kg
Certifications	CE (EN 61010-1:2010+A1:2019; EN 61326-1:2013); CNAS proficiency verified
Software Languages	English, French, German, Italian, Russian, Chinese

## Standard Configuration

Each QualiFi™ 6000SA ships with all accessories required for immediate MFR and MVR testing per ISO 1133 and ASTM D1238, plus PC software. Note that a compressed air supply of more than 0.6 MPa is required for the pneumatic functions.

Item	Quantity
Main unit (including 1 barrel)	1 set
Basic weight set (piston rod, guide bush, weight tray, weight cover)	1 set
Standard die $\Phi 2.095$ mm	1 piece
Level	1 piece
Barrel cleaning rod	1 piece
Feeding rod	1 piece
Die cleaning rod	1 piece
Cutter	1 piece
Funnel	1 piece
Fuse	2 pieces
Special tweezers	2 pieces
Hexagon wrench (2 mm)	1 piece
USB flash drive	1 piece
Fixed wrench (8-10)	1 piece
Power cable	1 piece
PC software (DMS data management)	1 set

## Optional Accessories

Item	Description
Sample Forming Machine	Compression pre-forming device for powder, flake, film fragment, or granule specimens prior to MFR/MVR testing — particularly useful for materials that cannot be loaded directly into the melt flow indexer barrel



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