



FREE LIME ANALYZER



Free Lime Analyzer - Solutions for Precise Lime Measurement

QualiCaO™ Series — Rapid & Precise fCaO Determination in Clinker, Cement & Steel-Slag

A Free Lime Analyzer is a precision analytical instrument that measures the free calcium oxide (fCaO) content in cement clinker, finished cement, and steel-industry slag — one of the most quality-critical analytical measurements in the global cement and steel industries. Free lime is the unreacted CaO that remains after the clinker calcination process; it is the single most important indicator of clinker quality, kiln efficiency, and finished-cement performance.

Too much free lime means under-calcined clinker that will cause unsoundness, expansion, and cracking in finished concrete; too little means over-burnt clinker that wastes fuel, damages the kiln, and produces hard-to-grind material. Rapid, accurate, and frequent fCaO measurement is therefore the foundation of every modern cement plant's kiln-control, quality-assurance, and production-optimization program — directly impacting fuel consumption, refractory life, cement strength, soundness, and ultimately the safety and durability of every concrete structure built worldwide.

Two well-established analytical methodologies dominate modern fCaO testing. The ethylene glycol extraction + benzoic acid direct titration method exploits the selective reactivity of ethylene glycol with CaO (which forms calcium glycolate) — titration with benzoic acid then quantifies the dissolved calcium for a fast, proven, cost-effective measurement. The electrical conductivity method extracts CaO into ethylene glycol but determines calcium concentration by measuring the electrical conductivity of CaO²⁺ ions in solution making them indispensable for the continuous kiln-control monitoring that modern cement plants require.

Qualitest offers a comprehensive Free Lime Analyzer portfolio engineered to match every cement-plant laboratory's throughput, automation, and accuracy requirement.

Measure Every Clinker. Optimize Every Kiln.

In every cement plant on Earth, free calcium oxide is the single most important indicator of clinker quality — the value that determines fuel consumption, kiln stability, refractory life, finished-cement strength, and the structural safety of every concrete building, bridge, and infrastructure project built with that cement. Too much fCaO triggers concrete unsoundness and field failures; too little wastes fuel, damages the kiln, and degrades cement performance. The cement manufacturers, clinker producers, steel-slag operators, and building-materials QC laboratories who consistently deliver high-performance, regulator-compliant, customer-trusted products are the ones equipped with free lime analyzers built for rapid analysis, high accuracy, and reliable industrial-process-monitoring performance — and the Qualitest QualiCaO™ portfolio gives you exactly that.

Whether you are running continuous kiln-control monitoring at a large cement plant, optimizing alternative-fuel blending for CO₂ reduction, certifying finished cement against international standards, supporting steel-slag composition control, or running fundamental cement-chemistry research, Qualitest has the free lime analyzer engineered to meet your exact needs. From the cost-effective QualiCaO™ I three-minute titration platform to the flagship fully-automated conductivity-method QualiCaO™ II, every Qualitest free lime analyzer delivers world-class analytical performance backed by industry-leading service and support.

APPLICATIONS

Applications in Industries

- **Cement Manufacturing** — Rapid fCaO testing of clinker leaving the kiln for real-time kiln-control feedback, fuel-consumption optimization, refractory-life management, and cement-strength prediction.
- **Clinker Calcination Control** — Continuous quality monitoring of thermal-system clinker output — ensuring proper calcination temperature, kiln burning zone control, and consistent clinker mineralogy.
- **Finished Cement Quality Control** — Batch-release verification of finished cement fCaO levels to ensure soundness compliance with ASTM C150, EN 197-1, GB/T 175, and other international cement standards.

- **Steel & Slag Industry** — Free lime determination in steel-industry slag for slag-composition control, slag-utilization decisions, and downstream slag-cement / aggregate production.
- **Building Materials & Construction** — Quality verification of cementitious materials, supplementary cementitious materials (SCM), and blended cements for ready-mix, precast, and structural-concrete applications.
- **Lime & Calcium Industry** — Quality control of burnt lime products, hydrated lime, and calcium-oxide-based industrial chemicals across mineral-processing operations.
- **Refractory Materials** — Free lime verification in refractory raw materials, fused calcium aluminates, and high-temperature ceramic products subjected to thermal cycling.
- **Process Optimization & Kiln Control** — Real-time process feedback for kiln-temperature optimization, fuel-blending decisions, alternative-fuel utilization, and CO₂ emissions reduction programs.
- **Regulatory Compliance & Third-Party Labs** — Certified third-party cement testing, government inspection laboratories, and accredited test houses supporting global cement-quality compliance.
- **Universities and R&D** — Cement chemistry research, alternative-cement formulation development, low-carbon-cement studies, and graduate-level cement-engineering training.

FEATURES

Why Choose Qualitest for Your Free Lime Analysis Needs

Qualitest is a globally recognized supplier of advanced cement, materials, and process-monitoring instruments, serving customers worldwide with one of the most comprehensive Free Lime Analyzer portfolios available — engineered specifically for the throughput, accuracy, and process-control demands of modern cement and steel-slag operations.

Two-Tier QualiCaO™ Portfolio

From the cost-effective QualiCaO™ I direct titration platform for cement plants needing fast, reliable, three-minute free lime results, to the premium QualiCaO™ II fully-automated conductivity-method platform with automatic display, printing, and alarm functions for high-throughput regulatory QC — Qualitest offers a coordinated portfolio that matches every cement-plant laboratory size, throughput, automation requirement, and budget.

Three-Minute Analysis Time

The QualiCaO™ I delivers fast and precise free lime measurements in just three minutes — dramatically faster than traditional wet-chemistry approaches and fast enough to support continuous kiln-control feedback. The QualiCaO™ II delivers comparable rapid results through a fully automated cycle. Both platforms transform fCaO testing from a labor-intensive periodic check into a frequent real-time process-monitoring tool.

Two Proven Analytical Methods

Qualitest offers customers their choice of analytical approach. The QualiCaO™ I uses the proven ethylene glycol + benzoic acid direct titration method that has anchored cement-industry fCaO analysis for decades. The QualiCaO™ II uses the electrical-conductivity method that eliminates human-introduced titration errors and enhances measurement accuracy. Cement plants can match the method to their specific accuracy, throughput, and operator-training requirements.

Full Automation Eliminates Operator Variability

The QualiCaO™ II's fully automated test process — featuring automatic display, automatic printing of results, and automatic alarm functions — significantly reduces testing time and manual labor intensity. Cement-plant operators are freed from manual titration endpoint determination, reducing operator-introduced variability and enabling high-throughput multi-shift operation.

Built for Industrial Process Monitoring

Qualitest free lime analyzers are engineered for the daily, repeated-use demands of busy cement-plant laboratories and continuous-process-monitoring operations. Durable construction, serviceable design, and user-friendly operation ensure year-after-year reliability — minimizing downtime, reducing total cost of ownership, and protecting your laboratory

investment over a long service life.

Versatile Cross-Industry Application

While cement plants are the primary application, Qualitest free lime analyzers also serve steel-industry slag-composition control, lime-products manufacturing, refractory raw-material QC, and a broad range of calcium-oxide-containing material applications — making each QualiCaO™ platform a versatile cross-industry analytical asset.

Cost-Effective Value & Global Support

Qualitest delivers premium free-lime-analyzer performance at a transparent, competitive price point — backed by global service, training, calibration support, electrode replacements, and stocked accessories worldwide. With offices and authorized partners across the world, expert installation, operator training, and ongoing service are always within reach.

TECHNICAL SPECIFICATIONS

Product Comparison Table

Specification	QualiCaO™ I (Titration Method)	QualiCaO™ II (Conductivity Method)
Product Tier	Direct titration platform — fast & cost-effective	Premium automated electrical-conductivity platform

Measurement Principle	Ethylene glycol extract + benzoic acid direct titration method — proven analytical chemistry foundation	Electrical-conductivity analysis of CaO^{2+} ions in ethylene glycol — fully eliminates manual-titration errors
Analysis Time	Approximately 3 minutes per sample — rapid result generation	A few minutes per sample — fully automated cycle delivers results within minutes
Sample Types	Cement clinker, finished cement, thermal-system clinker calcination quality	Cement, clinker, raw meal, finished cement, kiln-burnt material
Process Automation	Operator-controlled titration with rapid endpoint detection	Fully automated test process — automatic display, automatic printing, automatic alarm functions
Accuracy Enhancement	Standardized titration procedure with precise endpoint determination	Conductivity method eliminates the human-introduced errors associated with traditional titration — significantly improved accuracy
Result Output	Direct readout of fCaO content for rapid operator decision making	Automatic display + printed result + audible/visual alarm on completion — minimal operator monitoring required
Labor & Time Savings	Three-minute cycles dramatically reduce QC turnaround vs traditional laboratory methods	Significantly reduced testing time + dramatically lower manual labor intensity — frees QC operators for other tasks
Primary Use Case	Routine clinker / cement QC for cement plants needing fast, reliable, cost-effective fCaO determination	Premium cement-plant QC, regulatory compliance verification, multi-product QC operations needing automation + audit-defensible data
Industries Served	Cement plants, clinker calcination thermal systems, building-materials manufacturers	Cement plants, clinker producers, steel & slag-composition control operations, multi-product material QC labs

Operator Skill Level	Operator familiar with titration techniques — standard analytical-chemistry training	Minimal operator training required — automated cycle reduces dependence on titration expertise
Best Suited For	Cement plant labs needing fast 3-minute fCaO results with proven titration accuracy and lower acquisition cost	High-throughput cement QC, regulatory compliance, steel-slag composition control, automated multi-shift production-line monitoring



ADVANCED TESTING TECHNOLOGIES

USA | CANADA | UAE | GCC | EU | INDIA | APAC | AFRICA | LATIN AMERICA

Connect with us

Contact our **QualiTeam** today to find out how we can help your organization **select the most suitable testing solution** for your application, requirements, and budget.

Qualitest USA (Corporate Sales Office)

Toll-Free: 1.877.884.TEST (8378) | Fax: 954.697.8211
E-mail: info@qualitest-inc.com
Address: 8201 Peters Rd., #1000,
Plantation, FL 33324, USA.

Qualitest Canada & International

Tel: +1.905.944.9825 | Fax: +1.905.944.0304
E-mail: sales@qualitest-inc.com
Address: 70 East Beaver Creek Rd., #9, Richmond Hill,
Ontario L4B 3B2, Canada.

Qualitest Latin America (Mexico and LATAM Region)

E-mail: ventas@qualitest-inc.com

Qualitest KSA (Regional Office)

Tel: +966 11 500 6659
Address: Level 7, 3.09, District 3, King Abdullah
Financial District, Riyadh, Saudi Arabia

Qualitest Singapore (ASIA PACIFIC Regional Office)

Tel: +65 6393 5480 | E-mail: singapore@qualitest-inc.com
Address: 50 Raffles Place, Singapore Land Tower,
Level 46, Singapore, 048623.

Qualitest Indonesia (Representative Office)

Tel: +62 21 2985 9522 | Fax: +62 21 2985 9889
E-mail: indonesia@qualitest-inc.com
Address: One Pacific Place Level 11, Jl. Jend. Sudirman,
Kav. 52-53, SCBD Area, Jakarta 12190, Indonesia.

Qualitest FZE (Regional GCC/ME Office)

Tel: +971 4 8819252 | Fax: +971 4 8819262
Email: gcc@qualitest-inc.com
Address: Jafza One, BB 1610, Jebel Ali Free Zone,
PO Box 261440, Dubai, UAE.

Qualitest India

E-mail: india@qualitest-inc.com
Address: 15th Floor, Dev Corpora, Pokhran Road No.1,
Eastern Express Highway, Thane, Maharashtra,
Mumbai, 400601, India

