Rich-Burn Engines: Natural Gas, Propane LPG, LNG, Gasoline

With a rich-burn engine, where exhaust-stream oxygen levels stay below 0.5%, a single MIRATECH 3-way Non-Selective Catalytic Reduction (NSCR) system will ensure ongoing compliance for NOx, CO and HCs / HAPs /VOCs – with easier installation and maintenance, and long-lasting hassle-free performance.

MIRATECH CATALYSTS: SUPERIOR BY DESIGN

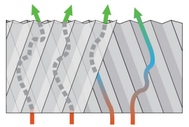
MIRATECH catalysts are known throughout the industry for superior performance, durability and easy maintenance. Wrapped in tough, 304 stainless for virtual indestructibility, the distinctive MIRATECH design features our built-in "Easy-Grab™" handle for quick, easy, safe insertion and removal. Chemisorption catalyst impregnation produces a cost-effective, long-lasting element that resists masking and catalyst "poisoning." And the patented MIRATECH banding and pinning process is your assurance of superior mechanical strength and high-temperature tolerance – to resist nesting, sagging and telescoping.

Available in a wide range of sizes and shapes, MIRATECH catalyst elements can be custom-tailored to fit virtually any space requirements, any brand of catalytic converter, and any budget.

NEXT AND VORTEX: BETTER-PERFORMING, LONGER-LASTING CATALYSTS

For any catalyst element to do its job – breaking down regulated pollutants into harmless gasses and water – engine exhaust has to come into contact with the catalyst material. Our revolutionary NEXT and VORTEX designs create turbulent flow that forces more exhaust gas to contact the catalyst for dramatically improved emissions reduction – with greatly increased strength and durability as a bonus.

NEXT *channel grooves create exhaust gas turbulence for more pollutant breakdown plus greater catalyst element strength.*

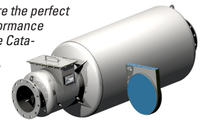


VORTEX *uses offset corrugations to create turbulent gas flow for better pollutant breakdown – with contact points resistance-welded for greater catalyst element strength.*

CATALYST HOUSINGS & CATALYST-SILENCER COMBOS

MIRATECH gives you a wide variety of better-designed, better-built, better-performing catalyst housing designs to choose from – each with high-value features you simply won't find anywhere else.

RHS/RCS



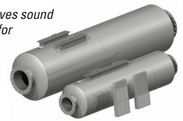
The MIRATECH RCS and RHS are the perfect solution if you need a high-performance housing unit for a Non-Selective Catalytic Reduction (NSCR) catalyst that integrates emission control and noise reduction for rich-burn, lean-burn or diesel industrial stationary engines in the 200 – 8,000 horsepower range. RCS unit cuts noise by 25-30 dBA . RHS unit, which is hospital grade, cuts noise by 30-35 dBA.

IQ

The MIRATECH IQ is an economical option if you need a durable housing unit for your Non-Selective Catalytic Reduction (NSCR) catalyst that is easy to install, easy to access and easy to maintain.

The MIRATECH IQ, which can be manufactured with your choice of A-36 carbon-steel or 304 stainless-steel, is engineered to perform in high-value NSCR systems that require first-time permit certainty, flexibility, performance and a lifetime of low-cost ownership.

Z-FLOW



The MIRATECH ZCS/ZHS design solves sound noise and exhaust emission issues for natural gas engines. These units are designed for an engine power range from 1,000 to 4,500 hp which are used in gas compression, gas transmission and gas storage applications. Z-Flow housings are the perfect solution when you need a high-performance housing unit for a Non-Selective Catalytic Reduction (NSCR) catalyst that integrates emission control and noise reduction for lean-burn natural gas engines in the 1,000 – 4,500 horsepower range.

GROUND ACCESS

MIRATECH's Ground Access product line is a custom solution for Power Generation and large gas compression engines with a unique design. Ground Access is a combination catalyst silencer and allows the housing to rest vertically vs. horizontally. Ground Access eliminates the needs for stands, ladders and platforms, improves aesthetics, reduces installed cost as well as installed footprint.

Ground Access utilizes MIRATECH's VORTEX catalyst elements which provide increased durability and catalyst performance from higher air-flow turbulence across the catalyst.

Contact MIRATECH

Your Best First Step In NESHAP Compliance: Call Us.

Count on MIRATECH for comprehensive, fully integrated, single-source solutions that give you *assured, ongoing compliance* with less cost and less disruption of your operation – tailored to your specific needs and backed by responsive, U.S-based support.

WHY MIRATECH?

- Standard-Setting Technology
- Cost-Effective, High-Performance, High-Value Systems
- Vast Experience
  - *Over 12,000 Systems Installed, Worldwide*
- U.S.-Based Service & Support
  - *Fast-Response Field Service & Technical Support – Ready-To-Ship Replacement Parts Stocked In Tulsa, OK – U.S.-Based Engineering & Product Support*

ENGINES

- Stationary Reciprocating Engines:
  - *Natural Gas – Rich and Lean Burn*
  - *Propane/LPG*
  - *Diesel, Dual-Fuel*
  - *Alternative Fuels*

MARKETS

- Power Generation
  - *Distributed Generation / Cogeneration, Prime Power, Peak Shaving, Emergency Standby,* Air Compression, Chillers, Liquids Pumping, Greenhouse CO_2 Augmentation
- Gas Compression
- Marine Tow, Tug, Ferries, Dredges, Harbor Craft, Workboats
- Railway Passenger & Freight

FEATURES & BENEFITS

- Multi-Stage System: SCR, Oxidation, DPF, Ammonia Control
- *Compliance-Levels For All Emissions: NOx, CO, HAPs, VOCs, DPM*
  - Tier-4 Compliance
  - Up to 99% NOx Reduction
  - RICE NESHAP compliant systems for rich and lean burn engine applications including the MIRA-Monitor Continuous Parametric Measurement System (CPMS) that meets full record-keeping compliance requirements.
- Your Choice Of SCR Reactant: Urea Or Ammonia
- Efficient Reactant Atomization
- Purge Lines & Air-Assisted Injection Nozzle
- Easy access to injector for cleaning & maintenance
- Tough, durable carbon or stainless steel catalyst housing
- Insulation package with aluminum or galvanized steel sheathing
- Catalyst access door: Easy maintenance
- Advanced, user-friendly control technology
- Simple, quick bulkhead connections for wiring & plumbing
- Safety shutdown & alarm controls
- Noise reduction: Up to 50 dB(A)

To learn more, please visit miratechcorp.com and send us an e-mail at info@miratechcorp.com, or give us a call: 800-640-3141 ext. 126.

MIRATECH CORPORATION

EMISSIONS SOLUTIONS FOR INDUSTRIAL ENGINES

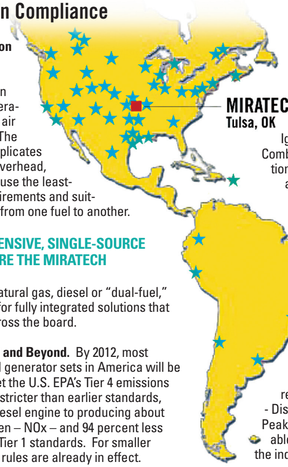
420 South 145th East Avenue
Tulsa, Oklahoma 74108 USA
P: (800) 640-3141 ext. 126
E: info@miratechcorp.com
www.miratechcorp.com

MIRATECH CORPORATION

Emissions Control Solutions For Power Generation

NESHAP Compliance
Distributed Generation / Cogeneration, Prime Power, Peak Shaving
Emergency Standby – And More

MIRATECH: The Best In Compliance



Today's on-site power generation operators face fast-mounting compliance challenges – in an environment of growing concern over the impact of industrial operations on the planet, focusing on air quality and noise in particular. The volatility of fuel prices only complicates these challenges. To contain overhead, operators need the flexibility to use the least-costly fuel. But regulatory requirements and suitable compliance solutions vary from one fuel to another.

COST-EFFECTIVE, COMPREHENSIVE, SINGLE-SOURCE COMPLIANCE SOLUTIONS ARE THE MIRATECH SPECIALTY

Whether your engines run on natural gas, diesel or "dual-fuel," MIRATECH is your best choice for fully integrated solutions that ensure ongoing compliance across the board.

Tier 4, NESHAP and Beyond. By 2012, most diesel-powered generator sets in America will be required to meet the U.S. EPA's Tier 4 emissions standards. Far stricter than earlier standards, Tier 4 limits a diesel engine to producing about 93 percent less oxides of nitrogen – NOx – and 94 percent less particulate matter – PM – than Tier 1 standards. For smaller engines – below 50 bhp – Tier 4 rules are already in effect.

NEW EPA RICE/NESHAP RULES FOR CI AND SI ENGINES

The U.S. Environmental Protection Agency (EPA) has issued new compliance rules for National Emissions Standards for Hazardous Air Pollutions (NESHAP or HAPS) for Compression Ignition (CI) and Spark Ignition (SI) Reciprocating Internal Combustion Engines (RICE). Visit the RICE/NESHAP section of MIRATECHCORP.COM to learn more or to access and download MIRATECH's CI and SI RICE NESHAP Compliance Flyers.

For Compression Ignition Engines EPA's rulemaking became effective May 3, 2010 with a full compliance deadline of May 3, 2013.

For Spark Ignition Engines EPA's rulemaking became effective August 20, 2010 with a full compliance deadline of October 19, 2013.

To avoid non-compliance fines, costly shutdowns and operational holdups, it's critical for anyone relying on engine-drive, on-site power generation - Distributed Generation/Co-generation, Prime Power, Peak Shaving, Emergency Standby and more - to find reliable cost-effective ways to meet the tough requirements the industry faces. MIRATECH solutions are ready now.

Why MIRATECH?

First-fit Compliance, Durable Unbeatable Track Record. Real-world experience goes into every MIRATECH Project. Over the past two decades, we've installed more than 12,000 units worldwide, in applications of all shapes and sizes, in all kinds of environments. If there's a problem – or a potential problem – we've probably already solved it. When new challenges arise, no one delivers reliable, cost-effective solutions faster.

WORLD-CLASS TECHNOLOGY: BETTER PERFORMANCE BY DESIGN.

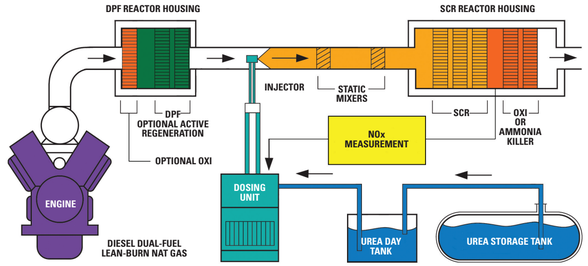
MIRATECH is an acknowledged world leader in the field – and we've earned our reputation as a trailblazer in innovative, standard-setting technology tailored to customer needs.

- MIRATECH solutions are comprehensive, fully integrated and custom-tailored to meet your specific needs and budget. Whatever engine or fuel you use - natural gas, diesel or dual-fuel - and whatever emissions limits you face, MIRATECH solutions ensure cost-effective, ongoing compliance for all regulated exhaust pollutants - including Diesel Particulates, HAPS and Noise.
- MIRATECH solutions have consistently been the benchmark for Best Available Control Technology (BACT).
- Our Diesel Particulate Filter (DPF) is CARB-Verified for Level III Plus compliance.
- Simple, user-friendly control and communications technology connects to any facility's communication systems.
- Fast-response, U.S. based field service and technical support.
- Ready-to-ship replacement parts stocked in Tulsa, OK for quick delivery.
- In-house engineering and product support.

BOTTOM-LINE VALUE.

When you install a MIRATECH system your engine will run more efficiently, with less fuel cost, and with ongoing compliance assured every step of the way – working harder, longer, with greater flexibility to handle varying loads, and with less risk of non-compliance fines or operational shutdowns.

Lean-Burn Natural Gas, Diesel & Dual-Fuel Engines



MIRATECH systems reduce regulated exhaust stream pollutants to failsafe, "first-time "compliance levels for any stationary reciprocating diesel, dual-fuel or lean-burn natural gas engine. These pollutants include oxides of nitrogen, (NOx), carbon monoxide (CO), and unburned hydrocarbons (HC/NMHC) – including Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs) – noise and diesel particulate matter (DPM).

Why SCR? With lean-burn engines, there is simply too much oxygen in the exhaust stream for a Non-Selective Catalytic Reduction (NSCR) system to reliably reduce NOx to compliance levels. That's why MIRATECH systems for these engines start with an advanced Selective Catalytic Reduction (SCR) system that uses aqueous urea or ammonia – your choice – and a catalyst to convert NOx to harmless nitrogen and water vapor.

CO & HC – HAPs & VOCs. Fully integrated with SCR, MIRATECH Oxidation Catalysts and Diesel Oxidation Catalysts convert exhaust-stream CO and hydrocarbons – including VOCs and Hazardous Air Pollutants like formaldehyde – to carbon dioxide and water. Installed in as many layers as you need to ensure problem-free, ongoing compliance, our Oxidation Catalysts also serve as a failsafe prevention of ammonia slip from the SCR stage. Better designed and better built, MIRATECH catalysts set the standards for performance, durability and safe, easy maintenance.

DIESEL PARTICULATE MATTER (DPM) REDUCTION

With a diesel engine, include a state-of-the-art MIRATECH Diesel Particulate Filter (DPF) in your MIRATECH system to reduce DPM to Tier 4 compliance levels and even stricter state and local limits. MIRATECH DPFs give you the option of either Passive Regeneration, using exhaust heat to oxidize soot, or Active Regeneration, using an independent heat source for DPM compliance with any engine load, right from startup. The MIRATECH Diesel Particulate Filter (DPF) is specifically designed for industrial engine applications and holds the prestigious Level III Verification status from the California Air Resources Board.

Noise reduction. As an added benefit, MIRATECH systems cut noise by as much as 50 dB(A).

Turn-key first-fit compliance solutions tailored to your needs. MIRATECH gives you a range of options to choose from – open loop and closed loop control systems, a variety of durable housing configurations, different levels of emissions reduction, control systems, and more. And we supply all the expert advice, training and product support you need to get the most out of your emissions control investment.

State-Of-The-Art Monitoring & Control

Advanced MIRATECH control systems reduce both the costs and the hassles of emissions compliance – ensuring maximum efficiency and performance with least distraction from your core operations.

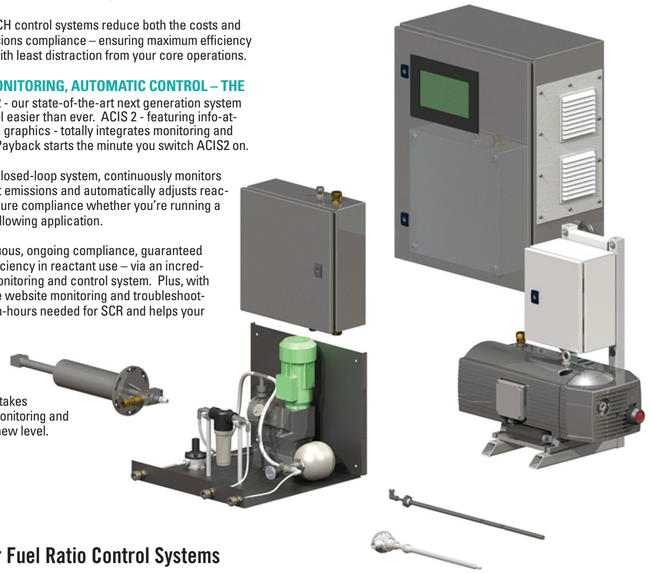
AT-A-GLANCE MONITORING, AUTOMATIC CONTROL – THE NEW ACIS2

ACIS2 - our state-of-the-art next generation system - makes SCR control easier than ever. ACIS 2 - featuring info-at-a-glance on-screen graphics - totally integrates monitoring and control functions. Payback starts the minute you switch ACIS2 on.

They key? ACIS2, closed-loop system, continuously monitors actual post-catalyst emissions and automatically adjusts reactant injection to ensure compliance whether you're running a baseload or load-following application.

The payoff? Continuous, ongoing compliance, guaranteed – and maximum efficiency in reactant use – via an incredibly user-friendly monitoring and control system. Plus, with features like remote website monitoring and troubleshooting, ACIS2 cuts man-hours needed for SCR and helps your personnel work more efficiently and reliably.

One look and you'll agree: ACIS2 takes emissions system monitoring and control to a whole new level.



MIRATECH Air Fuel Ratio Control Systems

MEC-L & MEC-FI: Air-Fuel Ratio Control for Lean-Burn Natural Gas Engines Specifically designed for lean-burn natural gas engines, the Compliance Controls MEC-L and MEC-FI for fuel injected engines continuously monitor the air-fuel mix and precisely maintain the optimum air-fuel ratio over varying loads, speeds, fuel quality and ambient conditions – for top performance in both your engine and emissions control system. Best of all MIRATECH Controls systems are fully automatic. With the MEC-L and MEC-FI, you won't waste valuable personnel time on your air-fuel ratio controller.

MEC-R Air Fuel Ratio Control for Rich-Burn Natural Gas Engines. The MEC-R Rich Burn Air Fuel Ratio Controller continuously monitors and precisely controls the air/fuel mix in rich-burn, carbureted natural gas-fueled engines. By maintaining the proper air/fuel ratio over varying engine loads, speeds, fuel quality and ambient conditions, it maximizes the efficiency of both the engine and its three-way catalytic converter. The MEC-R9 offers the same simplicity as the MEC-R model, but with more setpoints you get even tighter control. The MEC-R9 controller offers nine setpoint targets, based on a combination of three RPM settings and three manifold pressure settings. If your operation has to deal with tightening regulations, abrupt load changes, wide swings in ambient temperature or fuel quality fluctuations, the right choice is the MEC-R family: MEC-R, MEC-R9, and - for even more control - the MEC-R64 with 64 setpoints.