GTE™ INDUSTRIES

a clear direction for the future

EMISSION PRODUCTS

Sound and Emissions Solutions for Industry

GTE INDUSTRIES™

a clear direction for the future

EMISSIONS LINE

General Info

www.gteind.com / +1.888.894.3726

A COMPLETE SOLUTION for the INDUSTRIAL ENGINE MARKET Including Power Generation, Gas Compression and Power Units.

- **3-Way Catalysts** -Providing NOx, CO and NMHC control for rich burn gas engines
- **Oxidation Catalysts** -Providing CO and NMHC control for lean burn gas and Diesel engines
- **Catalyzed Soot Filters** -Providing Self Cleaning Particulate, CO and NMHC control for Diesel engines

Serving the following industries:

- **Agriculture**
- **Mining**
- **Construction**
- **Manufacturing**
- **Transportation**
- **Oil and Gas**
- **Government**
- **Power/Electrical Systems**

....And More

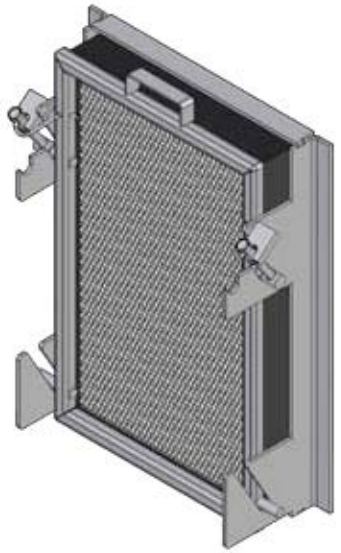
FEATURE	GTE	Miratech	EMIT	Johnson Matthey	DCL	BASF	Emerachem
Replacement Element		Y	Y	Y	Y	Y	Y
State of The Art Holster System		N	N	N	N	N	N
Parallel Expandable Design		Y	N	N	N	N	N
Limited 3 Year Warranty		N	N	N	N	N	N
Global Installed Base		Y	Y	Y	Y	Y	Y
ISO/TS 16949:2002 Quality Standard		N	N	Y	N	Y	N
Commonality		Y	N	N	N	N	N
Common Element Dimension		Y	N	N	N	N	N
Sound and Emission Solution		N	N	Y	N	N	N
Braised Substrate Foil		N	N	N	N	N	N
No Support Bars Needed		N	N	N	N	N	N
USA Made and Supported		N	Y	Y	N	Y	Y
Modularity		Y	N	Y	N	N	N
Research & Development Lab		N	N	Y	N	Y	N

WHAT MAKES GTE A WORLD LEADER

- Extensive Knowledge and Experience – GTE Industries has provided tens of thousands of industrial sound and emissions solutions since1978.
- Complete Solutions with Accessories – GTE extends a full line of standard accessories to provide complete solutions.
- Unrivaled Catalog of Products – With customization and superior standard solutions and options, GTE prides itself in offering answers for sound and emissions challenges.
- Industry-Leading Innovation – GTE engineers and manufactures cutting-edge solutions for all sound and emissions requests, pushing the limits of industry norms.
- Proven Reliability – Standard products ship in two weeks from order confirmation, while GTE's engineers stand ready to customize solutions for any sound attenuation or emissions challenge.

OUR JOURNEY

Founded as GT Exhaust Systems in California in 1978, our company began with two men building industrial silencers in a small garage. Fourteen years later, the company moved to Lincoln, Nebraska, where we experienced significant growth. We have expanded our products and services, focusing a great deal on emissions solutions. Today, we are a respected industry leader and an expert in sound and emissions solutions. As we have grown, however, one staple of our success has always remained a constant - give customers the best solution with the best service.



Internal View of Assembled Catalyst Unit

A variety of silencer options and configurations

- Designed to meet your application
- Stainless or carbon steel construction
- Cost effective modular design for install flexibility and continued compliance
- Catalytic elements with three (3) year warranty
- End or side inlet tailored to your installation requirements
- Available with dual inlets
- Special sizes available when space is a problem
- Special construction minimizes potential damage from backfire
- Designed with easy access for cleaning and maintenance
- Sampling and control instrument ports provided

DPF Unit

3-Way Catalyst

- Nitrogen Oxide (NOx) reduction
- Carbon Monoxide (CO) & non Methane – non Ethane Hydrocarbon (NMNEHC) oxidation.
- Stoichiometric rich burn spark ignition (gas or lpg) engines

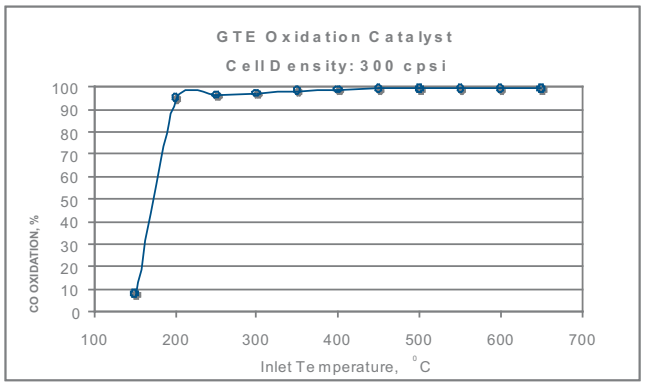
Oxidation

- No impact on NOx
- CO & NMNEHC oxidation
- Spark ignition engines, lean or rich burn, Natural Gas or lpg, and diesel engines

Diesel Particulate Filter / Silencer

- Primarily applicable where air quality regulations require particulate reduction on diesel engines.
- Ceramic filter
- Oxidation catalyst applied to surface
- GTE packages in a "501" style silencer

Detail view of mesh



Oxidation and 3-Way Catalysts

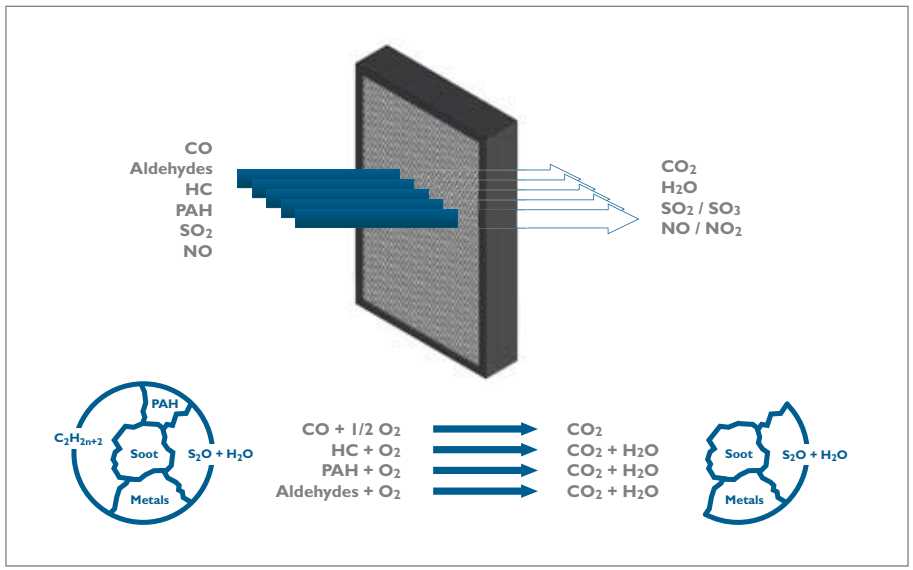
Our catalytic elements incorporate a high quality metal substrate. A sinusoidal shaped foil is 100% vacuum brazed between two flat sections for superior high temperature strength and durability. This prevents telescoping of material under exhaust pressure conditions eliminating the requirement of traditional substrate bracing. The metal foil is either cut to length for rectangular elements or continuously wound for cylindrical elements and is protected by a stainless steel frame, 0.125 inches thick. Cell density is 300 cells per inch for maximum catalytic activity.

The substrates contain one or more precious elements from the Platinum Group Metals (PGM), primarily platinum (Pt), palladium (Pd), and rhodium (Rh). The chemistry of the substrates is optimized to keep the PGMs finely dispersed in very small particles, yielding a highly active catalyst.

The patented washcoating technology offers high temperature stability and resistance to sintering. The washcoats are cured under controlled high temperature / time conditions to ensure that you consistently receive a long-life, high-quality product.

The Oxidation Catalysts provide hydrocarbon and CO abatement with secondary particulate reduction for diesel applications, and CO and Non-Methane Hydrocarbons (NMHC) abatement from lean burn natural gas engines. High destruction of aldehydes removes the characteristic objectionable odor of diesel.

The 3-Way Catalyst uses non-selective catalytic reduction (NSCR) to reduce NOx and is designed for rich-burning (fuel rich) gas engines operated at or very close, to a stoichiometric air/fuel ratio. NOx catalytically is reduced to nitrogen while providing oxygen that reacts with Carbon Monoxide (CO), hydrocarbons (CXHX), aldehydes, and poly aromatic hydrocarbons (PAH), oxidizing them to carbon dioxide (CO2) and water vapor (H2O).



3-Way Catalyst Reaction Two Step Process

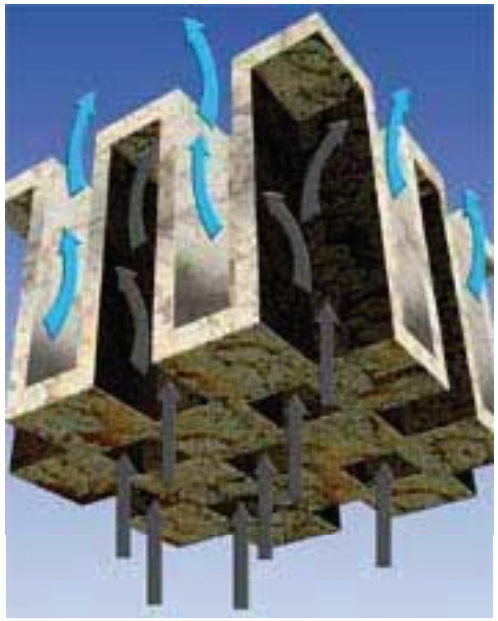
1. Deplete Oxygen (Oxidize CO with any "free or excess" O2 that may be in the exhaust gas; this must be no more than 0.5% excess air relative to stoichiometric)

   2CO + O2 = 2CO2
   CmHn + (m + n/4)O2 = mCO2 + (n/2)H2O

2. Convert NOx (NO and NO2 are chemically reduced to Nitrogen (N2) making the oxygen available to chemically oxidize the CO to CO2)

   NO + CO = 1/2N2 + CO2
   2NO2 + 4CO = N2 + 4CO2

It should be noted that atoms are recombined (referred to as "conversion") from emission molecules to harmless byproducts. The amount of conversion is commonly reported as reduction (percent) for internal combustion engine catalysts. The term "destruction" is also used instead of reduction, but nothing is really destroyed.

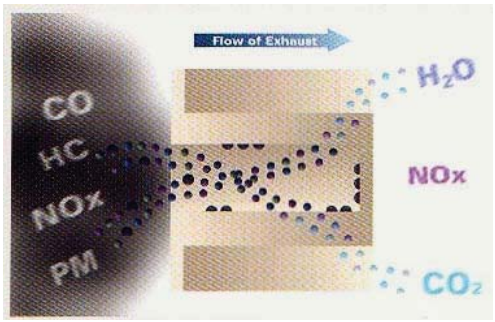


Diesel particulate matter (soot) is composed of solid as well as liquid. Particulates consist of liquid heavy hydrocarbon, carbon soot, water, and hydrated sulfuric acid. Carbon monoxide (CO), a poisonous gas produced by incomplete combustion, is created when fuel is burned. Incomplete burning in "cool" areas of the combustion chamber, such as cylinder walls and the valves, result in hydrocarbon emissions (HC).

Diesel emissions account for approximately 70% of all particulate matter contaminating our air, and is now classified as a toxic air contaminant by the California Air Resources Board. Airborne particulates are inhaled and fine particles can attach themselves to the lining of the lungs, which then can lead to lung cancer. The longevity associated with Diesel engines will require retrofits in order to achieve ambient air pollution reductions.

GTE Silencers utilizes catalyzed particulate filters to dramatically reduce Diesel emissions. The advanced technology behind the catalyzed Diesel particulate filters (cDPF) enable engines to comply with governmental emissions regulations by reducing toxic levels of Diesel particulate matter, carbon monoxide and hydrocarbons.

The filter consists of a cellular ceramic substrate. Exhaust gases enter a honeycombed maze of channels that actually captures the particulates. The filter is designed to be self-regenerating. The special catalytic coatings on the filter substrate interact with the gases and carbon particles to create complex chemical reactions. The interaction between the exhaust gas and the filter creates a chemical reaction, which converts carbon monoxide and hydrocarbons into harmless carbon dioxide and water vapors. Most particles larger than 35 nanometers are efficiently removed from the exhaust. Tests have shown that up to 99.6% of the DPM is removed. Hydrocarbons and carbon monoxide are also reduced by up to 99%.

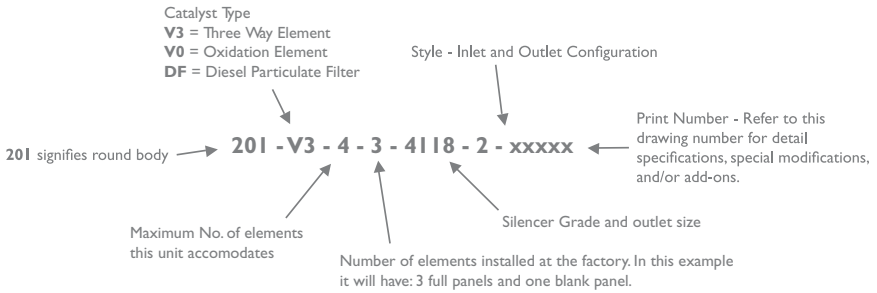


The regeneration process is dependent on exhaust temperatures. High or low sulfur fuels (greater than 15 ppm sulfur content) require higher exhaust temperatures than the ultra-low sulfur fuel. To cover most sulfur scenarios while meeting the California Air Resources Board (CARB) and state requirements, GTE Industries recommends heating the filters up to a 750 F regeneration temperature to burn any collected diesel particulate matter. GTE's catalyzed Diesel particulate filter silencer features a special thermal wall inserted between the double outer shells to trap heat so the filter can heat up quicker to burn the particulate matter before it builds up the backpressure too high. This special construction is modified to prevent any fiberglass from escaping into exhaust systems or filters.

Results of GTE Industries Filters* Tested at the University of California's Riverside Facility

To meet the minimal 85% particulate reduction and the newer California Air Resources Board (CARB) Level 3PLUS requirements, the particulate filters used by GTE were tested at the certified University of California's Riverside facility operating on California diesel "red dye" number 2, with 500 ppm maximum sulfur content. The results of these PM2.5 CFR and PM2.5 ISO tests (both weighted ISO 8178) ranged from 98.5% particulate reduction efficiency to 99.6% particulate reduction efficiency. During the same tests, the total hydrocarbon (THC) reduction efficiencies ranged from 81% to 58% for the 0 hour and 1000 hour run times respectively, with the 500 hour test at 99% reduction efficiency. The carbon monoxide (CO) tests ranged from 98% to 89% reduction efficiencies for the 0 hour and 1000 hour run times respectively. The GTE filters exceeded the CARB Level 3PLUS specifications with negligible NO to NO2 conversions. This is due to the special washcoat formulation that makes the GTE filters NOx neutral.

Part Numbering System. 201-V3 - 4 - 3 - 4118 - 2 - xxxxx



Catalytic Silencer Options and Models

GTE Catalytic Silencers are available in carbon steel or stainless steel. Standard sizes available from four (4) inches through 30 inch inlets & outlets and with various elements to suit the application needs. Larger sizes available as special application designs. Special modular design allow selection of larger body with fewer active elements, providing option for increased performance by simply installing additional active elements at a later date.

- Available with a round design
- Designed to simplify installation while maintaining high degree of sound attenuation
- Greater variety of inlet and outlet configurations
- Special construction minimizes potential damage from backfire
- Rental fleet owners have option of removing elements for safe storage where catalytic action is not required

Silencer Design Options

201	Round Silencer Body
211	Dual Inlet Round Body for Cummins Engines
216	Dual Inlet Round Body for Caterpillar Engines
218	Dual Inlet Round Body for MTU/Kohler Engines

Element Options

VO	Oxidation Element
V3	Three Way Element
DF	Diesel Particulate Filter

Inlet & Outlet Configuration

Style	
1	End Inlet (x) End Outlet
2	Side Inlet (x) End Outlet
3	Side Inlet (x) Side Outlet
4	End Inlet (x) Side Outlet

Silencer Grade Options

		Attenuation dBA
1100	Industrial (Round Elements Only)	5-10
2100	Industrial	13-19
4100	Residential	19-25
5100	Critical	25-33
6100	Super Critical	32-40
7100	Extreme Applications	42-52

Catalytic Element Chart

	Part Number	Dimensions in Inches
Oxidation Element	#200013168	15.44 x 24.75 x 3.70
Three Way Element	#200013170	15.44 x 24.75 x 3.70
Blank Panels	#23617	15.44 x 24.75 x 3.70
Single Panel Framed Gasket	#40644	--
Double Panel Framed Gasket	#40595	--

Diesel Particulate Filter Options

Round DPF Element	Diameter	Lg
G size	11.25”	14”
H size	12”	112”
J size	15”	15”

Please visit www.gteind.com for a Request for Quote or contact your local sales representative today!

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GTE has the solution for your sound, emissions and combined needs. Our clear answers department is standing ready to assist you with all your exhaust system or accessory needs. Call, fax, or visit our website today.