



**Exhaust & Engine Brake Silencer
FREQUENTLY ASKED QUESTIONS
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How does a Silent Partner™ differ from a muffler? What is the construction difference?

The Silent Partner uses the most advanced sound technologies ever employed for a truck application. Starting with a request from The Jacob's Vehicle Systems® company to eliminate the "Jake Bark", Donaldson and Jacob's engineers employed the latest acoustic technologies along with extensive subjective human sound metrics to address the problem. The development program challenge was not only to reduce the diesel engine exhaust noise in both acceleration and engine brake mode, but to shape the sound into a pleasant, mellow tone. This is the first time that such optimized, psycho-acoustic sound-quality technology has been used to design a diesel engine truck muffler.

The result is the greatest sound reduction in the same size envelope as the current production muffler, with no increase in back-pressure. This breakthrough technology employs a patent-pending design with reactive, dispersive and absorptive sound attenuation. The Silent Partner is not a muffler, as much as it is an Engine Exhaust Silencer.

There are no moving parts. The Silent Partner has been tested and designed to operate with the most popular diesel engines used in North America. These include all Detroit Diesel, Caterpillar, Mack, Cummins, International and Volvo engines up to 600 HP.

The Silent Partner provides significant sound reductions and a "mellowing" of noise. This noise reduction is effective in all modes of operation—engine braking, driveby and acceleration. In addition the materials and workmanship used in the Silent Partner are superior to those found in standard original equipment and replacement mufflers. These upgrades include high grade aluminized 409 stainless steel, heavier gauge materials, improved construction design, and stainless steel welding. This is the same material used in \$1,200 catalytic converters.

The Silent Partner is the only exhaust device endorsed by Jacob's Vehicle Systems, the same people who developed the diesel engine brake in 1961.

How long will it last?

The stainless steel Silent Partner is the first muffler with an 8-year, 1,000,000-mile warranty. Our aluminized steel Silent Partner has a 4 year or 500,000-mile warranty

Standard mufflers can require replacement, after as few as 2 years. Because of the Silent Partner's all-stainless-steel construction and long life warranty frequent muffler replacement will be a thing of the past.

What is the warranty?

The warranty on the stainless steel Silent Partner is 8 years or 1,000,000 miles (1,600,000 km).

The warranty on the aluminized steel Silent Partner is 4 years or 500,000 miles (800,000 km).

Will I be able to operate the truck in areas where I previously could not because of noise restriction?

Many localities have signs that prohibit the use of an engine brake. But enforcement is based on the distinctive noise generated when the engine brake is engaged. With proper installation on a sound exhaust system, a truck equipped with a Silent Partner will meet any EPA noise emission standards.

The Silent Partner exhaust noise is quieter than all the rest of the truck noise! Use of the Silent Partner would make community concern about truck noise (especially due to engine brake use) a non issue.

What other value is there to me or my company?

In addition to the cost savings associated with the long-life and warranty of the Silent Partner, there are three other major "values":

a) Improved *image in the community*:
External noise reduction (engine exhaust noise) gives your fleet the advantage of a "community friendly"

image, and the resultant improvement in community relations.

b) *Additional cost savings:*

The reduction of external noise associated with the Jake Brake will allow/encourage greater use of the Jake Brake. This translates directly to less wear and tear on mechanical brake systems, resulting in additional cost savings. In field testing, we have found that increased use of the Jake Brake results in a 2 to 2-and-a-half fold increase in the life of mechanical brake systems, a measurable cost savings.

c) *Driver safety and comfort:*

The Silent Partner provides improvement in interior sound quality over standard mufflers. By shaping the interior noise which has been associated with increased fatigue, hearing loss and even irritability, the Silent Partner provides both a safer and more comfortable work environment for your driver. The installation of a Silent Partner demonstrates the concern the fleet has about the driver's comfort and well-being and will certainly be a positive factor in driver retention.

What does the test data show in terms of performance?

The Silent Partner is significantly quieter than any muffler on the market today. In developing the Silent Partner, the data used has been collected using the most technologically advanced tools - super-computer models, laboratory engine dynamometers, hemi-anechoic test chambers - as well as real-life settings - test track drivebys, and both over-the-road and off-road truck use. All tests have demonstrated that the Silent Partner provides a significant reduction in noise in both the positive power (acceleration) and in negative power (engine brake) application. This reduction in exhaust noise at 50 feet (EPA, and SAE test standards) is a major design breakthrough.

What does the government mandate as standard?

The EPA mandates that all new trucks must pass a drive-by and can not exceed 80 dB(A) at 50 feet - (Environmental Protection Agency, subchapter G -

Noise Abatement Regulations, part 205 - Transportation Equipment Noise Emission Controls, 40 CFR 205.52, vehicle noise emission standards).

In this drive-by test there is no utilization of de-acceleration or engine braking; however, upon purchasing a truck, a truck owner, engaged in interstate commerce, can not exceed 83 dB(A) at 50 feet " at any time or under any condition of highway grade, load, acceleration or deceleration... "on highways with speed limits of 35 MPH or less; or 87 dB(A) at 50 feet, on highways with speed limits of more than 35 MPH. (Environmental Protection Agency, Noise Abatement Regulations, part 202 - Motor Carriers Engaged in Interstate Commerce, 40 CFR 202.20 Standards for highway operations.)

No other muffler can beat the Silent Partner in all modes of operation. It is the quietest exhaust silencer ever made available and the only one designed especially to quiet the "sharp bark" of the engine brake.

How does the Silent Partner achieve this silencing?

Essentially, what the Silent Partner has done is to shape and modify the diesel engine noise in sound metrics' areas such as sharpness. High frequencies and pulsing tones are the most annoying to the human ear. Silent Partner reduces these, essentially making diesel engine noise mellower (thus more acceptable). It perhaps can be compared to the sound a Mercedes door makes when closing, versus the harsh ringing of an alarm clock. While they both may be the same "loudness", the sound of one is more pleasant. This area of subjective sound design was used extensively by Donaldson engineers.

As the Silent Partner accumulates miles, will it become noisier?

In terms of the acoustic measurement tools and design principles, the Silent Partner takes diesel engine muffler technology to a new level. Because of its superior design, construction and materials compared to anything on the highway today, we are confident that there will be no noticeable increase in noise

during the warranty period. Tests done on prototype field units showed no deterioration in sound reduction.

Are there any emission benefits?

While the Silent Partner will not affect particulate or NOx emissions, it will provide significant reduction in noise emissions. Currently, the Silent Partner meets all governmental noise emissions' regulations for diesel engines.

From who can I purchase a Silent Partner?

Because Donaldson supplies over 80% of all new truck mufflers, it can be specified on all new trucks. In addition, the Silent Partner is also available as a direct upgrade replacement to existing mufflers. These can be purchased through any authorized Donaldson distribution outlet -- warehouse distributor or dealer..

Why the higher price?

In addition, to the use of superior materials and heavier duty construction compared to a standard muffler, no other muffler can achieve the performance of the Silent Partner. No product today can meet the (patent pending) performance in the same size package, all with the same back pressure as a standard OEM muffler. The Silent Partner is the most cost-efficient way to reduce diesel engine noise with the lowest weight and cost. There is no penalty to fuel efficiency or no loss of power since the Silent Partner has the same back pressure as current production mufflers. The Silent Partner costs about as much as a new brake job. Pound for pound, dollar for dollar, there is not a less expensive way to quiet a diesel engine than the Silent Partner.

Are the dimensions of the Silent Partner the same as a standard muffler?

Yes; they are 10" x 45" with 5" diameter inlet and outlet. The Silent Partner has achieved significant noise attenuation and sound quality improvement in a

standard production package size. This break through allows direct replacement, without modification, of current production or aftermarket vertical mufflers. There is no additional cost penalty for either OEM or retrofit installation, over a standard muffler.

What is the weight difference?

The Silent Partner, with all its performance, adds less than 15 pounds over the weight of a current production muffler.

Can we use the same bracketry?

The Silent Partner is designed to place the weight mostly at the inlet (bottom) of the unit, where it is most stable. Since Silent Partner has the same dimensions as most vertical mufflers, it is a direct fit replacement. Off -road installations of the Silent Partner - on trucks used in mining and logging operations - have shown no problems after 18 months of operation. Of course, when installing the Silent Partner new clamps and brackets should be used and mounting masts should be examined for integrity.

What is the construction difference between single and dual Silent Partners?

There are construction differences between the single and dual mufflers because of the different roles they play and different exhaust flows each carries. In its extensive research to develop the Silent Partner, Donaldson has insured unique sound tuning for these two different applications. The single vertical unit is not recommend for installation on engines exceeding 500 HP. For engines in the 450 to 600 HP, it is recommended that the dual vertical units be used, since they provide better flow at lower back pressure, while still maintaining the superior performance of the Silent Partner.

Will I be able to get OEM installation?

Yes. But because the Silent Partner is new, you may have to specify the Donaldson part number when ordering. M101158 is the part number for single

vertical systems; M101159 for dual vertical systems. On new Freightliner Trucks, the model numbers are M101160 for single vertical systems and M101161 for dual vertical systems.

These same part numbers are used in the replacement market. The Silent Partner you spec on a new truck is the same product sold in the replacement market.

What are the available applications and or sizes for the Silent Partner?

There are four models of the vertical style of the Silent Partner. These current Silent Partner models are dimensionally replacing current single and dual vertical mufflers. Vertical units account for over 90% of all class 8 truck muffler styles in North America.

A horizontal unit is planned in the near future.

Are any fleets successfully using the Silent Partner?

There are a number of fleets that have been used for testing selected by both OEM's and Donaldson. All truck tests have been done in North America and Australia. Every fleet involved in the testing has subsequently requested to keep the Silent Partner on their trucks. In addition, a number of fleets have decided to retrofit.

How does the Silent Partner work?

The Silent Partner, takes advantage of four types of sound reduction technologies. These are reactive silencing, resistive silencing, adsorptive silencing and body shell noise damping. By achieving a careful balance of these four technologies, within the same size envelope and back pressure as a standard muffler, the Silent Partner represents a break-through in diesel engine silencing.

What is reactive silencing?

Reactive silencing is the application of "wave cancellation" technology. The Silent Partner uses this

technology to actually tune out or cancel certain frequencies that are harsh to the ear. While this technology is used in conventional mufflers, only the Silent Partner was engineered to tune out "Jake Brake Bark".

What is resistive silencing?

Resistive sound attenuation primarily results from energy dissipation, such as forcing or directing flow of sound through smaller diameter holes, apertures, or tubes, which causes a smoothing of pressure pulsations (noise). Again, this technology is used by Donaldson in our truck mufflers, but the Silent Partner, embodies this technology specifically aimed at low frequencies, and the high pressure pulsation's emanating from "Jake Brake" application.

What is adsorptive silencing?

Sound waves, are energy. Adsorptive silencing takes sound wave energy and transforms the energy into thermal energy. It accomplishes this by using acoustic packing with fibers. The sound energy moves the fibers that convert energy to heat. Where such absorptive packing is used in other applications, the sound waves pass or are directed over the or through the packing.

Donaldson, uses a unique proprietary manufacturing process and special adsorptive packing design in the Silent Partner which provides the greatest efficiency at dissipating the energy of the sound waves.

What is body shell noise damping?

In order to achieve the noise attenuation, in both the acceleration and Jake mode, tremendous sound pressures and counter pressures are being propagated and dampened with the Silent Partner. In an ordinary muffler, these sound pressures result in unwanted transmission of exhaust noise into the environment, by vibrating the body. The Silent Partner's proprietary shell damping design (patent pending) eliminates the tendency of the outer shell to vibrate as a result of the sound pressures inside the Silent Partner.

Don't exhaust brakes quiet engine brake noise, too?

Yes, exhaust brakes used in conjunction with an engine brake can reduce the pulsating noise from an engine brake. But they also reduce the effectiveness of the engine brake. In addition, since an exhaust brake relies on the opening and closing of a valve in a hot exhaust system, it not only requires frequent maintenance to maintain proper operation, but extended use raises exhaust and engine temperatures. The exhaust brake relies on putting tremendous back pressure on the engine. This can result in valve burn out.

The Silent Partner uses no moving parts, and allows full and maximum operation of the engine brake. With the Silent Partner, when the engine brake is engaged, fuel is cut off, and the exhaust temperatures decrease. The exhaust system is allowed to use maximum exhaust flow, without excessive back pressure. This is yet another reason why the Silent Partner is the only such product to be endorsed by Jacob's Vehicle Systems, the originator of the engine brake - the Jake Brake®

How long has Donaldson been making diesel exhaust mufflers?

In 1950, Donaldson was asked by Cummins Engine company to develop a heavy duty "long life" 100,000

mile truck muffler, in a reasonable size [remember this was 1950, when tires went 15,000 miles, most trucks still used gas engines, and air cleaners used oil bath]. Working with Armco Steel Company, Donaldson was the first company to introduce aluminized steel mufflers to the automotive industry!. With this muffler, Donaldson became the first company to produce a heavy duty diesel truck muffler which effectively met the industry needs.... reasonable size (9 inches in diameter) and low backpressure - and low noise, thus overcoming some of the "objections" of the diesel engine. This muffler (M090010) was specially successful in the State of California, where truck noise had become a serious problem after W.W.II.

Over the past fifty years Donaldson has always been a leader in meeting new truck noise emission legislation. Today over 80% of the class 6-8 trucks use Donaldson mufflers. In a recent independent study, Donaldson was the number one preferred name brand of muffler buy heavy-duty truckers.

The Silent Partner, like its revolutionary grand father, is about to set another new standard for truck mufflers.

Jacob's Vehicle Systems and Donaldson welcome you to the "Sound Solution".