



UNIVERSAL SILENCER

A DIVISION OF NELSON INDUSTRIES, INC.

We're Leading A Quiet Revolution®

TM

Engine Exhaust Silencers, Spark Arrestors

Product Catalog No. 246-A

General Information

Engine Exhaust Silencers

Universal engine exhaust silencers are high quality, fully welded, reactive silencers designed to reduce exhaust noise on all types of internal combustion engines. Each engine and each operating location require a unique combination of silencer properties. For this reason many different silencer models are cataloged to cover most silencing problems. In cases where standard silencers will not meet a particular need, special silencers will be designed on application.

EN Series - Multi-Chamber Silencers

For the majority of engines and operating conditions multi-chamber type silencers provide maximum noise attenuation within acceptable back pressure limits. Most naturally aspirated and supercharged engines need this type of silencer. Many turbocharged engines are best silenced with this design also. Factors which influence the choice of silencer design are explained on page 3.

ET Series - Straight-Thru Silencers

Some engines require very low exhaust system back pressures for maximum engine performance. Many turbocharged engines and some naturally aspirated engines fall into this category. For these engines, straight-thru, reactive silencers are available to provide adequate silencing while imposing negligible restriction on the flow of exhaust gas.

ES Series - Spark Arresting Silencers

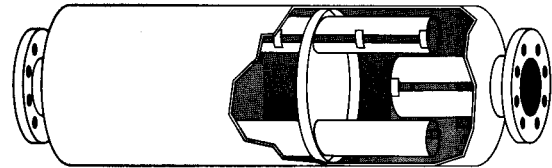
Operating locations exist where fire hazards and safety codes require removal of sparks from exhaust gases. Universal's spark arrestor silencers are engineered to perform the dual function of spark arrestment and silencing for all internal combustion engines.

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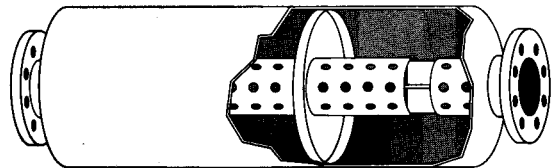
EN Series

Multi-chamber exhaust silencers for most reciprocating engines.



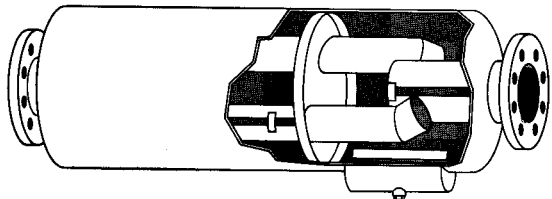
ET Series

Straight-thru exhaust silencers for engines which demand very low back pressures.



ES Series

Spark Arresting exhaust silencers for engines operating in high fire potential areas.



Accessories

- Flexible connectors
- Raincaps
- Companion flanges
- Explosion relief covers
- Mounting attachments
- Inspection openings

Application Data, Sizing Information

Choosing the correct exhaust silencer for a given engine is an important although not difficult task. First of all, the degree of silencing is chosen which will satisfy the noise requirements unique to each engine and location. Secondly, the silencer size is selected to accommodate the specified volume of exhaust flow without imposing excessive back pressure.

Selection of Silencer Type (Grade)

Each silencer group described on page 2 has a number of series with different noise attenuation characteristics.

The series letter designation (e.g. EN2) indicates in relative terms the degree of noise attenuation; the higher the number, the greater the attenuation.

- 2 - "Industrial" or "Commercial"
- 3 - "Semi-residential"
- 4 - "Residential"
- 5 - "Critical"

The attenuation curves given on the top of each page indicate the attenuation in dB by octave bands.

These curves are based upon "typical" applications. They will not necessarily define the precise insertion loss for any specific application since the insertion loss achieved may be influenced substantially by many factors including engine size, type, speed, and unsilenced noise levels and frequency distribution.

Selection of Silencer Size

The open flow area within the silencer should be large enough to accommodate the maximum possible exhaust flow without exceeding the engine manufacturer's maximum allowable back pressure. Improperly sized silencers may cause loss of power or possible damage to the engine.

Data Required

- Engine Exhaust Flow (CFM)
- Exhaust Temperature (°F)
- Maximum Back Pressure (inches of water)

The following formulas allow the correct silencer size to be quickly determined.

$$A. V = 4005 \sqrt{\frac{\Delta P}{c \left(\frac{530}{T+460} \right)}}$$

V = Gas velocity, ft/min

ΔP = Back pressure, inches of water

c = Silencer pressure drop coefficient. (Table 1.)

T = Exhaust Gas Temperature, °F

NOTE: Velocity should not exceed 15,000 Ft./Min. regardless of the allowable back pressure.

$$B. \text{ Flow area required (Ft.}^2\text{)} = \frac{\text{Exhaust CFM}}{V}$$

After choosing the silencer size (Table 2.) which has a flow area equal to or greater than that calculated, the actual back pressure can be calculated as follows:

$$C. \Delta P = c \left(\frac{V \text{ actual}}{4005} \right)^2 \left(\frac{530}{T+460} \right)$$

$$D. V \text{ actual} = \frac{\text{exhaust CFM}}{\text{silencer flow area}}$$

Table 1. Pressure Drop Coefficients

SILENCER MODEL	PRESSURE DROP COEFFICIENT - c
EN 2, 3, 4	4.2
EN5 (Sizes 1-10)	4.2
EN5 (Sizes 12 and up)	5.3
ET2	0.5
ET4	1.0
ES2, 3	4.2

Table 2. Flow Area/Size

Flow Area-ft ²	Dia. (Size)-in.	Flow Area-ft ²	Dia. (Size)-in.
.0055	1	2.6	22
.012	1½	3.1	24
.022	2	3.7	26
.034	2½	4.3	28
.049	3	4.9	30
.067	3½	5.6	32
.087	4	6.3	34
.136	5	7.1	36
.196	6	7.9	38
.349	8	8.7	40
.55	10	9.6	42
.79	12	10.6	44
1.07	14	11.5	46
1.4	16	12.6	48
1.8	18	15.9	54
2.2	20	19.6	60

Contact Universal Silencer's engineers for assistance with your engine silencer selection and sizing problems.

Engine Exhaust Silencers

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INDUSTRIAL SILENCING AND AIR FILTERING
REQUIREMENTS.**

**Complete Lines of Silencers and Air Filters/Filter-
Silencers for**

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- Reciprocating Engines
- Gas Turbine Engines
- High Pressure Vents & Blowdowns
- Centrifugal Compressors
- Specialty Applications (Such as Pressure Reduction
Valves, Rotary Screw Compressors, etc.)

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