

FABRICATION & TESTING OF AQUA SILENCER FOR DIESEL ENGINE

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ABSTRACT- An Aqua Silencer's main purpose is to deal with emission and noise control from engine exhaust. This system uses water hence it is named as Aqua silencer. This project is an attempt to reduce the toxic content of engine exhaust, before it is emitted to the air. The main pollutants exhausted by automobiles are CO, UBHC, Nox and Lead etc, other sources such as electric power plant, industrial processing. With the use of charcoal, perforated block and outer shell aqua silencer is made. An aqua silencer is fitted at the end of exhaust pipe of the engine. The charcoal purifies the harmful sulphur and nitrous content produced from engine. Sound produced under water is less hearable than its produced in atmosphere. It is tested in diesel engine. The smoke level and noise is considerable less than the conventional silencer. An aqua silencer is an attempt in this direction; its mainly deals with control the emission and noise.

Keywords- Aqua Silencer , Charcoal, Lime Water.

I. INTRODUCTION

Air pollution can be defined as addition to our atmosphere of any material, which will have a deleterious effect on life upon our planet.[1] It plays an important role in controlling the noise and emission of gases from engines.[2] We cannot ignore the harmful effects of the large mass of the burnt gases, which contaminates our clean environment every day.[3] This project is an attempt to reduce the pollutant contents of diesel exhaust, before it is exhausted to the air. This system can be safely used for diesel power packs which could be used in industries.[4] In today's life the air pollution causes health problems to the human and also the environment. Now a days Air pollution is one of the major problems. As petrol and diesel engines are mainly used in many fields.[5] Aqua silencer is the modification of conventional silencer. It is constructed with the help of

perforated block, charcoal, outer block and connecting pipe.[6]

It uses charcoal and lime water as pollutant reducing agents. Charcoal and lime water reduce NOx, hydrocarbons, sulphur contents, etc. in the exhaust gases.[7] The sound produced under water is less hearable than its produced in atmosphere. This is due to small sprockets in water molecules, which minimize its amplitude thus, sound level decreases.[1] This system works more effectively than conventional silencer by more pollution reduction along with noise reduction.[8]

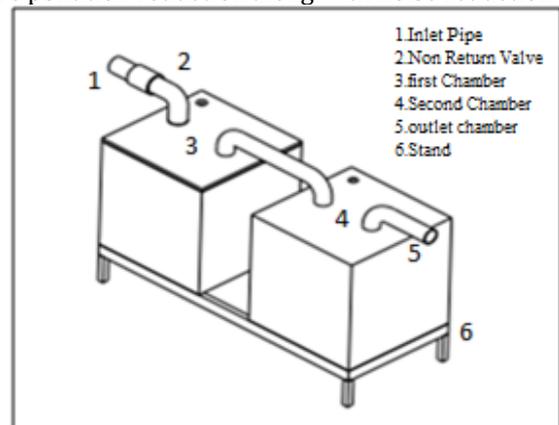


Fig.1, Simple Block Diagram of Aqua Silencer

the use of less costly and simple pollution reducing agents like charcoal and lime water pollution reduced effectively hence this system can be used in developing countries.[7] In order to avoid this type of gases by introduced by aqua silencer.[9] The gases and noise level in aqua silencer is lower than commonly used silencer.[10] engine exhaust waste is recovered by using heat exchanger.[11] catalytic convertor and muffler need heat to keep normal working normal working in exhaust vehicle.[12]

II. LITERATURE REVIEW

The research over the modification and development of aqua silencer is less. However few researchers have worked over reduction of noise and opacity in silencer.

Prof H.A Khande In this research paper they worked on aqua silencer. It is fitted to the exhaust pipe of engine can control exhausts emission and noise effectively as compared to that of conventional silencer, it is cheaper, no need of catalytic converter and easy to install. Sound produced under water is less perceptible than it is produced in air. This mainly because of small sprockets in water molecules, which lowers its this property of water is used in this silencer and hence its name Aqua Silencer.[1]

Dr.P.K.Sharma-An Aqua Silencer is a device which is used for pollution and noise control. Sound produced under water is less than it produced in air. This is due to small sprockets of water molecules, which drops its amplitude thus, lowers the sound. Because of this water is used in aqua silencer. The noise and smoke level is considerable less than the conventional silencer, it is less costly, there is no need of catalytic converter and is simple install.. The main pollutants contribute by vehicles are carbon monoxide (CO), unburned hydrocarbon, oxides of nitrogen (NOx) and Lead.[9]

III. CONSTRUCTION

Aqua silencer is used to minimize the harmful effect of polluting agent in exhaust gases. The schematic diagram of aqua silencer is shown in figure 1. Aqua silencer mainly consist of two outer blocks connected to each other by connecting tube as shown in fig. In first block consist of perforated block inside it filled with charcoal. The second block is filled with water up to certain height.

A small opening provided at the top of the container to make way for exhaust gases to atmosphere. A drain plug is provided at the bottom of the container for periodically cleaning of the water filled container.

IV. SYSTEM DESIGN

Volume calculation of rectangular reservoir:

- i. The volume of rectangular tank is calculated by multiplying the length (L) by the breadth (B) by the depth (H)
- ii. It is important to remember that all dimensions must be in the same unit.

If the dimensions of tank are;

$$\text{Length (L)} = 250 \text{ mm}$$

$$\text{Breadth (B)} = 250 \text{ mm}$$

Table No.1, Specifications of the Parts of Aqua Silencer

Sr No.	Parts	Length	breadth	Diameter	Thickness
1	Perforated Block	250	250	-	6
2	Outer Block	200	200	-	6
3	Inlet Pipe	-	-	60	3
4	Outlet Pipe	-	-	60	3
5	Drain Plug	-	-	30	-
6	Filler Plug	-	-	30	-
7	Non Return Valve	-	-	-	-

$$\text{Depth (H)} = 200 \text{ mm}$$

Then the volume will be;

$$\text{Volume (V)} = L \times B \times H$$

$$V = 250 \times 250 \times 200$$

$$V = 12.5 \times 10^6 \text{ mm}^3$$

$$V = 0.0125 \text{ m}^3$$

The total capacity of tank in ltr.is;

$$V = 0.0125 \times 1000$$

$$V = 12.5 \text{ liters}$$

Therefore,

Capacity of rectangular tank = 12.5 liters.

V. CAD MODELLING

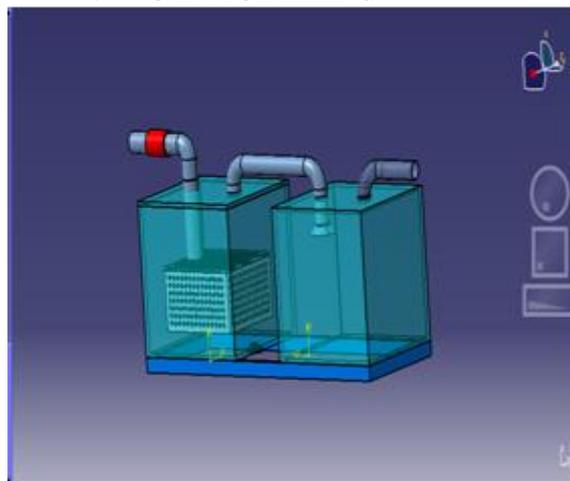


Fig. 2, CAD Model of Aqua Silencer

VI. WORKING

The aqua silencer is fitted at the end of the exhaust pipe of the engine. This exhaust gas passes through perforated Block which is placed inside the outer block and the perforated block inside charcoal. These Charcoals can absorb high amount of polluting agent. As the exhaust gas enters in to the aqua silencer, the perforated Block which consists of small holes of various diameters converts high mass bubbles is converted into low mass bubbles. Along with that gases are passing through charcoal layer which purify the gases. Thus emission is controlled by charcoal layer in the perforated block. Then gases passes through lime water due to which gases again purifies to the presence of small sprockets in water molecules which leads to minimizes its amplitude thus lowers the noise level and finally gases exhausted to atmosphere.

VII. CONCLUSION

This system works more effectively than conventional silencer by more pollution reduction along with noise reduction.

It has some other advantages like it require cheap pollution reducing agents like charcoal. it's construction is simple it does not require any costly processes. But the system must be leakage proof to avoid the leakage of water from system. The lime water needed to be changed after certain time period. This system can be used in industries where the engines are stationary but with some modification it also can be used in automobile.

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