

Analysis of Air Filter Media Design

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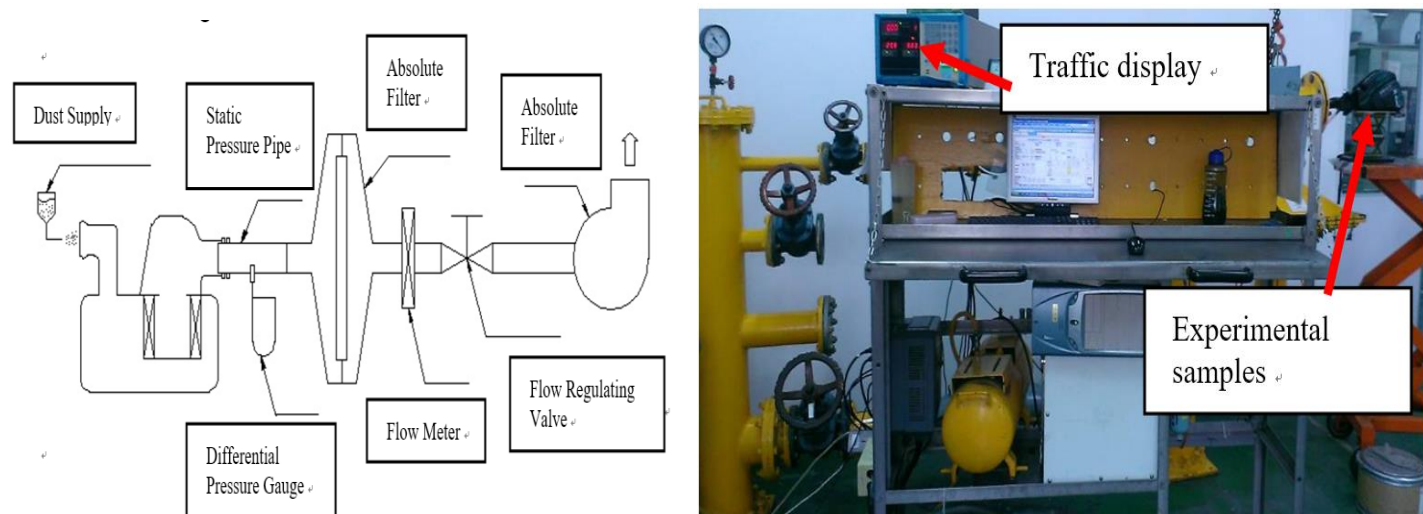
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Abstract

In this study, two different filter materials were used, and the two filter materials were sprayed with three different oil contents of 7g, 14g and 20g respectively for testing. Analyze whether the oil content of the two filter materials affects the performance of the air filter. Its filtration performance is evaluated based on three items: ventilation resistance, dust capture capacity, and cleaning efficiency. As a result, generally speaking, if you want to protect the engine from being worn by dust, you need to use filter materials with high cleaning efficiency. However, high cleaning efficiency will also lead to high ventilation resistance. If the ventilation resistance is high, it will result in less air intake and reduced horsepower. Small. The results of this study can show the relationship between the oil content of filter paper and ventilation resistance, dust capture capacity and cleaning efficiency.

Methodology Experimental equipment and experimental methods

Enter methodology section here. The laboratory environment must ensure that the air temperature is $23 \pm 5^\circ\text{C}$, the relative humidity of the air is $55 \pm 15\%$, and the atmospheric pressure is 101.3 kPa. During the weighing phase of each test, the allowable humidity change rate is $\pm 2\%$. Judgment of test effectiveness: the powder proportion is $\pm 5\%$, and the powder increase or decrease rate is within $\pm 2\%$.



Ventilation resistance test device

Results and discussion

The experimental results were compiled for the comprehensive performance comparison of commercially available A filter elements and other brand C filter elements. A total of 6 different oil contents were tested, as shown in Table 5.1 and Table 5.2. It can be found that the oil content of the two filter elements has a similar influence on performance.

A-Type Comprehensive performance

No.	Oil content (g)	Ventilation resistance (mmAq)	Terminal cleaning efficiency (%)	Dust capture capacity (g)	Dust transmittance (%)
1	0	54.2	98.86	7.15	1.15
2	7	60.3	98.69	11.72	1.31
3	10	60.1	97.62	16.17	2.38
4	14	61.4	96.52	13.45	3.46
5	17	64.5	95.88	11.19	4.07
6	20	66.6	94.74	9.38	5.32

B-Type Comprehensive performance

No.	Oil content (g)	Ventilation resistance (mmAq)	Terminal cleaning efficiency (%)	Dust capture capacity (g)	Dust transmittance (%)
1	0	56.9	99.15	8.09	0.85
2	7	61.1	98.95	12.49	1.05
3	10	64.1	98.89	17.49	1.10
4	14	66.7	97.56	14.65	2.43
5	17	63.6	97.01	12.56	2.99
6	20	67.5	96.37	9.70	3.60

Conclusion

Engine life has a great relationship with cleaning efficiency and dust penetration. According to the results of this study, although two different filter papers were used, the test results were that when the oil content is 0g, the cleaning efficiency is the best. Taking into consideration the consumer market and engine performance, the optimal condition of this vehicle type should be when the oil content of the filter element is 10g. However, the air filters designed for different models or different exhaust volumes will be different, so the size of the filter element will also be different. The filter paper area of this filter element is about 1300 cm². According to the relationship between oil content and area Calculation shows that when the oil content is 10g, the oil content of the filter element is about 77 g/m².

