

# SOUTHWEST RESEARCH INSTITUTE

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ENGINE AND VEHICLE RESEARCH

Subject: **Southwest Research Institute Project No. 03-1211 -001**, "Testing of P153971 Air Filter Elements"; November 20, 1998

This report presents results of airflow resistance, efficiency, and dust capacity tests conducted on two (2) Donaldson P153971 air filter elements provided by the client for evaluation. One element was new (test ID# 2); one was used/cleaned (test ID#1), as noted in Table 1. The used element was reported to have been dry cleaned by a patented air filter cleaning machine.

Testing was conducted in accordance with the SAE J726 JUN93 Air Cleaner Test Code. Initial pressure drop, initial and cumulative efficiency, and dust capacity were measured. The cumulative efficiency/dust capacity tests were conducted at 650 scfm (101.3 kPa, 20°C) using PTT ISO 12103A2 Fine test dust (Batch 4794F) at a concentration of 1 g/m<sup>3</sup> air (0.028 g/ft<sup>3</sup> air). The initial efficiency tests were run for thirty (30) minutes using Fine test dust at a concentration of 0.0069 g/ft<sup>3</sup> air (to feed an equivalent of 1 g/ft<sup>2</sup> of media). Each test was conducted with the air filter element installed in an appropriate laboratory housing.

The test sequence for each unit was as follows: measure initial pressure drop as a function of airflow rate, conduct the initial efficiency test and then the cumulative efficiency test while measuring dust capacity to 20 inches of water terminal pressure drop across the housing and element.

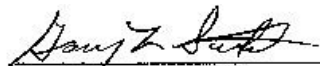
Test results are presented in Table 1 and Figures 1 and 2. Table 1 gives initial pressure drop, initial and cumulative efficiency, and dust capacity. Figure 1 shows initial pressure drop across the units as a function of air flow rate. Figure 2 shows pressure drop as a function of the amount of dust fed during dust loading. Dust capacity in Table I represents the amount of dust fed to the units at a terminal pressure drop of 20 inches of water.

Each element was inspected before and after testing. No visible manufacturing flaws and no dust leakage paths were observed. Both elements had similar cumulative efficiencies. Initial efficiency and initial pressure drop were higher for the used/cleaned element, as expected, while dust capacity was slightly lower, also as expected. The relatively close values for initial pressure drop, and the slight decrease in dust capacity (13.1%) indicate that the element had been well cleaned. Both the performance data and the visual inspection show that the cleaning had no negative impact on the element's structural integrity. It should be noted that testing was only done on one element each, and that the used element had presumably only been cleaned once.

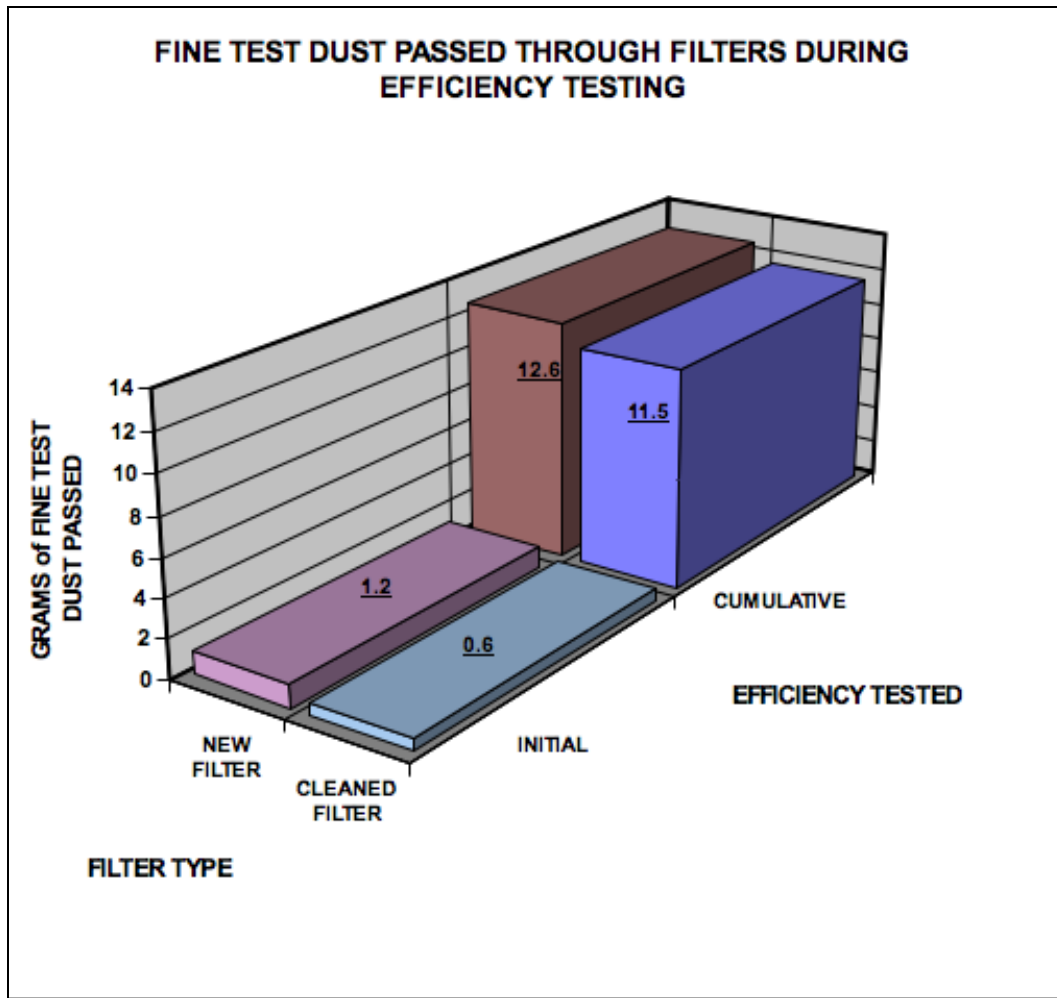
Sincerely,



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## The Cartridge Air Filter “Dry Cleaning” Story

An interesting phenomenon associated with air filters is the fact that they have to be used for a period of time, and get a little dirty, before they reach their maximum efficiency level. This break-in period allows a porous pre-coat, or cake, to build up on the filter; and this in turn is what is needed for the filter to reach its maximum filtering efficiency.

In dry cleaning a filter with a properly designed system, if any given particle of dirt is loosened from the media, it will be removed from the filter. This means that any dirt left in the filter after dry cleaning (normally less than 1%), is left in place where it remains part of the original pre-coat. Then when the dry cleaned filter is put back into use, it has already been partially broken-in; and **its efficiency is actually better than a brand-new replacement filter**. This increased efficiency has been confirmed with tests conducted by independent laboratories and the test reports are available for your review.