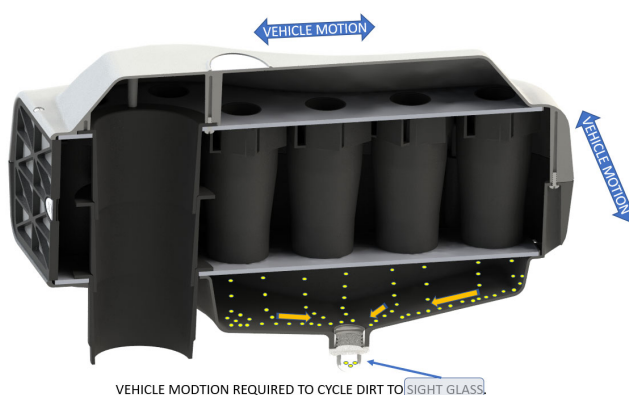




## OVERVIEW

This is an overview of the KWT Particle Separator Filter performance testing per ISO 5011 Standard. Testing was completed at the KWT facility, San Diego in Bay 1 adjacent to Bay 2 where satellite manufacturing and testing are conducted.

In order to accurately test per ISO 5011 Standard, it should be noted that our product **requires vehicle motion to cycle dirt to the sight glass**. In a lab environment no vehicle motion exists, so the filter must be vibrated to extract the dirt from the dirt collection chamber down to the sight glass where it can be **accurately** weighed against particles passed. If this process is not executed, it will lead to highly inaccurate results.



Testing was performed at various engine speeds, media types (ISO 5011 Coarse, Glamis Sand, Talc), and heavier media encountered in a trailing position under race conditions. Two filter types exist, normally aspirated and turbo. Particle separators in general will not filter at the same efficiency over variations in RPM, particle size and humidity. For example, a humid environment will add weight to the dirt particles which has the effect of higher efficiency for a particle separator. Testing was performed in a lab-controlled temperature and humidity environment to ISO 5011 Standards.

The KWT Particle Separator is particularly difficult to test since removal of all dirt from the dirt collection chamber is reliant upon vehicle motion which doesn't exist in the lab. It is this reason the KWT filter is placed atop a vibratory plate to speed up the process of dirt removal from the sight glass post test for accurate measurement of dirt captured.

## TEST RESULTS SUMMARY

Manufacturer	Efficiency Rate	Particulant Used	Flow (CFM)	Back Pressure (psi)	Back Pressure (In H2O)
KWT Particle Separator	94%	ISO 5011 Coarse	270	-0.197	5.46
KWT Particle Separator	91%	ISO 5011 Coarse	113	-0.031	0.86
KWT Particle Separator	96%	Glamis Sand	270	-0.197	5.46
KWT Particle Separator	92%	Glamis Sand	113	-0.031	0.86
KWT Particle Separator	98%	Dirt, Trailing Position	270	-0.197	5.46
KWT Particle Separator	94%	Dirt, Trailing Position	113	-0.031	0.86

## TEST SETUP

The test set-up is shown below. It consists of a KWT Particle Separator, downstream filter, RZR Filter Box (Used for Pressure Testing Only), RZR Filter (Used For Pressure Testing Only), Fan A, Fan B, Flow Probe, Pressure Probe, and ancillary equipment.



***KWT Particle Separator Test Setup***



***Pressure Probe at 270 CFM***



***Dirt Extraction Post Filtration Test***



## TEST DETAILS

**Efficiency:** The KWT Particle Separator removes between 91% to 98% of dirt ingested depending on engine speed and particulate size. Dirt types tested were ISO 12103-1 A4 Coarse Test Dust, Glamis Sand, and Dirt encountered during a trailing position in a race at engine speeds of ~113 CFM up to 270 CFM. Lab testing the KWT Particle Separator **requires** normal vehicle motion to cycle dirt to the sight glass.

**Capacity:** The KWT Particle Separator has approximately 60 cubic inches (2600 grams) of dirt collection capacity. This capacity is sufficient to accumulate dirt captured over several weeks or more of riding time. In a recent video (Shown on KWTfilters.com) shot by a race team who uses the KWT Particle Separator, 10 races and 2 tune sessions were put on the filter before opening the sight glass. The dirt collection chamber was still not full and had plenty of capacity for more race sessions.

**Restriction:** The KWT Particle Separator back pressure testing was completed with a full RZR airbox, RZR Filter and all necessary flex hose. The added pressure restriction at 113 CFM was -.031psi (.81in H2O) and at 270 CFM, -.197psi (5.46 in H2O). Dyno testing of the KWT Particle Separator on a 2019 Can Am Maverick Turbo (Below Photo) revealed less than 1% horsepower loss on the Dyno results.



*KWT Particle Separator Dyno Testing*