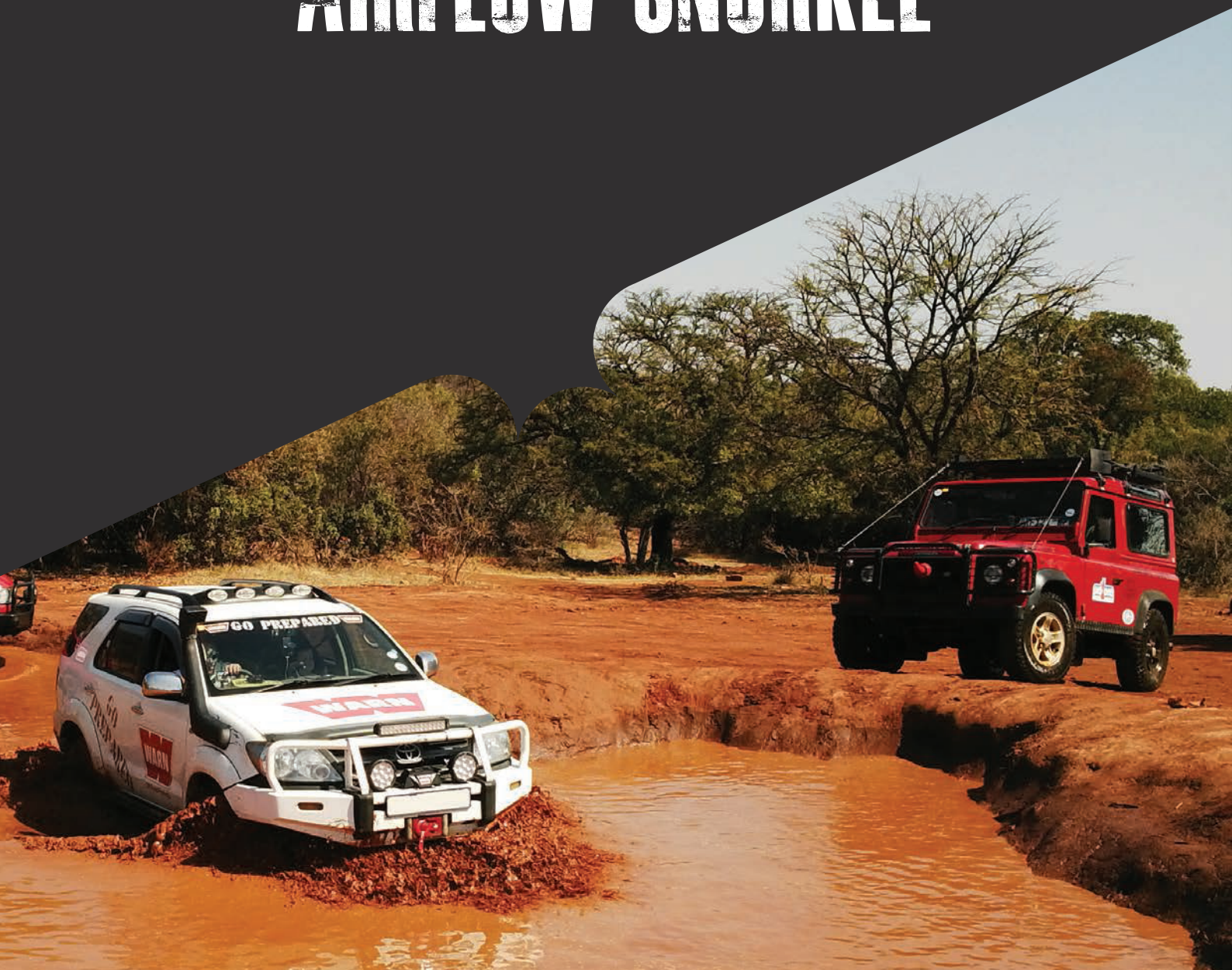


AIRFLOW SNORKEL



AIRFLOW SNORKELS ARE MUCH MORE

Fuel efficiency, economy and getting the most out of the vehicle is what Airflow Snorkels aim to achieve and yes, to go through that river crossing. Airflow has a range of cold air ram induction manifolds that will aim at increasing the performance and efficiency of your 4WD. Airflow produces models that provide substantial ram and cold air induction effect and also models that provide ram effect only.

HOW DOES IT WORK

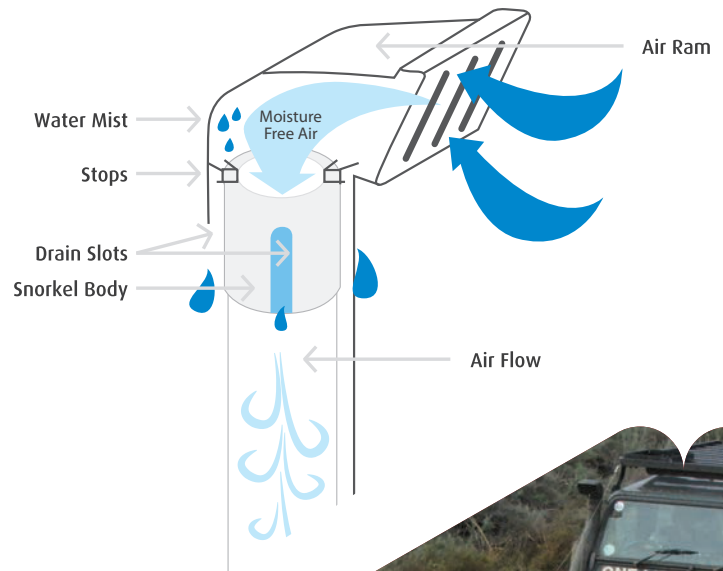
Fuel efficiency, economy and getting the most out of the vehicle is what Airflow Snorkels aim to achieve and yes, to go through that river crossing.

The Airflow Cold Air Induction System (ACAIS) harvests fresh air at roof level where it is the least disturbed. This air contains less contaminants and is cooler than air absorbed from the engine bay. When the air is cooler, it contains more oxygen. Consequently, the availability of cooler air inflow results in potentially increasing power and torque.

Cyclone air ram operation

Air passing into an air ram creates a cyclonic effect which separates out the majority of the contaminants.

As the air swirls, the heavier air particles move out where they hit the vertical ribs which slow the particles down. With the action of the air, gravity and the ram-effect the particles are pushed out the four slots in the air ram. The finer particles are removed by the vehicle air filter.



AIR RAM

Not all air rams are equal in performance.

In general air rams need an open face preferably without a screen (which deflects airflow).

Approximately 30% of the incoming airflow (above 25kph) is used in the separation process. A vertical cylinder section is incorporated for the cyclone separation to occur, with the aid of gravity and the air flow hitting against the separator ribs to separate the foreign material out.

The minimum air required for any snorkel to operate is 1.4 time original inlet. (Less than this ratio and there will be insufficient cyclone action to separate the contaminants out effectively). This is a ratio of inlet velocity and mass airflow to outlet. In general terms if this ratio is not adopted the engine will not have the minimum amount of air to the engine required for operation as it was designed. Not all snorkel makers meet the 1.4:1 standard required. The size refers to the inlet size of the snorkel body. Not the size of the air ram.

The Small 3" Airflow Air Rams (parabolic type air ram) has a ratio of 3.8 to 1 induction capability. This can potentially add improvements to performance, economy, emissions and engine longevity.

Other types of induction into the snorkel induction tube / manifold.

- Where the intake is moulded into the body of the snorkel (generally for design considerations), this provides limited separation of the air.
- Some cases where the snorkel intake is perpendicular to the direction of travel. This will cause a net vacuum at certain speeds.
- In the case of the air ram being turned away from the direction of travel the result is lessening of the positive pressure that is desirable. In the extreme a vacuum is caused (i.e. turning the air ram backwards which may cause engine damage.)
- Incorrect design of the air ram can cause excessive induction noise, lack of separation, air blocking by vortex of the air at various speeds. This air blocking will limit airflow. This is a common occurrence where the design / look is put above the functionality of the air ram.

Now the air has gone through the air ram and the heavy particles have been removed

The air is travelling in a straight line and is slowing down as it comes into a larger volume area (in the case of cold air induction models). This will cut down the swirling effect caused by the air ram. This in turn reduces the friction loss. In the case of a non-induction tube type, air passes down to the outlet, where it is directed, with under bonnet tubing and ducting, into the air box. This will still increase efficiency and performance, but not to the extent of a cold air induction type.

SNORKEL BODY

Approximate % contaminates removal

Pre-filter slow down the air. Therefore the air slows down, less separation occurs and therefore the pre filter collects more contaminants. There is not an absolute number (amount) of separation of contaminants.

A comparison against type of inlet/air ram, shows the following across 5 set flow rates as an average.

- **Type A** triangular shape (several brands) 10 to 30%, using maximum 50% of the available flow for separation
- **Type B** curved down top (several brands) 15% to 50%, using maximum 45% of the available flow for separation
- **Type C** cyclone (several brands)(type 1) 40 to 70%, using maximum 30% of the available flow for separation
- **Type D** cyclone (several brands)(type 2) 80 to 90%, using maximum 22% of the available flow for separation
- **Type E** cold air induction air ram 30% to 80%, using maximum 18% of the available flow for separation.

Ration of inflow rate to our flow rate of the intake as an average across the normal driving speed range. (0 to 100 kmph)

- A. Inlet 0.9 to 1
- B. Inlet 0.8-1.5 to 1
- C. Inlet 1.1 to 1
- D. Inlet 1.5 to 1
- E. Inlet 3.8 to 1

Anything under >1 is creating a vacuum at the entry point. Anything over <1 is creating compressing at the entry point.

In fact the Airflow Cold Air Induction range has 3.8 time the air. It can use as low as 3% and up to 15% of the available air for the separation process.

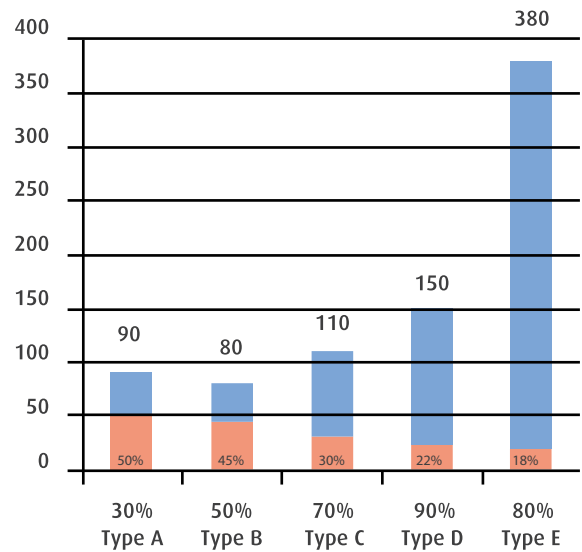
Some other brands have a various cosmetic shapes that can impair the inward flows dramatically. They can use a very large percentage of the available air for the separation process. This will vary depending on the prevalent conditions and should only be used a guide.

The material for the snorkel is from the highest grade Virgin Polyethylene Plastic and is fully formulated for long term UV resistance.

The most extreme conditions encountered in many parts of the world have tested "Airflow" snorkels to the limit and the durability, toughness and design aspects of the snorkel have proved to be equal to the most difficult challenge.

FEATURES

- Designer styled with no visible bolts or brackets.
- 3" inch cold air induction allows 3.8 times more airflow when compared to competitors 3 inch ram which only allows 1.8 times more air flow than standard.
- Thermo plastic rubber TPR flexible hose rated to 135 degrees celcius.
- Minimal joint points from snorkel to air-cleaner for minimum resistance.
- Utilising existing air-cleaners and under bonnet access points where possible.
- New access points to air-cleaners are used where existing connection do not allow sufficient air-flow.
- Stainless steel clamps and 'A' pillar brackets.
- Polyethylene rotor moulding for every Airflow Snorkel.
- Virgin polyethylene powder 9800 to tests ASTM D1238/D1505/D790/D638/D2440/D1525.
- One piece polyethylene moulded air ram including grill.
- One piece aero foil grill on the cold air induction air ram for greater lamina air flow.
- CAD (Computer Aided Design) templates detailing layout, check measurements, fitting instructions and kit lists.



■ Air intake (say 100% is the value of standard intake)
■ Air used for contaminates removal



DIFFERENCES BETWEEN SNORKEL TYPES

The major difference is that Airflow is designed for improved performance first, better fuel economy, reduced exhaust emission and the ability to go through river crossing in certain conditions. In many cases the products are made of substandard materials that do not last.

That can cause the product to:

- Loose there shape
- Move when exposed to the sun
- Become brittle and break down
- Warp and move after fitting
- Re milled or recycle what decreases life
- Some use cheap virgin materials that are better than re-cycle or milled materials
- This is certainly no where near the standards of the compounded materials used by Airflow

FITMENT

The Airflow cold air induction snorkel is generally more difficult to fit because we insist that the maximum amount of air is delivered to the engine to make the improvements. This can make a lot tighter to fit. Where possible we use round ridged piping or TRP spiral wound ducting which stays round. Therefore less net turbulence. Flexible pipe that does not stay round has a greater possible friction loss. It therefore has a greater friction loss that spiral duct in certain circumstances.

'A' Pillars, break away system

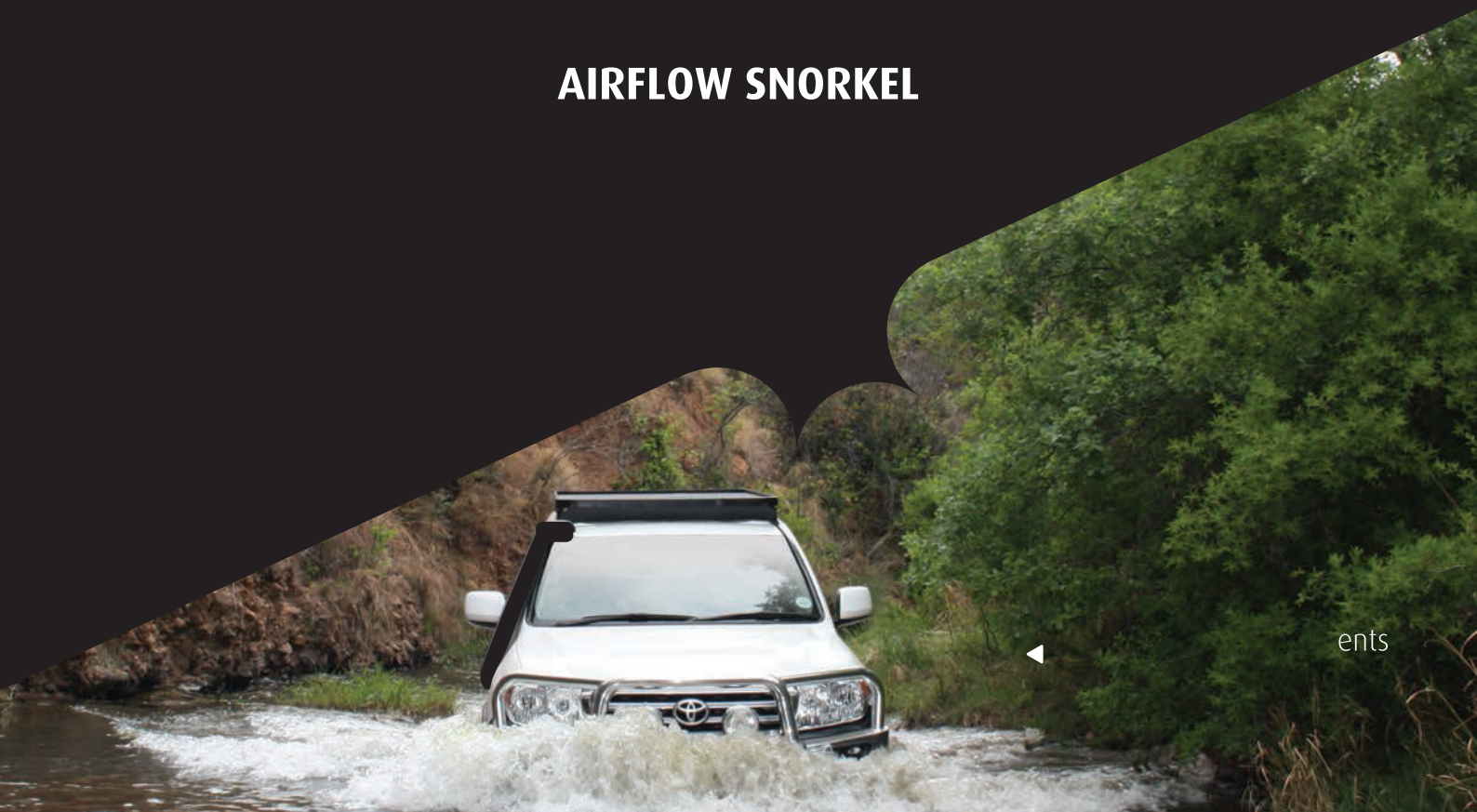
The 'A' pillar is fixed with 2 nylon body plugs and 2 self tap screws. The 'A' Pillar is fixed with a 6mm bolt and washer set to the snorkel.

In the case of a major impact the A pillar bracket system is designed to brake away from the vehicles A pillar. The 'A' pillar in the vehicle is a major structural member of the vehicle. Which is what can happen with the system that most of the other manufactures use catastrophic damage is often the result. The aim is to limit the damage in the case of a major impact.

CONCLUSION

Purchasing an ACAIS can potentially improve your car's performance at most engine speeds. Furthermore, it can reduce fuel consumption and make your engine run cleaner. This is future proofing your adventures.

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