



## ABOUT UNITISED AIR BOX DESIGNS AND AIR FILTERS

### Engine cover with integrated air filter

A recent trend in European vehicle engines, has seen the integration of the air intake components within the engine cover.

Integrated or unitised airboxes, enable the engine to be efficiently used across multiple vehicle platforms while reducing manufacturing costs.

The airbox and Mass Airflow device are built around the engine module, reducing intake ducting to external airbox assemblies, that would typically take up valuable engine bay real estate, while also adding manufacturing costs.



Connection for Air Mass Meter/Adaptor

Secondary Air Injection Hose

Air Filter Element

Connection for Air Mass Meter/Adaptor

Secondary Air Injection Hose

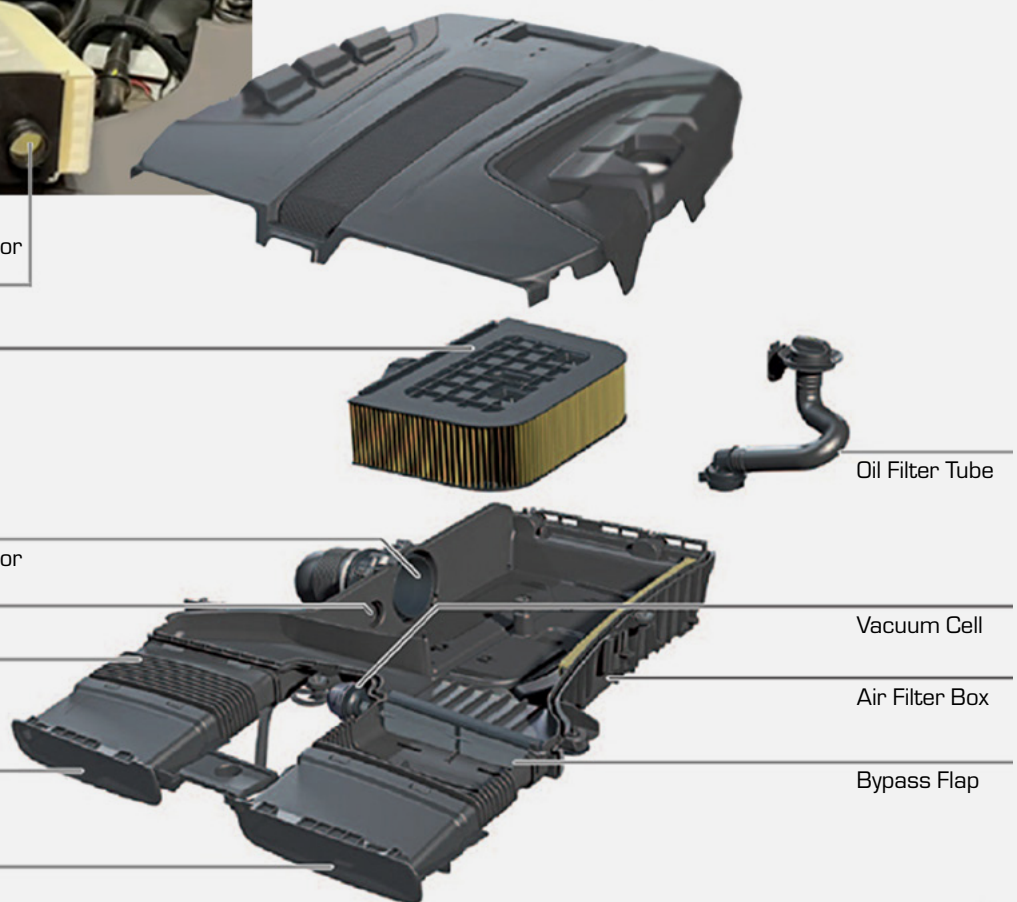
Main Intake

Air Intake from the Front End

Air Intake from the Front End

### Unitised Airbox Design

The modular design, combining air intake, air box, air filter element, and air intake direction controls, has resulted in less room for the air filter element itself.





## ABOUT UNITISED AIR BOX DESIGNS AND AIR FILTERS CONTINUED

However, coupled with the performance demands of modern engine design, the air filter element must deliver higher filtration performance, especially with respect to particle retention efficiency, supporting ever increasing service intervals and the reduced cost of ownership manufacturers strive to deliver.

This requires the use of high-performance filter elements and complex flow guidance design mechanisms which have resulted in these new look filter elements.

The air filter element to suit these engines are of a plastic moulded design, compared to the more common panel filter.

The Ryco A2023 replacement air filter element, suits the Volkswagen Audi Group - V6 engines as used in AUDI Q7 (4M) and VW Toureg (CR) which includes both the 3.0l TFSI (CREC) and 3.0l TDI (CRTC).

The filter element itself supports clean measured air through the larger intake pipe that flows through the mass air flow meter, while the second smaller intake feeds the secondary air injection system. This system supports emission controls by introducing oxygen into the exhaust during engine warm up. This causes the fuel injectors to read lean, which in turn causes the powertrain control module (PCM) to add more fuel. This additional fuel helps warm up the catalytic converter faster. Forcing air into the exhaust system also directly reduces hydrocarbon (HC) and carbon monoxide (CO) emissions.

The lower section of the engine cover forms what we would recognise as a traditional airbox. This is fed by two flexible air intake runners - one of which is fitted with a vacuum operated bypass flap.

The bypass flap is controlled by the vehicle ECM to control induction noise, guard against potential snow or water ingestion, and to ensure sufficient airflow at higher crankshaft speeds.

### Acoustics

During low RPM and load conditions the bypass flap is kept closed – reducing drive-by and cabin noise.

### Snow

To guard against potential snow ingress, the flap is only opened at an ambient temperature of greater than 5 degrees Celsius.

### Rain

Signals from the windscreen mounted rain sensor are used by the ECM to determine the probability of water ingress to the engine. If sufficient rain is detected the bypass flap is closed.

### Torque

To help achieve maximum torque outputs, lower fuel consumption, reduced charge air temperatures and therefore reducing tailpipe emissions (EURO 6) the bypass flap is kept closed until crankshaft speeds of 3500 RPMS are reached.



Connection for Air Mass Meter/Adaptor

Secondary Air Injection Hose



### A2023

Fits: AUDI Q7 (4M) V6 & VW Toureg (CR) V6



### A1940

Fits: MERCEDES BENZ C220, C250, E220, E250



### A1944

Fits: MERCEDES BENZ GL350 and GLS350d (X166) 04/2013../on

