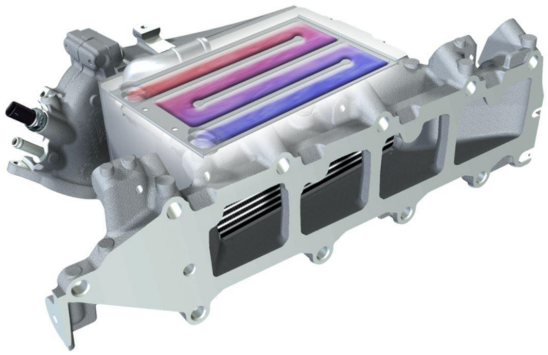
Technical Bulletin

September, TSB-VSA-VEC-092021-01



NEWS

Water-charge air cooler

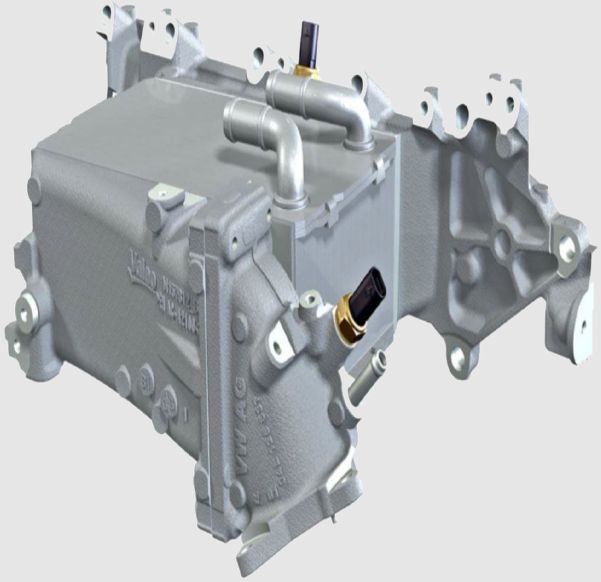
Application for

Engines with turbo
or supercharger

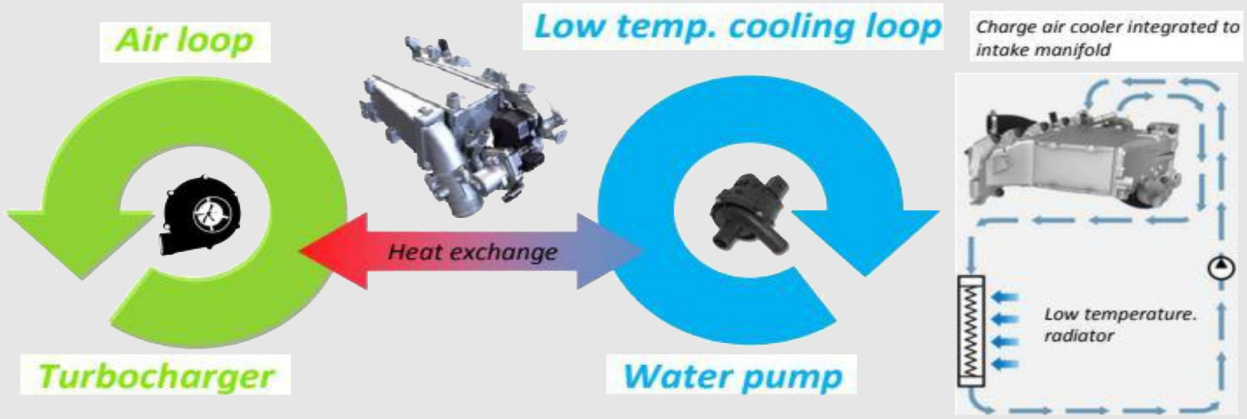
Water-charge air cooler

- The engines with turbocharger is **traditionally** cooled by **air to air heat exchanger** located in the **front-end** of the vehicle
- The new system offers new **air to water heat exchanger** rather than being cooled by **ambient air**.
- The heat from the **charge air cooler** first passes through a **separate low-temperature coolant circuit** before being **expelled** to the **ambient air** by a **dedicated low-temperature radiator.**
- The intake loop benefits from **more efficient** air cooling coupled with a **shorter airflow**.
- It provides considerably **reduced pressure losses** compared with **air-to-air cooling** improving the **vehicle response to acceleration**.

Water-charge air cooler specifications



- it is **designed** and **fabricated** by **brazed full aluminum structure**.
- **Reducing** the **volume** between the turbo charger **outlet** & **inlet valves improves** the **acceleration of response time**, **reducing** the **time taken** to attain **maximum boost pressure** at the engine' take intake by approx **150 mSec** at **1500 rpm** (**14% improvement**).
- The **charge air cooler** is **NOT connected** to the **engine cooling circuit**
- Although **the coolant temperature** is **higher** than the ambient temperature by **15-20°C**, it has **higher performance** in **lowering** the **temperature** of the **intake air** as the **heat absorption** of the **liquid** is **higher** than **air**.
- In case of **acceleration** at **full load** the **temperature** of **intake rises** by **5°C** compared to **20-30°C** from an **air to air system**, due to the **higher efficiency** and **inertia**.
- **Heat** is **expelled** from the **coolant fluid** in a **dedicated radiator** which is fed by l**ow-power electric pump** through small diameter hoses **20mm**



Water-charge air cooler advantages

- It **improves** vehicle **response times** under **acceleration**.
- It **enhanced** the **control of combustion** parameters (the air temperature is virtually constant at the engine's intake manifold) and provides **denser intake air** due to its **improved efficiency** and **low internal pressure losses**.
- **Less pressure** is **lost** between the **turbocharger** and the **cylinder head intake**, and the **compressor's workload** and **consumption** are **reduced** while **achieving** the same engine **intake air pressure**. Alternatively, a **higher** intake charge air pressure can be provided, **enhancing** engine **performance** from the **same compressor load**.
- The unit is **more compact**: the cooling module in the front-end of the vehicle is up to **20% smaller**, and **the long charge air ducts** leading to a heat exchanger at the front of the vehicle have been **eliminated**.
- **Installation** of a **turbo-** or **supercharged** engine in the engine compartment is **simplified**.