Ariane 6, Rocket

Liquid Hydrogen and Liquid Oxygen

Ariane 6

Ariane 6 is a two-stage rocket that uses liquid hydrogen and liquid oxygen engines.

The first stage relies on an upgraded Vulcain engine from the Ariane 5, while the second stage is powered by the Vinci engine, designed specifically for Ariane 6.

As the number of missions launched to space grows rapidly year by year, there is growing interest in ensuring the long-term sustainability of human space activities – which includes minimising their impact on the Earth and space environment. Ariane 6, Europe's newest rocket, has been designed with sustainability in mind from the outset, starting from its initial development and continuing throughout its lifetime.

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Vulcain 2.1

Vulcain 2.1 is the main stage engine and sits at the bottom of the Ariane 6 core. Calling Vulcain an engine hardly does it justice, this rocket engine uses liquid oxygen and hydrogen as fuel, providing more than 1370 kN of thrust.

The temperatures involved in operating the Vulcain 2.1 are extreme, it feeds itself from liquid hydrogen at –253° C and liquid oxygen at –183°C. These liquids are heated by passing them around the combustion chamber.

Two turbopumps inject hydrogen and oxygen into the combustion chamber. The burnt gases are then ejected at the nozzle outlet. The liquid hydrogen turbopump alone turns at 33 000 revolutions per minute and produces 15 megaWatts of power – more than a high-speed train engine, and there are two turbopumps on Ariane 6 to keep Vulcain 2.1 satisfied with fuel.

— Vulcain 2.1

Vulcain 2.1 consumes over 327 kg/s of fuel a second and does this for 468 seconds to propel the launcher away from Earth.


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