The Automated Transfer Vehicle (ATV) is an unmanned automatic vehicle which is put in orbit by the European Ariane 5 launcher. It provides the International Space Station with: pressurized cargo, water, air, nitrogen, oxygen and attitude control propellant. It also removes waste from the station and re-boosts it to a higher altitude to compensate for the atmospheric drag.

**Launch Configuration**
- **Payload:** 8 racks with 2 x 0.314 m$^3$ and 2 x 0.414 m$^3$ envelope each 1.146 m$^3$ in front of 4 of these 8 racks.
- **Cargo mass:**
  - Dry cargo: 1,500 - 5,500 kg
  - Water: 0 - 840 kg
  - Gas (Nitrogen, Oxygen, air, 2 gases/flight): 0 - 100 kg
  - ISS re-fueling propellant: 0 - 360 kg (306 kg of fuel, 554 kg of oxidizer)
  - ISS re-boost and attitude control propellant: 0 - 4,700 kg
- **Total cargo upload capacity:** 7,667 kg

**Launch Vehicle:**
- Ariane 5 (300 x 300 km, 51.6° transfer orbit) ATV-2 will be launched with its solar panels folded to the body of the spacecraft. Electrical power will be supplied by non-rechargeable batteries.

**Flight Hardware**
- Propulsion and re-boost system
- Avionics equipment
- Guidance navigation and control system
- Communications system
- Power generation and storage system
- Thermal control system
- Russian docking and refueling system

**On Orbit Configuration**
- Deployed solar arrays, with a total span of 22.3 m, that provide electrical power to rechargeable batteries for eclipse periods. Automated flight towards the International Space Station.
**Specifications**

**DIMENSIONS**
- Length: 9,794 mm (probe retracted)
- Largest diameter: 4,480 mm
- Solar arrays span: 22,281 mm

**MASS BUDGET**
- Vehicle dry mass: 10,470 kg
- Vehicle consumables: 2,613 kg
- Total vehicle mass: 13,083 kg
- Total cargo upload capacity: 7,500 kg
- Mass at launch (max): 20,750 kg
- Waste download capacity: 6,300 kg (420 km altitude, 51.6° inclination)

**PROPULSION**
- Main propulsion system: 4 x 490 N thrusters
- Attitude control system: 28 x 220 N thrusters
- Propellant: Monomethyl hydrazine fuel and Nitrogen tetroxide oxidizer
- Pressurisation: Helium pressurant at 31 MPa

**COMMUNICATIONS INFRASTRUCTURE**
- To ground: S-band via TDRS satellite
- ATV to ISS: 5 band antenna via Proximity link
- Navigation: GPS

**THERMAL/ENVIRONMENTAL CONTROL**
- Thermal Control: Multi Layer Insulation material, active thermal control using Variable & Constant Conductive Heat Pipes and paints
- ECLSS: Fire detection, air circulation, air temperature monitoring

**ELECTRICAL POWER**
- Ascent to ISS and de-orbit: 4 Solar panel wings of 4 panels each and 40 Ah rechargeable batteries
- Number of arrays: 4
- Number of panels/array: 4
- Generated power: 3,800 W after 6 months in orbit
- Required power: < 400 W Dormant mode
- supplied by ISS: < 800 W Active mode

**MAIN CONSTRUCTION MATERIAL**
- Pressure shell: Al - 2219
- Micrometeoroid and Debris Protection System:
  - Primary bumper: Al-6061 T6
  - Secondary bumper: Nextel/Kevlar blankets
- Internal structure (tanks): Al-6061 T6
- Thermal insulation: Goldised Kapton Multi-layer Insulation blanket & aluminised beta cloth
- Solar arrays: Silicon Solar Cells on 4-Carbon fibre Reinforced Plastic Sandwich panels

**MAIN CONTRACTOR**
- EADS-Space Transportation, Leading a consortium of many sub-contractors

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**PROJECT:** ATV-2
**DOCUMENTATION:** ESA-HSF-COU-024
**SCALES:** 1:75
**DATE:** 10 January 2011

ATV-2 Johannes Kepler ready for mating

ATV-2 Johannes Kepler tanking up, 10 January 2011