THIRD VEGA LAUNCH FROM THE GUIANA SPACE CENTER

On the third Vega launch from the Guiana Space Center (CSG) in French Guiana, Arianespace will orbit Kazakhstan's first Earth observation satellite, DZZ-HR.

With Soyuz, Ariane 5 and now Vega all operating at the Guiana Space Center, Arianespace is the only launch services provider in the world capable of launching all types of payloads to all orbits, from the smallest to the largest geostationary satellites, along with clusters of satellites for constellations and missions to support the International Space Station (ISS).

Vega is designed to launch payloads in the 1,500 kg class to an altitude of 700 km, giving Europe a launcher that can handle all of its scientific and government missions along with commercial payloads.

Designed to launch small satellites into low Earth orbit (LEO) or Sun-synchronous orbit (SSO), Vega will quickly establish itself as the best launcher in its class, especially in the emerging market for Earth observation satellites.

Vega is a European Space Agency (ESA) program financed by Italy, France, Germany, Spain, Belgium, the Netherlands, Switzerland and Sweden. The Italian company ELV, a joint venture of Avio (70%) and the Italian space agency (30%), is the launcher design authority and prime contractor, while Arianespace handles launch operations.

For its third launch, Vega will orbit the DZZ-HR Earth observation satellite, the 51st of this type to be launched by Arianespace.

DZZ-HR is an 830 kg satellite that is designed to provide a complete range of civilian applications for the Republic of Kazakhstan, including monitoring of natural and agricultural resources, provision of mapping data and suport for rescue operations during natural disasters.

Built by Airbus Defence and Space in Toulouse, it will remain in service for 7.25 years. Once in its assigned Sun-synchronous orbit, DZZ-HR will be renamed KazEOSat-1.

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MISSION DESCRIPTION

The third Vega launch from the Guiana Space Center (CSG) will place the DZZ-HR satellite into circular orbit at an altitude of approximately 750 km.

The launcher will be carrying a total payload of 918 kg, including 830 kg for the satellite to be released into its targeted orbit (SSO, with an inclination of 98.5°).

The launch will be from the Vega Launch Complex (SLV) at Kourou, French Guiana.

Orbit : SSO
Altitude : 750 km
Inclination : 98.5°

Liftoff is scheduled for the night of April 28, at exactly:

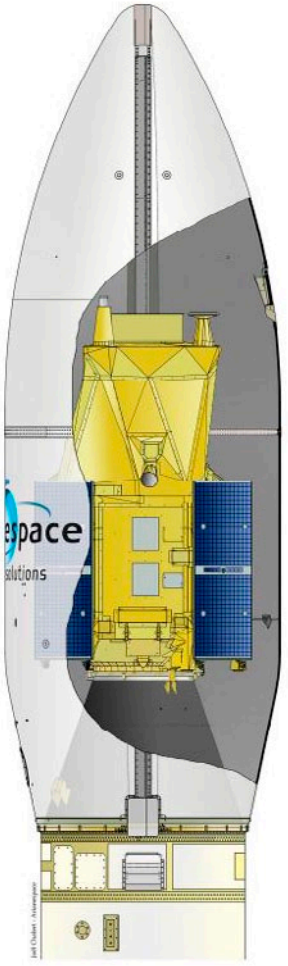
10:35:15 pm (Local Time in French Guiana), on April 28, 2014
9:35:15 pm (in Washington, DC)
01:35:15 (UTC) on April 29, 2014
3:35:15 am (in Paris)
7:35:15 am (in Astana - Kazakhstan)

The launch at a glance

Following liftoff from the Guiana Space Center, the powered phase of the first three stages of Vega will last 6 minutes and 14 seconds. After this first phase, the launcher's third stage will separate from the upper composite, which includes the AVUM upper stage, a payload adapter and the satellite. The lower three stages will fall back to Earth.

The AVUM upper stage will ignite its engine for the first time, operating for about 5 minutes, followed by a ballistic phase lasting about 41 minutes. The AVUM stage will then reignite its engine for about 2 minutes, prior to releasing the DZZ-HR satellite a minute after the engine is shut down.

The DZZ-HR satellite will be released at 55 minutes and 29 seconds after liftoff



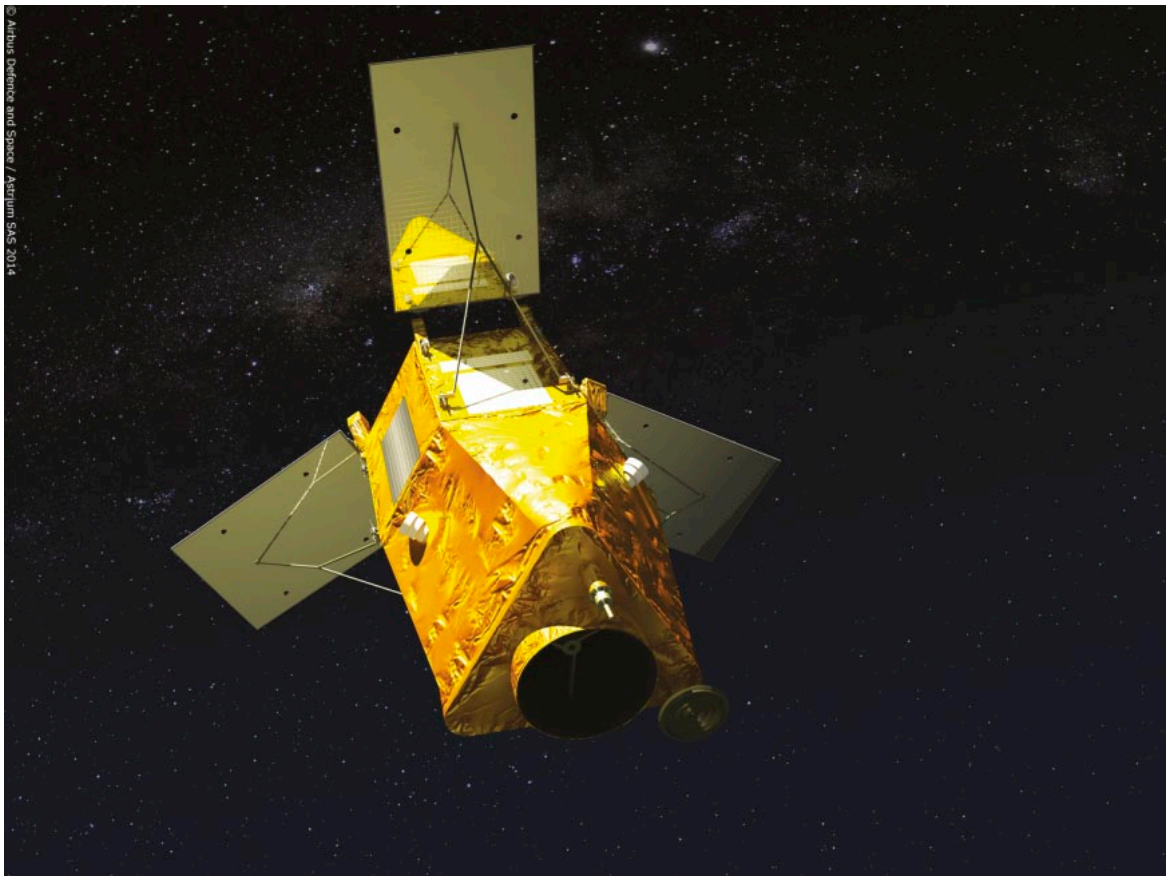
Mission length

The nominal length of the mission, from liftoff to separation of the satellite, is 55 minutes and 29 seconds.

Vega payload Configuration

The DZZ-HR satellite (KazEOSat-1) was built by Airbus Defence and Space for the Republic of Kazakhstan.

The DZZ-HR SATELLITE



Customer	Airbus Defence and Space for The Republic of Kazakhstan
Mission	High-resolution images for mapping, monitoring of natural and agricultural resources, support for search & rescue operations during natural disasters.
Manufacturer	Airbus Defence and Space
Orbit	Sun-synchronous at 750 km altitude
Inclination	98,54°
Dimensions	2.10 m x 3.70 m
Satellite mass	Total mass at lift-off 830 kg
Design life	7.25 years nominal
Electric power	1200 W at beginning of life

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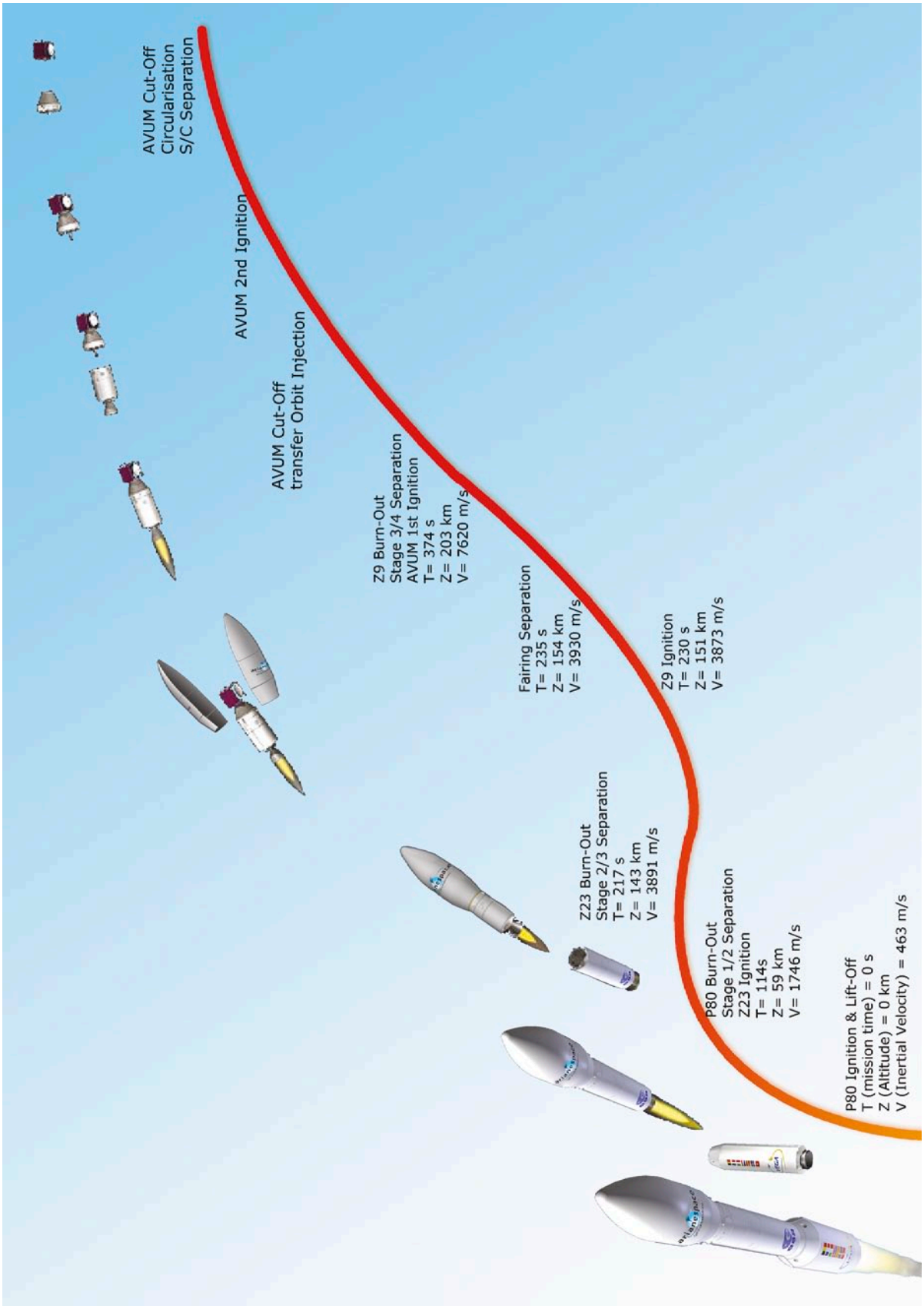
LAUNCH COUNTDOWN AND FLIGHT EVENTS

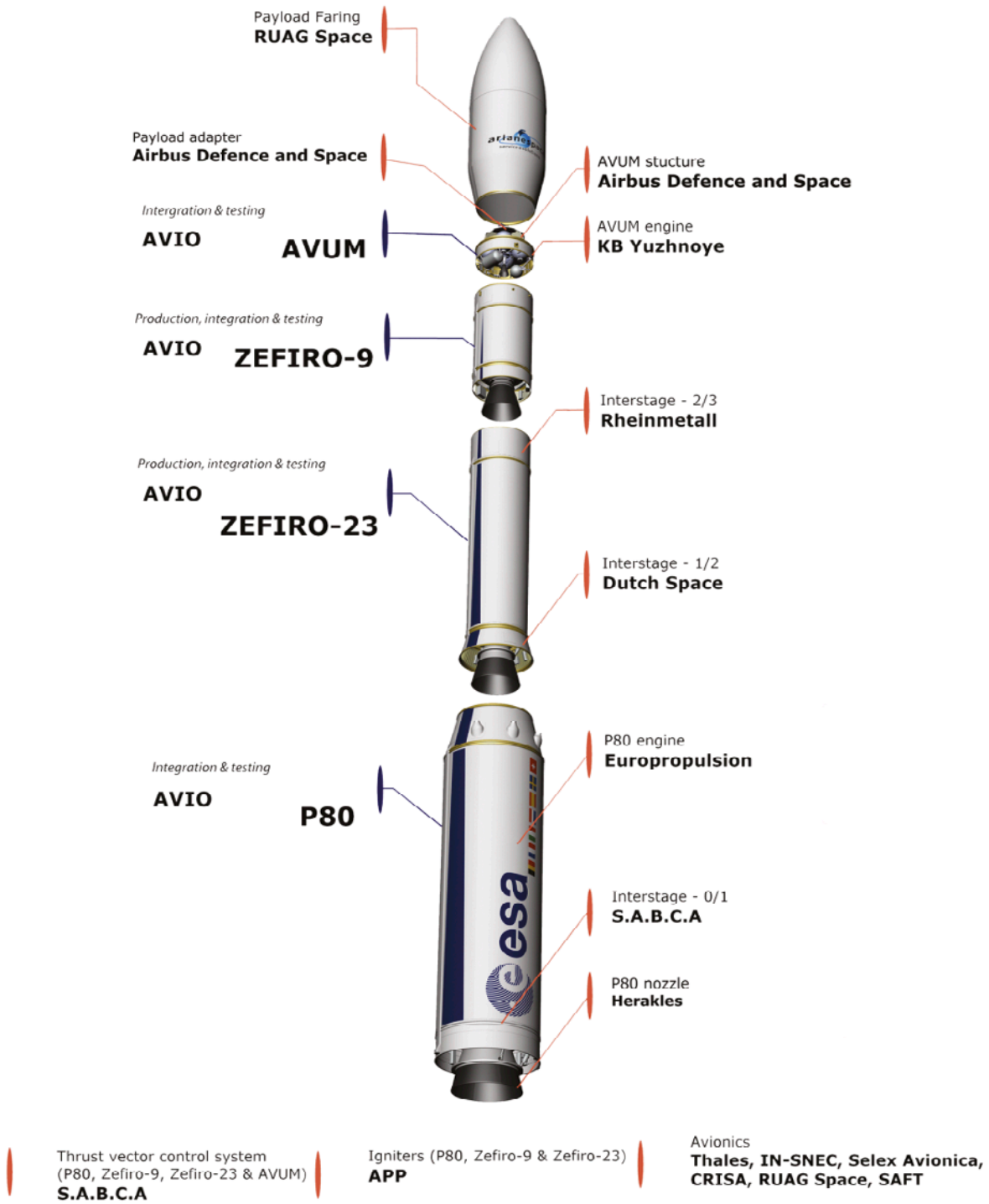
The countdown comprises all final preparation steps for the launcher, the satellites and the launch site, including the steps leading up to authorization of first-stage P80 ignition. .

Events	Time (h:min:s)
Start of countdown	-07:45:00
Activation of MFU (Multi Function Unit)	-05:40:00
Activation of Inertial Reference System (IRS)	-05:30:00
Activation of telemetry transmitters	-05:30:00
Activation of onboard computer and loading of flight program	-04:55:00
Activation of SMU (Safeguard Master Unit)	-04:50:00
Synchronization of onboard clock with Universal Time (UTC)	-04:25:00
IRS alignment and checks	-04:20:00
Removal of safety devices	-03:40:00
Mobile gantry withdrawal (45 min)	-02:40:00
Activation of SRI after withdrawal of gantry	-01:55:00
Activation of telemetry transmitters after withdrawal of gantry	-01:20:00
Activation of transponders	-01:20:00
Launcher system ready	-00:34:00
Last weather report prior to launch	-00:10:00
Start of synchronized sequence	-00:04:00
Liftoff	**00:00:00**
Separation of first stage (P80)	+00:01:53
Separation of second stage (Zefiro-23)	+00:03:36
Jettisoning of fairing	+00:03:54
Separation of third stage (Zefiro-9)	+00:06:14
AVUM first burn	+00:06:216
AVUM shutdown	+00:11:52
AVUM second burn	+00:52:35
AVUM shutdown	+00:54:33
Separation DZZ-HR	**+00:55:29**

MISSION PROFILE



THE VEGA LAUNCHER & THE MANUFACTURERS



VEGA CHARACTERISTICS

Vega is a launch vehicle comprising three stages with solid rocket motors:
– P80 first stage
– Zefiro-Z23 second stage
– Zefiro-Z9 third stage
The fourth stage, AVUM, ensures mission versatility, injecting the payload(s) into precise orbits.
The fairing, 2.6 meters in diameter, can hold one or several payloads.
The total weight at liftoff is 139 metric tons. The launcher is 30 meter high and has a maximum diameter of 3 meters.

Launcher performance

The baseline performance set for Vega is to inject 1,500 kg into circular polar orbit at 700 km altitude, inclined 90° to the Equator, with injection accuracy of 5 km for altitude and 0.05° for inclination (1σ).
The diversity of launch elevations possible from Europe's Spaceport in Kourou, along with the flexibility provided by AVUM, will enable Vega to inject a wide range of payloads into different orbits, including 2,500 kg payloads into quasi-equatorial circular orbit at 200 km, 2,000 kg payloads for the International Space Station, or 1,300 kg payloads to be injected into Sun-synchronous orbit at an altitude of 800 km.

P80 first stage

Vega's first stage is powered by a large single-piece solid rocket motor containing 87,732 kg of the solid propellant HTPB 1912. This SRM delivers maximum vacuum thrust of 3,015 kN and burns for 110 seconds prior to being jettisoned at an altitude of about 55 km.
The P80 stage, a filament-wound carbon-epoxy case, has the same diameter (3 m) as the solid boosters used on Ariane 5 and its overall length (11.2 m) is similar to that of one of the longest segments of the solid booster.

Zefiro stages

The second and third stages of Vega use Zefiro solid rocket motors. These two stages, each 1.9 m in diameter, comprise a filament-wound carbon-epoxy case, with low-density EPDM insulation and a nozzle with flex-joints, equipped with electromechanical actuators to direct the thrust.
The Zefiro-Z23 stage is 8.39 m long, and is loaded with 23,820 kg of solid propellant HTPB 1912, providing maximum vacuum thrust of 1,120 kN. It operates for 77 seconds.
The Zefiro-Z9 stage is 4.10 m long and is loaded with 10,570 kg of solid propellant HTPB 1912, providing maximum vacuum thrust of 317 kN. Although it is the smallest solid rocket motor on Vega, it offers the longest burn time, of 119 seconds.

AVUM

AVUM (Attitude & Vernier Upper Module) has a bipropellant propulsion system to provide orbital injection, and a monopropellant propulsion system for roll and attitude control.
It is designed to inject different payloads into different orbits, and ensures the fine pointing of satellites prior to separation. At the end of the mission, it is deorbited under safe conditions to limit the amount of orbital debris.
AVUM contains about 577 kg of liquid propellant (UDMH/NTO), distributed in four tanks. It is powered by an engine derived from the reignitable RD-869, providing 2.45 kN of thrust. It has two also sets of three monopropellant thrusters to control roll and attitude. AVUM also contains Vega's avionics module, which handles flight control and mission management, telemetry and end-of-flight functions, along with the electrical power supply and distribution.

Fairing and payload adapters

The fairing, 2.6 m in diameter and with a volume of 20 m3, is made of two half-shells, each 7.90 m long.

Launch complex

The Vega launch pad ("Site de Lancement Vega" or SLV) was built on the former Ariane 1 launch pad (ELA-1). It is located about 1 km southwest of the ELA-3 launch pad, used for Ariane 5.
The concrete launch pad was modified to handle Vega and the new 50 meter mobile gantry, weighing about 1,000 metric tons, along with the umbilical mast, stretching 32 meters high. Four 60-meter masts protect the pad against lightning strikes.
The three solid propellant stages and the bipropellant module are assembled on the launch pad. The payload composite is integrated on Vega about a week prior to launch.
The mobile gantry is displaced on its 80-meter long rails several hours before the launch.
The Vega launch center (CDL) is in the building that already houses its Ariane 5 counterpart, 1.3 km from the launch pad. Mission control is handled from the Jupiter building, already used for Ariane and Soyuz launches.

ARIANESPACE AND THE GUIANA SPACE CENTER

Arianespace was founded in 1980 as the world's first launch Service & Solutions company. Today, Arianespace has 21 shareholders from ten European countries (including French space agency CNES with 34%, Airbus Defence and Space with 30%, and all
European companies participating in the construction of Ariane launchers).

Since the outset, Arianespace has signed more than 350 launch contracts and launched 320 satellites. Nearly two-thirds of the commercial satellites now in service worldwide were launched by Arianespace. The company posted sales of 975 million euros in 2013.

At January 1, 2014, Arianespace had 330 employees working at headquarters in Evry, near Paris, Kourou, French Guiana, where the Ariane, Soyuz and Vega rockets are launched, and offices in Washington, D.C. (United States), Tokyo (Japan) and Singapore.

Arianespace offers launch Service & Solutions to satellite operators from around the world, including private companies and government agencies. These services call on three launch vehicles:
- The Ariane 5 heavy launcher, operated from the Guiana Space Center.
- The Soyuz medium launcher, operated from the Baikonur Cosmodrome in Kazakhstan, and from the Guiana Space Center.
- The Vega light launcher, operated from the Guiana Space Center.

With this complete family of launchers, Arianespace has won nearly half of the commercial launch contracts open to competition worldwide in the last two years. Arianespace now has a backlog of more than 40 satellites to be launched.

The Guiana Space Center: Europe's Spaceport

For over 30 years, the Guiana Space Center (CSG), Europe's Spaceport in French Guiana, has offered a complete array of facilities for rocket launches. It comprises the following installations:
- CNES/CSG facility, the technical center run by French space agency CNES, comprising all facilities and resources needed for operation of the launch site, including radars, a telecommunications network, weather station, and launcher telemetry receiving stations.
- Payload preparation buildings (EPCU), especially the S5 building.
- Launch complexes for Ariane, Soyuz and Vega, comprising the launch zones and launcher integration buildings.
- Various industrial facilities, run by Air Liquide Spatial Guyane, Astrium, Europropulsion andRegulus, which contribute to the production of components for the Ariane 5 and Vega launchers. About 40 companies from Europe and French Guiana are involved in launcher operations.

Europe's commitment to independent access to space is based on actions by three key players: the European Space Agency (ESA), the French space agency CNES, and Arianespace.

ESA is in charge of development programs for the Ariane, Soyuz and Vega launchers at CSG. Once the launch systems have been qualified, ESA transfers responsibility to the operator Arianespace. ESA has helped transform the role of the Guiana Space Center, in particular by funding the construction of the launch complexes, the payload processing buildings and associated facilities. Initially used for the French space program, CSG has gradually become Europe's own Spaceport, according to the terms of an agreement between ESA and the French government. To ensure that the Spaceport is available for its programs, ESA takes charge of the lion's share of CNES/CSG fixed expenses, and also helps finance the fixed costs for the launch complexes.

French space agency CNES plays several roles at the Guiana Space Center:
It designs all infrastructures and is responsible, on behalf of the French government, for safety and security.
It provides the resources needed to prepare the satellites and launchers for their missions. Whether during tests or actual launches, CNES is also responsible for overall coordination of operations. It collects and processes all data transmitted from the launcher via a network of receiving stations, to track Ariane and Soyuz rockets throughout their trajectory.

In French Guiana, Arianespace is the contracting authority in charge of operating the family of three launchers, Ariane, Soyuz and Vega.

For Vega, Arianespace supervises the integration and inspection of the launcher built by ELV, production prime contractor. Before taking official delivery of the launcher, it coordinates the preparation of satellites in the payload preparation facility (EPCU) operated by CSG, handles the final assembly of the launcher and integrates satellites on the launcher, and oversees the final countdown and launch from Launch Control Center. 3 (CDL3)

Arianespace deploys top-quality human and technical resources to prepare the launchers and satellites. This unrivaled expertise and outstanding facilities in French Guiana enable Arianespace to set the global standard for launch services.