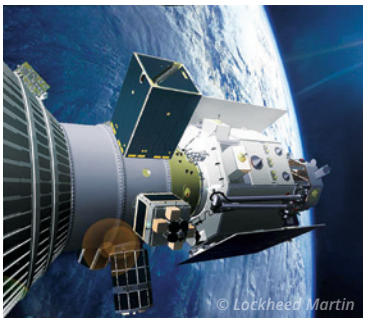
ESPA

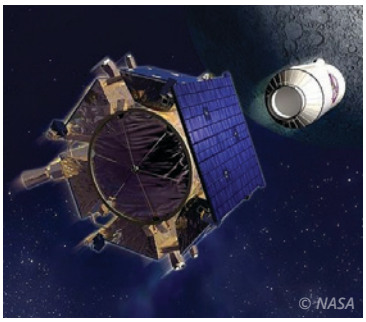
THE EVOLVED SECONDARY PAYLOAD ADAPTER

ESPA mounts to the standard NSSL (formerly EELV) interface bolt pattern (Atlas V, Falcon 9, Delta IV, OmegA, Vulcan, New Glenn) and is a drop-in component in the launch stack. Small payloads mount to ESPA ports featuring either a Ø15-inch bolt circle with 24 fasteners or a 4-point mount with pads at each corner of a 15-inch square; both of these interfaces have become small satellite standards. ESPA is qualified to carry 567 lbs (257 kg), and a Heavy interface (with Ø5/16" fastener hardware) has been introduced with a capacity of 991 lbs (450 kg). All small satellite mass capabilities require the center of gravity (CG) to be within 20 inches (50.8 cm) of the ESPA port surface. Alternative configurations can be accommodated.

ESPA GRANDE

ESPA Grande is a more capable version of ESPA with Ø24-inch ports; the ring height is typically 42 inches. The Ø24-inch port has been qualified by test to carry small satellites up to 1543 lb (700 kg).





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ESPA

ESPA IS ADAPTABLE TO UNIQUE MISSION REQUIREMENTS

- The Air Force's STP-1 mission delivered multiple small satellites on an Atlas V.
- NASA's Lunar Crater Observation and Sensing Satellite (LCROSS): ESPA was the spacecraft hub for the LCROSS shepherding satellite in 2009.
- ORBCOMM Generation 2 (OG2) launched stacks of two and three ESPA Grandes on two different Falcon 9 missions and in total deployed 17 satellites. (2014-15)
- AFRL's ESPA Augmented Geostationary Laboratory Experiment (EAGLE) used ESPA as the primary structure of a free-flyer satellite in 2018 and was the prototype for on-going Long Duration Propulsive ESPA (LDPE) programs, renamed ROOSTER.
- AFRL's DSX mission, launched on Falcon Heavy in 2019, is in Medium Earth Orbit, also demonstrating ESPA's capability as the structural hub of a satellite.
- Spaceflight Industries' SSO-A mission, launched on Falcon 9 in 2019, used ESPA (with SoftRide vibration isolation) to carry multiple small spacecraft in a stack of various adapters showing the 'stackable' nature of this type of system.

ESPA uses thru holes on the ports but they can be tapped holes if required. ESPA minimum height is determined by the port size, e.g., 24-inch ports correspond to a 32-inch height minimum, but 42-inch is typical for ESPA Grande.

Tested ESPA capacity assumes the use of load factors based on the ESPA Mass Acceleration Curve (MAC).

SPECIFICATIONS

	ESPA P/N	Port Count	Port Ø	Ring Height	Port Payload Capacity	ESPA Mass	Port Interface Bolt Size
Standard ESPA	6-15-24	6	15″	24″	257 kg*	136 kg	1/4″ Bolts
ESPA Heavy					450 kg*		5/16″ Bolts
ESPA Grande	4-24-42	4	24″	42″	700 kg*	211 kg	1/4″ Bolts**
Stretched ESPA	4-24-60			60″		286 kg	

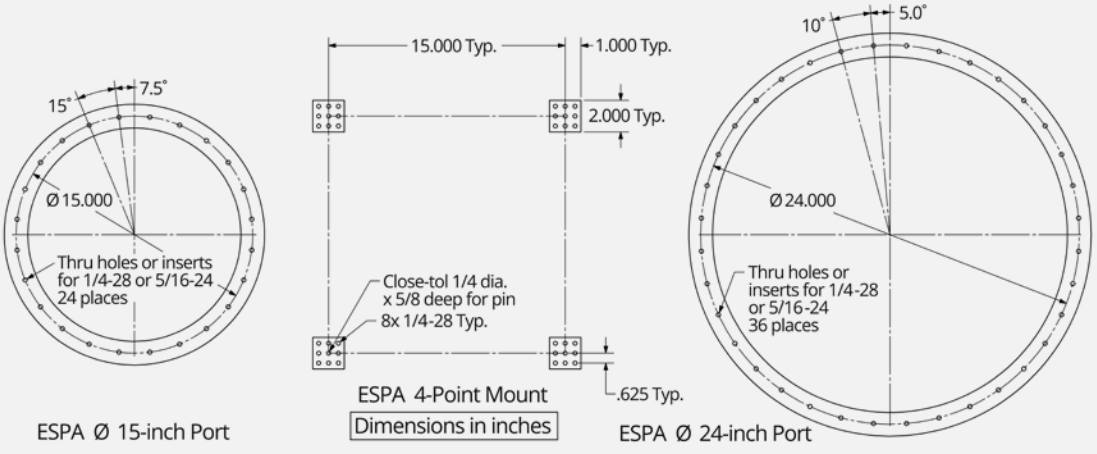
* Capacities require CG at 50.8cm (20″), and decrease to 220 kg, 322 kg, and 465 kg if using heritage ESPA load factors.
** ESPA Grande is qualified with 1/4″ or 5/16″ bolts, larger bolts are recommended (but not required) for payloads above 465 kg

OTHER VARIANTS

ESPA is versatile and can be easily modified, in many cases with no impact to the qualification status. Port size and quantity can be "mixed and matched" to accommodate a variety of payloads. A common modification is five 24-inch ports on an ESPA Grande. Other port sizes such as 11.7-inch and 8-inch are possible. Examples include:

- Small Launch ESPA – Ø38.8-inch ring provides 8- or 15-inch ports for Minotaur family and other small launch vehicles. The SL-ESPA has a mass of 59 kg.
- ESPAStar™ – Custom ESPA for NGIS's ESPAStar™ product line. This ring has no circular ports but instead the ESPA 4-Point Mount (4PM) in six locations, and it has a mass of 113 kg (compared to 136 kg for the standard ESPA).

DIMENSIONS



ESPA Ø 15-inch Port

ESPA 4-Point Mount
Dimensions in inches

ESPA Ø 24-inch Port

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For more information:
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