

# White Sands Test Facility

## Propulsion Test Stands

**Test Stand 301**



Test Stand 301 is an ambient stand used in conducting propulsion tests on engines and propulsion systems. The stand is currently used in support of the space shuttle aft reaction control system testing. It has a dual-position, vertical and horizontal firing capability, with a removable roof to allow for large test article installation. Tests are monitored and recorded using video, sequence, and infrared cameras. The system is 4995 ft above sea level and has a maximum test article envelope of 25 by 18 by 18 ft high (with roof on). The stand has 2000-gal  $N_2O_4$  and hydrazine family propellant storage/run tanks. The propellants can be saturated with helium up to 285 psia, which can be temperature conditioned between 40 to 120 °F (4 to 49 °C). Catch-and-weigh tanks and two aspiration systems are available. The stand interior can be thermally conditioned between 40 to 120 °F (4 to 49 °C).

**Test Stand 302**



Test Stand 302 is an insulated 32 ft diameter by 38 ft high (10 m diameter by 11.6 m high) carbon steel altitude chamber with three interior levels for test article access with a dual-position, vertical or horizontal firing capability, and an altitude capability of up to 100 K ft (30.5 km) for engine firings using the steam ejector system and up to 250 K ft (76 km) non-firing capability with vacuum pumps. The test chamber height can be extended to 58 ft (17.7 m) with an extension and can be thermally conditioned between 40 and 120 °F (4 to 49 °C). Propellant capabilities include a 2800-gal hydrazine conditioning unit, which can be saturated with helium or nitrogen up to 540 psia and temperature conditioned between 40 and 120 °F (4 to 49 °C). It has a 2000-gal hydrazine dump tank. MMH/ $N_2O_4$  propellant combination is also available. Maximum thrust for this stand is 25 K lbf (111 kN). This stand also has a removable lid for large test article installation.

**Test Stand 303**



Test Stand 303 is an insulated 11 ft diameter by 39 ft long (3.35 m diameter by 11.9 m long) horizontal carbon steel altitude chamber capable of holding propulsion systems up to approximately 7 ft (2.13 m) in diameter and 25 ft (7.6 m) in length. It is capable of testing single engines or test articles with multiple engines up to 1000 lbf (4.5 kN) total thrust. It has a single-position, horizontal firing capability and an altitude capability of up to 100 K ft (30.4 km) for engines firing using the steam ejector system and up to 250 K ft (76 km) non-firing capability with vacuum pumps. Propellant ( $N_2H_4$ ) capabilities include 2800-gal hydrazine conditioning unit, which can be saturated with helium or nitrogen up to 540 psia and temperature conditioned between 40 and 120 °F (4 to 49 °C). It has a 2000-gal hydrazine dump tank. It is supplied with nitrogen at 150 psig and shares the hydrazine system with Test Stand 302. The stand is currently used for shuttle APU (Auxiliary Power Unit) testing. The test chamber can be thermally conditioned between 40 and 120 °F (4 to 49 °C).

**Test Stand 328**



Test Stand 328 is an ambient test stand and is 29 ft long, 27 ft wide, and 20 ft tall (8.8 m long, 8.2 m wide, and 6.1 m tall). It can accommodate test articles up to 24 ft by 24 ft by 14 ft (7.3 m by 7.3 m by 4.3 m). It has a single-position, horizontal firing capability, with a retractable building structure. For variable servicing and firing orientation, it has an articulating test article base. The system is 4995 ft (1522 m) above sea level. The stand has 750-gal  $N_2O_4$  and hydrazine family propellant storage/run tanks. Propellants can be saturated with helium up to 285 psia, and can be temperature conditioned between 40 and 120 °F (4 and 49 °C). The stand itself can also be thermally conditioned between 40 and 120 °F (4 and 49 °C). Maximum thrust for this stand is 25 K lbf (111 kN). This stand is currently being used to dismantle the Peacekeeper 4<sup>th</sup> stage missiles.

**Test Stand 401**



Test Stand 401 is a 32 ft diameter by 33 ft high (9.75 m diameter by 10 m high) carbon steel altitude chamber capable of accommodating a vehicle with a thrust vector-controlled 25 K lbf (110-kN) thrust engine firing vertically downward. The stand is capable of testing maximum test articles of 15 ft by 15 ft by 45 ft (4.6 m x 4.6 m x 13.7 m). It has three interior levels that can be reconfigured to meet test requirements. It has a dual-position, vertical and horizontal firing capability and an altitude capability up to 100 K (30.5 km) for engine firings using the steam ejector system and up to 250 K (76 km) non-firing capability with vacuum pumps. Propellant capability includes LOX, GOX,  $N_2O_4$ ,  $LH_2$ , hydrazines, methane, and hydrocarbon fuels and 2000-gal storage/run tanks. Hypergolic propellants (MMH/ $N_2O_4$ ) are contained in 2000-gal storage/run tanks and can be saturated with helium up to 600 psia and can be temperature conditioned between 40 and 120 °F (4 and 49 °C). Propellants can be pressure or pump transferred, and two propellant aspiration systems are currently installed. Additionally, the stand has a 500-gal, 600-psi hydrocarbon fuel system (currently ethyl alcohol) and a 1500-gal, 500-psi liquid methane storage vessel. The stand will support low pressure cryogenics (28,000-gal  $LH_2$  and 13,500-gal LOX) and has vacuum-jacked feed lines to support 400-ft<sup>3</sup> (11 m<sup>3</sup>) GOX at 3000 psi. The test stand can be thermally conditioned between 40 and 120 °F (4 to 49 °C).

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**Test Stand 402**



Test Stand 402 is an ambient test stand, capable of accommodating approximately 60 K lbf (270 kN) thrust engine, firing vertically downward into a water-cooled deflector. The system is 4885 ft above sea level and includes a maximum test article envelope of 15.5 ft by 15.5 ft by 30 ft (maximum with the stand enclosure in place). It has dual-position, vertical or horizontal firing capability, and portable tankage. This stand is currently mothballed.

**Test Stand 403**



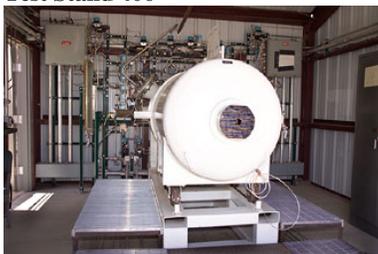
Test Stand 403 is a 32 ft diameter by 33 ft high (9.75 m diameter by 10 m high) carbon steel altitude chamber capable of accommodating a vehicle with a thrust vector-controlled 25 K lbf (110-kN) thrust engine firing vertically downward. It can test articles of 15 ft by 15 ft by 45 ft tall (4.6 m by 4.6 m by 13.7 m tall) and consists of three interior levels that can be reconfigured to meet test requirements. It has dual-position, vertical and horizontal firing capability with an altitude test capability up to 100 K (30.5 km) for engines firing using the steam ejector system and up to 250 K non-firing capability with vacuum pumps. The stand has 2000-gal  $N_2O_4$  and hydrazine family storage/run tanks. Hypergolic propellants (MMH/ $N_2O_4$ ) can be saturated with helium up to 300 psi and can be temperature conditioned from 40 to 120 °F (4 to 49 °C). Propellants can be pressure or pump transferred, and two propellant aspiration systems are currently installed. Maximum thrust for this stand is 25 K lbf (111 N) and has a screw-jack precision test article positioning system. The test stand can be thermally conditioned between 40 and 120 °F (4 to 49 °C).

**Test Stand 405**



Test Stand 405 is a horizontal firing stand, complete with a 9.5 ft diameter by 28 ft long (2.9 m diameter by 8.5 m long) altitude chamber capable of testing both solid propellant rocket motors and hypergolic engines up to 25 K lbf (110 kN) thrust. It has horizontal firing capability, and an altitude test capability up to 100 K (30.5 km) for engine firings using the steam ejector system up to 250 K (76 km) non-firing capability with vacuum pumps. Propellant capability includes  $N_2O_4$ , hydrazines, and solids. Liquid propellants are stored in 110-gal run tanks rated to 1000 psia and can be saturated with helium up to 285 psi and temperature conditioned from 40 to 120 °F (4 to 49 °C). Maximum thrust for this stand is 25 K lbf (111 N). Solid motor capability includes a control slip ring for motor rotation up to 120 RPM during firing with a side and axial thrust measurement system.

**Test Stand 406**



Test Stand 406 is a horizontal firing altitude chamber 40 inch diameter by 8 ft long (102 cm diameter by 2.5 m long). The chamber has an altitude capability of 100 K (30.5 km) for engine firings using the steam ejector system up to 250 K (76 km) non-firing capability with vacuum pumps. Propellant capability includes  $N_2O_4$  and hydrazines in 2000-gal storage and 15-gal run tanks. Hypergolic propellants (MMH/ $N_2O_4$ ) can be saturated with helium up to 300 psi and can be temperature conditioned from 40 to 120 °F (4 to 49 °C). Propellants can be pressure or pump transferred, and two propellant aspiration systems are currently installed. Maximum thrust for this stand is 1000 lbf (4.5 kN). The test stand has a HVAC system for personnel.