



## PROPULSION TEST FACILITY CAPABILITIES

### SUMMARY

WSTF offers numerous ambient pressure and altitude simulation stands to test rocket propulsion test systems as well as single rocket engines. Propellant capabilities include hypergolic and liquid oxygen/hydrocarbons. Both propellant and test article temperature conditioning is available, as well as the capability to provide saturated propellants to the test article inlets. Test stand specific details are identified below.

### VACUUM TEST STANDS (TS)

TS-302 (32 ft diameter by 38 ft high) and TS-303 (11 ft diameter by 39 ft long)

- Maximum thrust – 300 lbf
- Temperature conditioned from 40 to 120 °F
- Altitude Capability – Altitude > 100,000 ft for engine firing with steam system; up to 250,000 ft non-firing, with vacuum pumps
- Propellant Capability – 2,800-gal hydrazine conditioning unit; propellant can be saturated with helium or nitrogen up to 540 psia; propellant temperature conditioned between 40 and 120 °F; 2,000-gal hydrazine dump tank

TS-401 and TS-403 (32 ft diameter by 33 ft high)

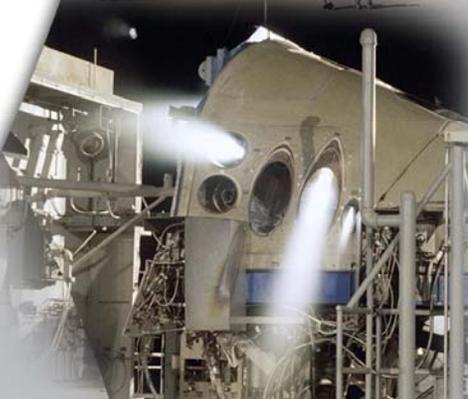
- Maximum thrust – 25,000 lbf (Vertical); 1,000 lbf (Horizontal)
- Vertical firing; screw-jack precision test article positioning system
- Ambient pressure-temperature conditioning from 30 to 120 °F
- Altitude Capability – Altitude > 100,000 ft for engine firing with steam system; up to 250,000 ft non-firing, with vacuum pumps
- Propellant Capability – 2,000-gal storage/run tanks for hypergolic propellants (monomethylhydrazine (MMH)/nitrogen tetroxide ( $N_2O_4$ )) can be saturated with helium up to 300 psia (600 at TS-401); both propellants can be temperature conditioned between 40 to 120 °F; pressure or pump transfer of propellants; two propellant aspiration systems installed
  - Portable propellant skids, (one each for hydrazines and  $N_2O_4$ ) including 15+ gal run tanks for engine inlet pressures up to 1500 psia
  - Low-pressure cryogenics: 28,000 gal liquid hydrogen; 13,500 gal liquid oxygen; vacuum-jacked feed lines
  - 400 ft<sup>3</sup> gaseous oxygen at 3,000 psi
  - 500 gal, 600 psi hydrocarbon fuel system (currently ethyl alcohol)

TS-405 (9.5 ft diameter by 28 ft long)

- Maximum thrust – 25,000 lbf; horizontal firing
- Altitude Capability – Altitude > 100,000 ft for engine firing with steam system; up to 250,000 ft non-firing, with vacuum pumps
- Propellant Capability – MMH/ $N_2O_4$  110-gal run tanks rated to 1,000 psia; both propellants can be saturated with helium up to 285 psia; both propellants can be temperature conditioned between 40 to 120 °F
- Solid Motor Capability – data acquisition and control slip ring for motor rotation up to 120 rpm during firing; side and axial thrust measurement system

TS-406 (40-in. diameter by 8 ft long)

- Maximum thrust – 1,000 lbf; horizontal firing
- Altitude Capability – Altitude > 100,000 ft for engine firing with steam system; up to 250,000 ft non-firing, with vacuum pumps



# National Aeronautics and Space Administration

LYNDON B. JOHNSON SPACE CENTER  
WHITE SANDS TEST FACILITY



## AMBIENT TEST STANDS

### TS-301

- 4,995 ft above sea level, maximum test article envelope 25 by 18 by 18 ft high
- Maximum thrust – 25,000 lbf; vertical or horizontal firing
- Temperature conditioned from 40 to 120 °F
- Propellant Capability – 2,000-gal storage/run tanks; both propellants (MMH/N<sub>2</sub>O<sub>4</sub>) can be saturated with helium up to 285 psia; both propellants can be temperature conditioned between 40 to 120 °F
- Catch-and-weigh tanks are available; two aspiration systems installed

### TS-328

- 4,995 ft above sea level maximum test article envelope 18 by 18 by 18 ft
- Maximum thrust – 25,000 lbf
- Horizontal firing; retractable insulated building
- Temperature conditioned from 40 to 120 °F
- Propellant Capability – MMH/N<sub>2</sub>O<sub>4</sub> 750-gal storage/run tanks; both propellants can be saturated with helium up to 285 psia; both propellants can be temperature conditioned between 40 to 120 °F
- Catch-and-weigh tanks are available; two aspiration systems installed

### TS-402

- 4,885 ft above sea level maximum test article envelope 15.5 by 15.5 by 30 ft
- Maximum thrust – 60,000 lbf vertical or horizontal firing
- Propellant Capability – No run tanks currently installed

## GENERAL TEST AREA FACILITIES (300 and 400 Areas)

Office and Support Buildings – each area

Control Centers – each area

Area-Wide Operations and Support Systems – each area (minimum)

### Propellants

- Bulk storage capacity of 3,500 gal each of MMH/N<sub>2</sub>O<sub>4</sub>
- Filtration and recirculation systems installed
- Portable molecular sieve units for iron and water removal

### Gases

- Nitrogen up to 3,000 psi at high flow rate
- Helium up to 5,500 psi (low- and high-pressure systems)
- Breathing air at 40 to 120 psi

### Waste Management Systems

- Remote Oxidizer Burner and Vent Stack Systems
- Remote Fuel-scrubber systems
- 1,800-gal oxidizer and fuel dump tank systems
- Standard Electrical Power
  - 480 and 120 Vac; 28 Vdc with battery backup
- Independent test article and facility power
- Fire Detection and Suppression
  - Independent, remote-controlled water monitors and UV flame detectors
  - Located in each test stand for test article and facility protection

## CONTACT

Robert R. Kowalski, NASA White Sands Test Facility, Project Manager,  
[robert.r.kowalski@nasa.gov](mailto:robert.r.kowalski@nasa.gov), (575) 524-5520

