



Main Technical Parameters

Flow M number	1.8...10.0
Re number per 1 m	$2 \cdot 10^6 \dots 42 \cdot 10^6$
Total pressure	110...8000 kPa
Dynamic pressure	8...120 kPa
Stagnation temperature	290...1075 K
Run duration	up to 300 s
Angle of attack (α) range	$-6^\circ \dots +30^\circ$ (60°)
Side slip angle (β) range	$-4^\circ \dots +9^\circ$
Tests section sizes:	
Cross section area	1×1 m
Test section length	2.35 m

Tested object sizes:

– Aircraft and cruise missile:

Length	up to 1 m
Wing square	up to 0.12 m^2
Wing span	up to 0.5 m
Fuselage middle part diameter	up to 0.12 m

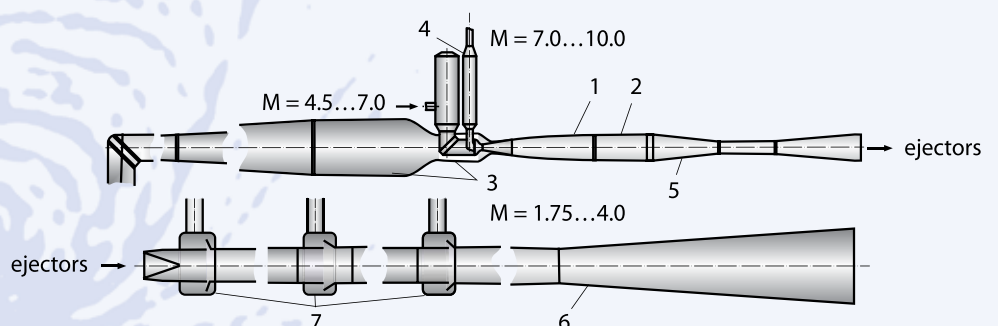
– Small tail empennage missile of high aspect ratio:

Length	up to 1 m
Middle part diameter	up to 0.25 m

– Reentry spacecraft:

Length	up to 0.6 m
Middle part diameter	up to 0.2 m

1. Supersonic nozzle
2. Test section
3. Removable stilling chambers
4. Resistance heaters
5. Supersonic diffuser
6. Exhaust diffuser
7. Ejectors system



General Description

T-116 Wind Tunnel is super- and hypersonic blowdown test facility with closed test section, and adjusted supersonic diffuser, three-level suction ejector operating via compressed air from vessel and exhausting it into atmosphere. Flow operational regimes are enabled by three independent air-supply ducts, i.e. one for supersonic velocities ($M = 1.8 \dots 4.0$) and two ducts for hypersonic ranges with M number $M = 5 \dots 7$ and $M = 7 \dots 10$. Hypersonic ducts are equipped with resistance heat. The wind tunnel is equipped with a set of interchangeable nozzles for a flow with different discrete M numbers.

The wind tunnel is equipped with a six-component electric mechanical balance and a set of strain gauge balances for forces and moments of the models and their structural elements, computerized measurement and control complex.



Capabilities

The following types of tests can be carried out in T-116:

- Total aerodynamic characteristics of a model and its components;
- Research of aircraft models with air flow through internal channels and with engine jets simulation;
- Aircraft structural components interference during their separation;
- Control methods for super- and hyper-sonic aircraft;
- Boundary layer laminarization via deep cooling of aircraft model surface;
- Pressure and heat flux distribution over a model surface;
- Physical research (shadow pictures of a model streamlining, visualization of current lines by colours blurring, film-photo-video registration of a model streamlining etc).



Technological Advantages

- Re numbers close to real ones at wide range of M numbers.
- High angle of attack ($28^\circ \dots 60^\circ$) mechanism.
- Mechanism for quick models insertion into a flow.
- Device for jet flows imitation via compressed air blowing from the model nozzles.
- Device for remote varying of control surfaces deflection angles during elements separation.
- Instrument with a cooling system for remote control of continuous discrete model's rudder deflection.
- System for model deep cooling by liquid and gas nitrogen mixture.



Application

All the above-mentioned capabilities of T-116 WT are used for experimental investigations of the models of aircraft, rocket, space vehicles and their structural elements.

