



1.4.1 Targets Catalog

The targets and metrics are tabulated below along with the method of validation and the necessary equipment for their verification. Some targets/metrics apply directly to functions defined in the functional decomposition, while the last three are added.

Table 1: Targets and Metrics Catalog

Function	Target	Method of Validation	Tools for Validation
Supports payload	Payload storage space of 10 x 10 x 30 cm	Direct Measurement	Measuring Tape
	Maximum payload mass of 4 kg	Direct Measurement	Scale
Prevents damaging impact	Impact velocity of less than 1 m/s	Parachute Drop Test	Accelerometer
Decelerates air vehicle	Begins deceleration for the last 170 m	Parachute Drop Test	Accelerometer
Initiates thrusters	Initiate thrusters at time 0 seconds	Thruster Functionality Test	Stopwatch
Deploys parachute	Deploys parachute after falling 80 m	Parachute Drop Test	Accelerometer
	Deploys parachute after 4 s	Parachute Drop Test	Video and Stopwatch
Allows access to payload	Opening with a diameter of at least 10 cm	Direct Measurement	Measuring Tape
Accelerates air vehicle	Reaches about 90 mph after 4 seconds	Official Drop Test	Accelerometer
	Acceleration of 9.81 m/s^2	Official Drop Test	Accelerometer
Stabilizes payload	Minimum noise swing of 1.05G	Official Drop Test	Accelerometer
Reduces degrees of freedom	Reduces DOF to 1	Air flow around body geometry test	Wind tunnel with accelerometer in body
	Mass moment of inertia is $<0.5 \cdot \text{body length}$ away from the nose	Balancing Test	Observation



Imitates microgravity	Duration of at least 4 seconds of microgravity	Official Drop Test	Stopwatch and video footage
	Magnitude of 10^{-6} G of microgravity	Official Drop Test	Accelerometer
Detaches from drone	1/4" Steel release hook attached to air vehicle	Hook-Connection Detachment Test	1/4" steel release hook and attachment held
Records data	Air vehicle provides a Bluetooth signal path with a minimum range of 10m	Official Drop Test	Computer connected to the air vehicle
Counteracts drag force	Air vehicle body has a cross-sectional area no larger than 490 cm^2	Direct Measurement	Measuring tape/Caliper
	Thrusters provide thrust calculated by PID control algorithm	Thruster Functionality Test	Set accelerometer value to control thrust
N/A	Maximum air vehicle weight of 15 kg	Direct Measurement	Scale
	Win 1 st place in competition	Competition	Trophy and prize money
	Mounting bracket for GoPro 4 cm away from pebble box	Direct Measurement	Measuring tape