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| **Requirement Number** | **Requirement** |
| 1 | Total mass of the CanSat (science payloads and container) shall be 600 grams +/- 10 grams. |
| 2 | CanSat shall fit in a cylindrical envelope of 125 mm diameter x 400 mm length. Tolerances are to be included to facilitate container deployment from the rocket fairing. |
| 3 | The container shall not have any sharp edges to cause it to get stuck in the rocket payload section which is made of cardboard. |
| 4 | The container shall be a fluorescent color; pink, red or orange. |
| 5 | The container shall be solid and fully enclose the science payloads. Small holes to allow access to turn on the science payloads are allowed. The end of the container where the payload deploys may be open. |
| 6 | The rocket airframe shall not be used to restrain any deployable parts of the CanSat. |
| 7 | The rocket airframe shall not be used as part of the CanSat operations. |
| 8 | The container’s first parachute shall not be enclosed in the container structure. It shall be external and attached to the container so that it opens immediately when deployed from the rocket. |
| 9 | The Parachutes shall be fluorescent Pink or Orange |
| 10 | The descent rate of the CanSat (container and science payload) shall be 15 meters/second +/- 5m/s after deployment while above 400 meters. |
| 11 | The descent rate of the CanSat shall be reduced to 5 meters/second +/-2 m/s when the CanSat descends below 400 meters. |
| 12 | 0 altitude reference shall be at the launch pad. |
| 13 | All structures shall be built to survive 15 Gs of launch acceleration. |
| 14 | All structures shall be built to survive 30 Gs of shock. |
| 15 | All electronics shall be hard mounted using proper mounts such as standoffs, screws, or high performance adhesives. |
| 16 | All mechanisms shall be capable of maintaining their configuration or states under all forces. |
| 17 | Mechanisms shall not use pyrotechnics or chemicals. |

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| 18 | Mechanisms that use heat (e.g., nichrome wire) shall not be exposed to the outside environment to reduce potential risk of setting vegetation on fire. |
| 19 | Both the container and payload shall be labeled with team contact information including email address. |
| 20 | Cost of the CanSat shall be under $1000. Ground support and analysis tools are not included in the cost. Equipment from previous years should be included in this cost, based on current market value. |
| 21 | XBEE radios shall be used for telemetry. 2.4 GHz Series radios are allowed. 900 MHz XBEE radios are also allowed. |
| 22 | XBEE radios shall have their NETID/PANID set to their team number. |
| 23 | XBEE radios shall not use broadcast mode. |
| 24 | The container shall include electronics to receive sensor payload telemetry. |
| 25 | The container shall include electronics and mechanisms to release the science payload on a tether. |
| 26 | The container shall include a GPS sensor to track its position. |
| 27 | The container shall include a pressure sensor to measure altitude. |
| 28 | The container shall measure its battery voltage. |
| 29 | The container shall transmit its telemetry once per second (1 Hz) in the formats described in the Telemetry Requirements section. |
| 30 | The container shall poll the payload for telemetry and relay that data four times per second (4 Hz) in the formats described in the Telemetry Requirements section. |
| 31 | The container shall stop polling and transmitting telemetry when it lands. |
| 32 | The container and science payload must include an easily accessible power switch that can be accessed without disassembling the cansat and science payloads and in the stowed configuration. |
| 33 | The container and payload must include a power indicator such as an LED or sound generating device that can be easily seen or heard without disassembling the cansat and in the stowed state. |
| 34 | An audio beacon is required for the container. It shall be powered after landing. |
| 35 | The audio beacon must have a minimum sound pressure level of 92 dB, unobstructed. |
| 36 | Battery source may be alkaline, Ni-Cad, Ni-MH or Lithium. Lithium polymer batteries are not allowed. Lithium cells must be manufactured with a metal package similar to 18650 cells. Coin cells are allowed. |

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| 37 | An easily accessible battery compartment must be included allowing batteries to be installed or removed in less than a minute and not require a total disassembly of the CanSat. |
| 38 | Spring contacts shall not be used for making electrical connections to batteries. Shock forces can cause momentary disconnects. |
| 39 | The Cansat must operate during the environmental tests laid out in Section 3.5. |
| 40 | The Cansat shall operate for a minimum of two hours when integrated into the rocket. |
| 41 | The science payload shall have their NETID/PANID set to their team number plus 5000. If the team number is 1000, sensor payload NETID is 6000. |
| 42 | The science payload shall transmit sensor telemetry to the container when polled. |
| 44 | The science payload shall include a pressure sensor, temperature sensor and rotation sensor. |
| 45 | The science payload shall include a video camera pointing 45 degrees up from the payload NADIR direction. |
| 46 | The science payload shall maintain orientation so the camera always faces south within +/- 20 degrees. |
| 47 | The payload shall be connected to the container with a 10 meter tether. |
| 48 | At 300 meters, the payload shall be released from the container at a rate of .5 meters per second. |
| 49 | The flight software shall maintain a count of packets transmitted which shall increment with each packet transmission throughout the mission. The value shall be maintained through processor resets. |
| 50 | The container shall maintain mission time throughout the whole mission even with processor resets or momentary power loss. |
| 51 | The container shall have its time set to UTC time to within one second before launch. |
| 52 | The container flight software shall support simulated flight mode where the ground station sends air pressure values at a one second interval using a provided flight profile csv file. |
| 53 | In simulation mode, the flight software shall use the radio uplink pressure values in place of the pressure sensor for determining the container altitude. |
| 54 | The container flight software shall only enter simulation mode after it receives the SIMULATION ENABLE and SIMULATION ACTIVATE |
|  | commands. |
| 55 | The ground station shall command the Cansat to start transmitting telemetry prior to launch. |
| 56 | The ground station shall generate csv files of all sensor data as specified in the Telemetry Requirements section. |
| 57 | Telemetry shall include mission time with one second or better resolution. Mission time shall be maintained in the event of a processor reset during the launch and mission. |
| 58 | Configuration states such as if commanded to transmit telemetry shall be maintained in the event of a processor reset during launch and mission. |
| 59 | Each team shall develop their own ground station. |
| 60 | All telemetry shall be displayed in real time during descent on the ground station. |
| 61 | All telemetry shall be displayed in engineering units (meters, meters/sec, Celsius, etc.) |
| 62 | Teams shall plot each telemetry data field in real time during flight. |
| 63 | The ground station shall include one laptop computer with a minimum of two hours of battery operation, XBEE radio and a hand-held antenna. |
| 64 | The ground station must be portable so the team can be positioned at the ground station operation site along the flight line. AC power will not be available at the ground station operation site. |
| 65 | The ground station software shall be able to command the container to operate in simulation mode by sending two commands, SIMULATION ENABLE and SIMULATION ACTIVATE. |
| 66 | When in simulation mode, the ground station shall transmit pressure data from a csv file provided by the competition at a 1 Hz interval to the container. |
| 67 | The science payloads shall not transmit telemetry during the launch, and the container shall command the science payloads to begin telemetry transmission upon release from the container. |
| 68 | All video cameras shall be in color, have a resolution of at least 640x480 and record at a minimum of 30 frames a second. |