Plantmosphere Technologies – System Test Plan

1 Humidification

Table 1: Humidification Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
1-T1	R3.5.1	Assess the humidification system's ability to regulate the RH level of the interior air.	The misters should turn on, thereby increasing the interior air's RH until it reaches a threshold value.	Pass
1-T3	R3.5.1	Verify that the humidification system deactivates when the RH level and temperature of the internal air is optimal.	The humidification system deactivates or remains inactive.	Pass

2 Ventilation

Table 2: Ventilation Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
2-T2	R3.4.5	Assess the effectiveness and efficiency of the ventilation system when attempting to establish thermal uniformity between the greenhouse interior and exterior.	When vents are opened and fans are activated, a successful ventilation system will equalize the internal and external air temperatures sufficiently quickly, and will not deprive the plants' leaves of airflow.	Pass

3 Irrigation

Table 3: Irrigation Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
3-T1	R3.6.3	Verify irrigation system can direct water from the reservoir to the trough.	The pump should be able to supply enough pressure such that all water in the reservoir can be delivered to the trough.	Pass
3-T2	R3.6.3	Verify irrigation system can detect changes is soil moisture.	The moisture sensors should read higher digital values when watered.	Pass
3-T4	R3.6.9	Verify the functionality of the water overflow pipe.	Overflow pipe should direct excess water to a drain.	Incomplete
3-T5	R3.6.14	Verify that the rainwater collection pipe delivers water to the reservoir.	Poured water should be collected by the rainwater collection pipe without significant pooling within the trough. Pipe should direct all water into the reservoir.	Pass

4 Lighting

Table 4: Lighting Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
4-T1	R3.3.2	Verify that the lighting system will not block natural sunlight.	The natural sunlight will be able to illuminate the plants.	Pass
4-T3	N/A	Verify that the lights only activate once the sun is obstructed, the allowable lighting time is surpassed, and the plants' daily light	The lights will activate.	Pass

		exposure quota has not been met.		
4-T5	N/A	Verify that the lights will deactivate when sunlight is unobstructed.	The lights will deactivate.	Pass
4-T6	N/A	Verify that the lights cannot turn on past sunset.	The lights will deactivate.	Pass

5 Power

Table 5: Power Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
5-T2	N/A	Assess the PSU's ability to simultaneously supply all sub-systems with the power they require.	The sub-systems should operate as expected.	Fail

6 Safety

Table 6: Safety Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
6-T1	R2.5.3	Assess the hermiticity of the electrical enclosures.	There will be no water inside the electrical enclosure.	Incomplete
6-T7	R2.5.12	Assess the strength of mounted components.	The force required to move the mounted component should be high.	Pass

7 Soil Heating

Table 7: Soil Heating Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
7-T1	R3.7.2	Assess the soil heating	The soil heating cable	Pass

		cable's ability to heat the soil.	should be able to heat the soil to temperatures above 74˚F.	
7-T2	R3.7.3	Assess the plant trough's temperature distribution.	The soil temperature should be sufficiently distributed throughout the trough.	Pass

8 Integration Testing

Table 8: System Integration Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
8-T1	R4.2.1	Assess the integration of the Plantmosphere's sub-systems.	All measured environmental parameters should reach and remain stable at the configured inputs. Output signal data should present expected values.	Incomplete

9 User Interface (UI) Testing

Table 9: User Interface Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
9-T1	R4.2.1	Asses the functionality of the user interface display module and keypad.	The user should be able to select the desired plant and mode of operation.	Pass
9-T2	R4.2.2	Asses the ability of the UI to update the System Status field.	The LCD module should display an error.	Pass

10 Validation Testing

Table 10: System Validation Test Plan

Test Case	Applicable Requirement(s)	Objective	Expected Outcome	Pass/Fail/Incomplete
10-T1	R2.2.1	Verify that the system promotes the healthy growth of plants	Case group of radishes should show significantly better health than control group. Seeds should be germinated and partially grown radishes should have increased in size.	Incomplete