Aerosol Containment Tent (ACT) Technical Summary

CSA Z317.2-19 sets out negative pressure differential and airflow requirements for patient isolation rooms. Specifically, the air change rate must be at least 20 ACH (Air changes per hour) and the negative pressure differential must be at least 7.5 Pa compared to the adjacent spaces. While the ACT falls outside the scope of CSA Z317.2-19, MACH32 used the pressure and airflow requirements as design criteria, effectively creating a small negative pressure isolation room around the patient.

The fan filter unit is 3rd party certified to meet UL and CSA safety requirements. The HEPA-AIRE filters are individually tested and certified to capture at least 99.97% of 0.3-micron particles.

In addition, MACH32 has performed a suite of tests to ensure that these performance criteria are met under two use case scenarios, depending on the status of the access ports. We measured the pressure using a calibrated differential pressure sensor at strategic locations in the tent and measured the airflow at the FFU outlet using a calibrated hot wire anemometer. The results of our in-house testing are summarized in Table 1.

Table 1: Summary of performance verification results

Scenario	Access ports	FFU Setting	Negative pressure differential	Air changes per hour (ACH)
1	Not in use	HIGH	> 30 Pa	> 2000 ACH
2	In use	HIGH	> 15 Pa	> 2000 ACH
CSA Z317.2-19 Requirement			>7.5 Pa	>20 ACH

The values in Table 1 are given for a sense of scale, and to demonstrate that the ACT performance exceeds the performance criteria for pressure and air flow outlined in CSA Z317.2. In the majority of cases, the measurements are above the values indicated in Table 1. Figure 1 (next page) provides further detail on the local negative pressure zones within the tent, demonstrating that the design exceeds the performance criteria.

To assess variability across different units, we measured the performance for 10 different component combinations. To assess repeatability, we repeatedly measured the performance after assembling and disassembling the unit, for several different units. In total, we have taken over 200 measurements across different configurations, set up conditions, and combinations of different components. In all cases, the measurements exceeded the pressure and flow criteria for CSA Z317.2.

MACH32 performs quality testing on every single unit sent to the customer. These quality tests are a streamlined version of our design performance verification tests. The pass/fail criteria for these quality tests are designed to identify any performance deviations from our in-depth verification tests. We confirm that every unit that leaves our facility performs to the CSA Z317.2 standard in terms of pressure differential.

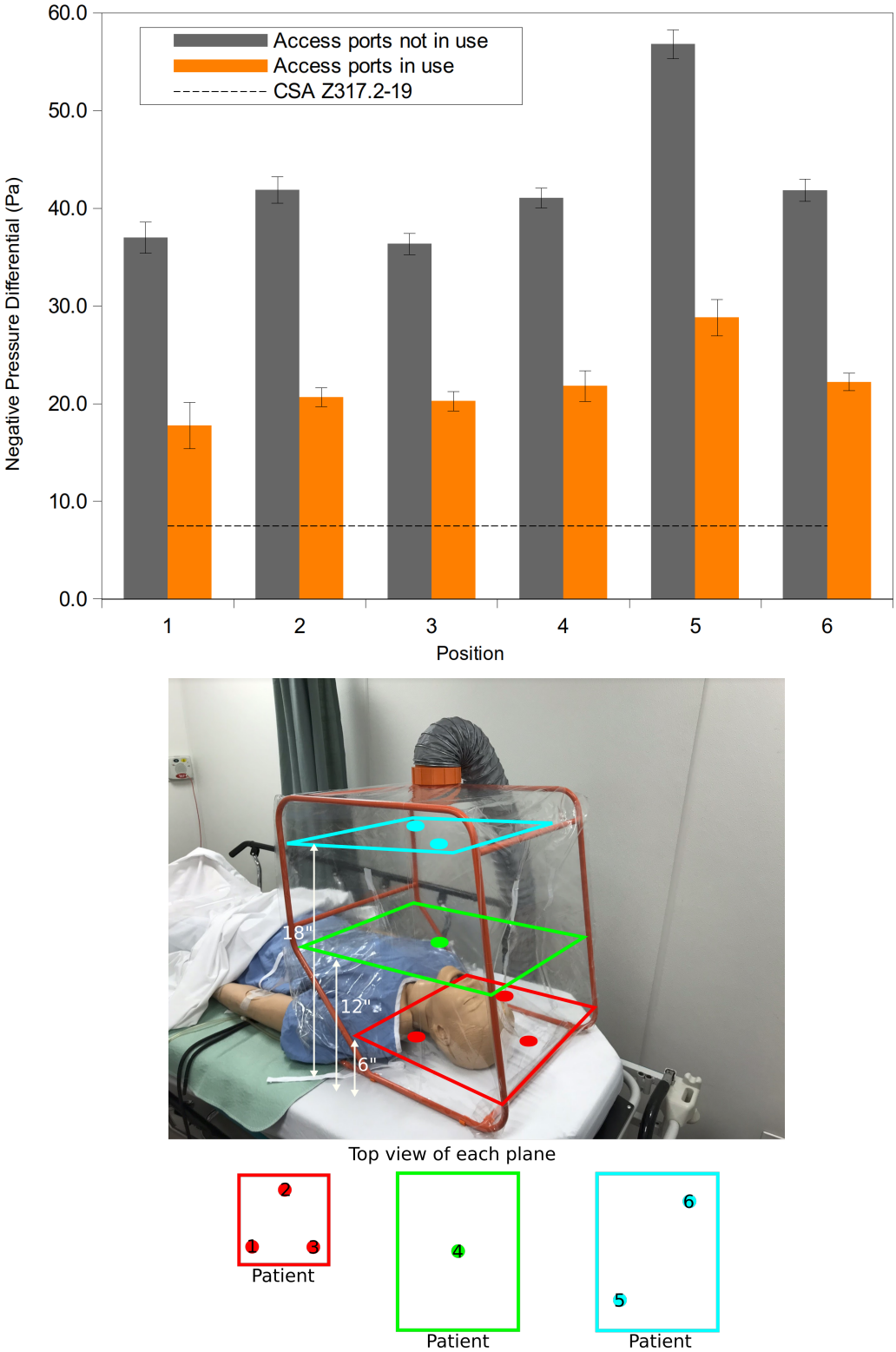

Figure 1: Local pressure differential within the tent.