Vitacore Industries Inc.
Website: https://vitacore.ca/
Email: info@vitacore.ca

Particulate Filtration Efficiency
Test Report

Manufacturer: Vitacore Industries Inc.

Respirator Model Tested: CAN95e (Black)

Report Date: 2023-01-19

1. Executive Summary

Twenty black CAN95e respirators were tested for Particulate Filter Efficiency in accordance with test method TEB-APR-STP-0059[1]. The twenty respirators were selected at random and subjected to a 5-minute Canadian Standards Association (CSA) test. All tested CAN95e respirators exhibited particulate filtration efficiency greater than 95% (Table 2).

2. Sample Description

Table 1. Sample and testing information.

Sample Name	Number of Samples	Analysis ID	Test Date
CAN95e	20	230109-BLK95e-A	2023-01-09

3. Test method

The Particulate Filter Efficiency (PFE) testing was performed in accordance with NIOSH Procedure TEB-APR-STP-0059 on a TSI® CERTITEST® Automated Filter Tester Model 8130A (Serial No.: 8130163502). Respirators were challenged by a NaCl aerosol which had been neutralized to the Boltzmann equilibrium state at 25 ± 5˚C and 30 ± 10% relative humidity. The particle size distribution was verified to be a count median diameter of 0.075 ± 0.020 µm, and a geometric standard deviation not exceeding 1.86. The aerosol concentration was not exceeding 200 mg/m^3.

The respirators were pre-conditioned at 85 ± 5% relative humidity and 38 ± 2.5 °C for 25 ±1 hours before testing. The challenge flow rate was checked for stability for at least 30 seconds prior to testing. Respirators were mounted on holders by hot melt glue to prevent leakage around the filter holder.

Three respirators were chosen randomly from the 20 submitted samples and subjected to a 5-minute CSA aerosol loading level, at the challenge flow rate of 85 Lpm. The penetration of the 20 samples was measured,

recorded, and printed at approximately 1-minute intervals during the test period. The highest penetration observed throughout the test of each filter was recorded as the maximum penetration of that respirator. The maximum filter penetration for each of the 20 samples was determined and record on the data sheet provided below.

Figure 1 below shows the setup of a CAN95e Respirator and the TSI Tester.

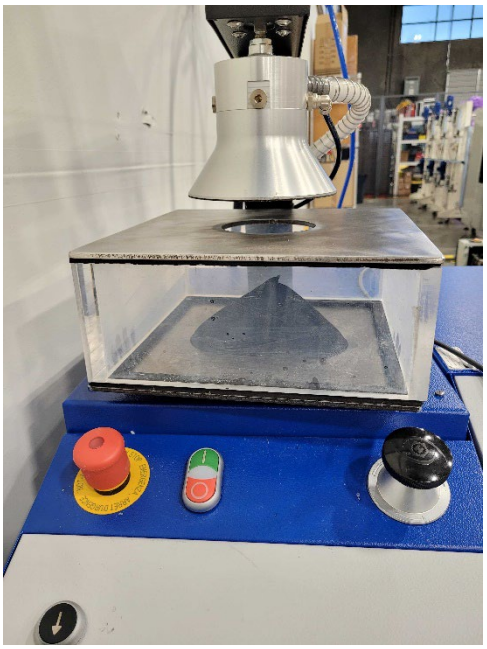

Figure 1. Black CAN95e Respirator under test using a TSI® CERTITEST® Automated Filter Tester Model 8130A.

4. Results

All samples exhibited minimum PFE% over 95%, shown in Table 2 below.

Table 3 to Table 22 summarize the 5-minute loading results of each respirator.

Table 2. Test result summary for twenty CAN95e Respirators according to NIOSH Method TEB- APR-STP-0059, including initial inhalation resistance, maximum penetration and PFE%.

Sample ID	Initial Inhalation Resistance (mmH_2O)	Initial Penetration (%)	Maximum Penetration (%)	Maximum Allowable Penetration (%)	PFE (%)	PASS / FAIL
230109-BLK95e-A -1	13.43	0.119	0.119	5.000	99.881	Pass
230109-BLK95e-A-2	13.3	0.147	0.147	5.000	99.853	Pass
230109-BLK95e-A-3	13.06	0.138	0.138	5.000	99.862	Pass

230109-BLK95e-A-4	13.22	0.124	0.124	5.000	99.876	Pass
230109-BLK95e-A-5	13.94	0.139	0.139	5.000	99.861	Pass
230109-BLK95e-A-6	14.17	0.120	0.120	5.000	99.880	Pass
230109-BLK95e-A-7	14.14	0.120	0.120	5.000	99.880	Pass
230109-BLK95e-A-8	13.61	0.131	0.131	5.000	99.869	Pass
230109-BLK95e-A-9	14.31	0.102	0.102	5.000	99.898	Pass
230109-BLK95e-A-10	14	0.083	0.085	5.000	99.915	Pass
230109-BLK95e-A-11	14.64	0.083	0.083	5.000	99.917	Pass
230109-BLK95e-A-12	13.59	0.155	0.155	5.000	99.845	Pass
230109-BLK95e-A-13	13.82	0.159	0.159	5.000	99.841	Pass
230109-BLK95e-A-14	14.01	0.126	0.126	5.000	99.874	Pass
230109-BLK95e-A-15	13.31	0.366	0.366	5.000	99.634	Pass
230109-BLK95e-A-16	13.2	0.113	0.113	5.000	99.887	Pass
230109-BLK95e-A-17	13.11	0.093	0.166	5.000	99.834	Pass
230109-BLK95e-A-18	14.37	0.152	0.148	5.000	99.852	Pass
230109-BLK95e-A-19	13.88	0.118	0.136	5.000	99.864	Pass
230109-BLK95e-A-20	13.22	0.111	0.171	5.000	99.829	Pass

Table 3. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-1.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	13.8	0.119	99.881	2.1
2	85.1	14.2	0.114	99.886	4.2
3	85.1	14.6	0.105	99.895	6.3
4	85.1	15.1	0.101	99.899	8.4
5	85.1	15.5	0.102	99.898	10.5

Table 4. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-2.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	13.7	0.147	99.853	2.1
2	85.1	14.1	0.136	99.864	4.2
3	85.1	14.6	0.125	99.875	6.3
4	85.1	15.1	0.122	99.878	8.4
5	85.1	15.6	0.122	99.878	10.5

Table 5. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-3.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.2	13.4	0.138	99.862	2.1
2	85.2	13.8	0.131	99.869	4.2
3	85.2	14.1	0.127	99.873	6.3
4	85.2	14.5	0.124	99.876	8.4
5	85.2	14.9	0.121	99.879	10.5

Table 6. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-4.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.2	13.5	0.124	99.876	2.1
2	85.2	13.9	0.116	99.884	4.2
3	85.3	14.3	0.104	99.896	6.3
4	85.3	14.7	0.102	99.898	8.4
5	85.3	15.2	0.102	99.898	10.5

Table 7. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-5.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.3	14.4	0.139	99.861	2.1
2	85.3	14.8	0.130	99.870	4.2
3	85.1	15.3	0.118	99.882	6.3
4	85.0	15.8	0.112	99.888	8.4
5	85.0	16.3	0.110	99.890	10.5

Table 8. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-6.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.0	14.6	0.120	99.880	2.1
2	85.1	14.9	0.115	99.885	4.2
3	85.0	15.2	0.107	99.893	6.3
4	85.1	15.7	0.101	99.899	8.4
5	85.0	16.1	0.098	99.902	10.5

Table 9. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-7.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	14.5	0.120	99.880	2.1
2	85.1	15.0	0.108	99.892	4.2
3	85.1	15.5	0.097	99.903	6.3
4	85.1	16.0	0.095	99.905	8.4
5	85.1	16.5	0.093	99.907	10.5

Table 10. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-8.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.0	14.1	0.131	99.869	2.1
2	85.1	14.6	0.120	99.880	4.2
3	85.1	15.1	0.108	99.892	6.3
4	85.1	15.6	0.103	99.897	8.4
5	85.1	16.1	0.102	99.898	10.5

Table 11. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-9.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	14.7	0.102	99.898	2.1
2	85.1	15.0	0.096	99.904	4.2
3	85.1	15.4	0.088	99.912	6.3
4	85.1	15.8	0.083	99.917	8.4
5	85.1	16.3	0.081	99.919	10.5

Table 12. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-10.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	84.9	17.9	0.083	99.917	2.1
2	85.0	18.1	0.085	99.915	4.2
3	85.0	18.5	0.084	99.916	6.3
4	85.0	18.8	0.085	99.915	8.4
5	84.9	19.3	0.085	99.915	10.5

Table 13.Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-11.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	15.0	0.083	99.917	2.1
2	85.1	15.4	0.079	99.921	4.2
3	85.1	15.8	0.070	99.930	6.3
4	85.1	16.3	0.068	99.932	8.4
5	85.1	16.7	0.066	99.934	10.5

Table 14. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-12.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	13.9	0.155	99.845	2.1
2	85.1	14.4	0.147	99.853	4.2
3	85.1	14.8	0.138	99.862	6.3
4	85.1	15.2	0.134	99.866	8.4
5	85.1	15.7	0.139	99.861	10.5

Table 15. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-13.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	14.2	0.159	99.841	2.1
2	85.1	14.6	0.147	99.853	4.2
3	85.1	15.1	0.138	99.862	6.3
4	85.1	15.5	0.133	99.867	8.4
5	85.1	16.0	0.134	99.866	10.5

Table 16. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-14.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	14.4	0.126	99.874	2.1
2	85.1	14.8	0.115	99.885	4.2
3	85.1	15.2	0.106	99.894	6.3
4	85.1	15.7	0.105	99.895	8.4
5	85.1	16.3	0.103	99.897	10.5

Table 17. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-15.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.1	13.7	0.366	99.634	2.1
2	85.1	14.0	0.358	99.642	4.2
3	85.1	14.4	0.343	99.657	6.3
4	85.1	14.8	0.331	99.669	8.4
5	85.2	15.2	0.328	99.672	10.5

Table 18. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-16.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.3	13.8	0.113	99.887	2.1
2	85.2	14.0	0.110	99.890	4.2
3	85.2	14.5	0.099	99.901	6.3
4	85.2	14.8	0.094	99.906	8.4
5	85.2	15.1	0.093	99.907	10.5

Table 19. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-17.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.2	13.4	0.166	99.834	2.1
2	85.2	13.8	0.161	99.839	4.2
3	85.2	14.1	0.151	99.849	6.3
4	85.2	14.6	0.148	99.852	8.4
5	85.2	15.0	0.152	99.848	10.5

Table 20. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-18.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.2	14.8	0.148	99.852	2.1
2	85.2	15.4	0.132	99.868	4.2
3	85.2	15.8	0.119	99.881	6.3
4	85.2	16.4	0.117	99.883	8.4
5	85.2	17.0	0.118	99.882	10.5

Table 21. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-19.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.2	14.3	0.136	99.864	2.1
2	85.2	14.7	0.121	99.879	4.2
3	85.2	15.3	0.114	99.886	6.3
4	85.2	15.7	0.112	99.888	8.4
5	85.2	16.2	0.111	99.889	10.5

Table 22. Loading test data including flow rate, inhalation resistance, penetration, PFE and NaCl mass loading according to NIOSH Method TEB-APR-STP-0059 for Sample ID 230109-BLK95e-A-20.

Run Time (min)	Flow Rate (Lpm)	Inhalation Resistance (mm H_2O)	Penetration (%)	PFE (%)	NaCl Mass Loading (mg)
1	85.2	13.6	0.171	99.829	2.1
2	85.2	14.0	0.156	99.844	4.2
3	85.2	14.5	0.148	99.852	6.3
4	85.1	14.9	0.141	99.859	8.4
5	84.9	15.5	0.146	99.854	10.5

Reviewed by: *Yuxuan (Steven) Fan MEng*, Project Associate

Prepared by: *Jamie Chiam BASc*, Research Assistant

These data are representative of only the samples tested.

References

1. National Institute for Occupational Safety and Health. Determination of Particulate Filter Efficiency Level for N95 Series Filters against Solid Particulates for Non-Powered, Air Purifying Respirators Standard Test Procedure TEB-APR-STP-0059 Revision 3.2. 2019.