TECHNICAL CORNER

TriDim Filter Corporation

ASHRAE 52.2-1999 Overview

ASHRAE Standard 52.2-1999 is fundamentally different from the older ASHRAE 52.1 Standard. This new standard measures air filter efficiency by how well the filter captures specific particle sizes. ASHRAE 52.2 classifies these sizes into 12 ranges that the test facility counters must recognize and measure. These ranges are part of the process of determining a filter 's **M**inimum **E**fficiency **R**eporting **V**alue (**MERV**).

Particle Counter(s) Size Range Boundaries (ASHRAE 52.2 Table 4-1)

Range	Size Range		Geometric Mean Particle Size (µm)
	Lower Limit (µm)	Upper Limit (µm)	
1	0.30	0.40	0.35
2	0.40	0.55	0.47
3	0.55	0.70	0.62
4	0.70	1.00	0.84
5	1.00	1.30	1.14
6	1.30	1.60	1.44
7	1.60	2.20	1.88
8	2.20	3.00	2.57
9	3.00	4.00	3.46
10	4.00	5.50	4.69
11	5.50	7.00	6.20
12	7.00	10.00	8.37

MERV: The overall efficiency of 52.2 tested air filters is expressed as a MERV at a specific air velocity. To determine a MERV, solid particles of varying sizes are introduced into the test system, upstream from the test filter. A laser particle counter alternately samples air upstream and downstream from the test filter. This is done on the clean filter and after five dust feedings. The lowest efficiency for each range is used to determine the Composite Minimum Efficiency. Once this efficiency is determined, the table below is used to determine a MERV.

ASHRAE 52.2-1999 OVERVIEW

MERV Parameters (ASHRAE 52.2 Table 12-1)

Standard 52.2 Minimum Efficiency Reporting Value (MERV)	Composite Average Particle Size Efficiency, % in Size Range, µm			Average Arrestance, %, by Standard 52.1 Method	Minimum Final Resistance	
	Range Group 1 0.30 – 1.0	Range Group 2 1.0 – 3.0	Range Group 3 3.0 – 10.0		Pa	in. of water
1	n/a	n/a	$E_3 < 20$	$A_{avg} < 65$	75	0.3
2	n/a	n/a	$E_3 < 20$	$65 \le A_{avg} < 70$	75	0.3
3	n/a	n/a	$E_3 < 20$	$70 \le A_{avg} < 75$	75	0.3
4	n/a	n/a	$E_3 < 20$	$75 \le A_{avg}$	75	0.3
5	n/a	n/a	$20 \le E_3 < 35$	n/a	150	0.6
6	n/a	n/a	$35 \le E_3 < 50$	n/a	150	0.6
7	n/a	n/a	$50 \le E_3 < 70$	n/a	150	0.6
8	n/a	n/a	$70 \le E_3$	n/a	150	0.6
9	n/a	$E_2 < 50$	$85 \le E_3$	n/a	250	1.0
10	n/a	$50 \le E_2 < 65$	$85 \le E_3$	n/a	250	1.0
11	n/a	$65 \le E_2 < 80$	$85 \le E_3$	n/a	250	1.0
12	n/a	$80 \le E_2$	$90 \le E_3$	n/a	250	1.0
13	$E_1 < 75$	$90 \le E_2$	$90 \le E_3$	n/a	350	1.4
14	$75 \le E_1 < 85$	$90 \le E_2$	$90 \le E_3$	n/a	350	1.4
15	$85 \le E_1 < 95$	$90 \le E_2$	$90 \le E_3$	n/a	350	1.4
16	$95 \le E_1$	$95 \le E_2$	$95 \le E_3$	n/a	350	1.4

The ASHRAE 52.2 Standard does not completely replace the ASHRAE 52.1 but is to be used with the older standard. See chart below for a comparison between the two standards.

Filter test description	Test standard	What it measures	Comments
Arrestance	ASHRAE 52.1	The percentage of test dust, by weight, that a filter is able to capture.	Only useful for comparing low-efficiency filters.
Dust spot efficiency	ASHRAE 52.1	The filter's ability to remove naturally occurring atmospheric dust.	A more stringent measure of performance than arrestance; however, the use of atmospheric dust can result in variable results.
Particle size efficiency (PSE)	ASHRAE 52.2	The filter's ability to remove airborne particles in specific size ranges from 0.30 to 10.0 microns in diameter, using controlled aerosol potassium chloride (KCl).	A much more comprehensive measure of filter performance, because it pinpoints efficiencies on specific particle sizes. Also yields more consistent and reliable results than dust spot efficiency testing.
Dust-holding capacity (DHC)	ASHRAE 52.1	The weight of test dust a filter can hold at a specified final pressure drop.	A useful way to compare relative service life of filters of similar design.
Pressure drop	ASHRAE 52.1, ASHRAE 52.2	The filter's resistance to airflow.	Resistance relates to energy usage. A lower resistance filter uses less energy at the same airflow.

If you have any questions or need additional information please contact us at info@tridim.com or 1-800-458-9835.

Information and tables used from Intertek Testing Services “ASHRAE 52.2 Quick Reference Guide”

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ASHRAE 52.1-1992 Overview

In the ASHRAE 52.1-1992 several important performance characteristics are tested.

Initial and Final Resistance: The resistance to air flow is measured in inches of water gage before the test (Initial Resistance) and at the end of the test (Final Resistance). These are important to determine if your system can handle the resistance of a filter and to compare the energy consumption between filters.

Initial Atmospheric Dust Spot Efficiency: Discoloration test that measures the discoloration of white target paper disc before and after the air filter when atmospheric air is fed to them. Initial efficiency is preformed on a clean filter.

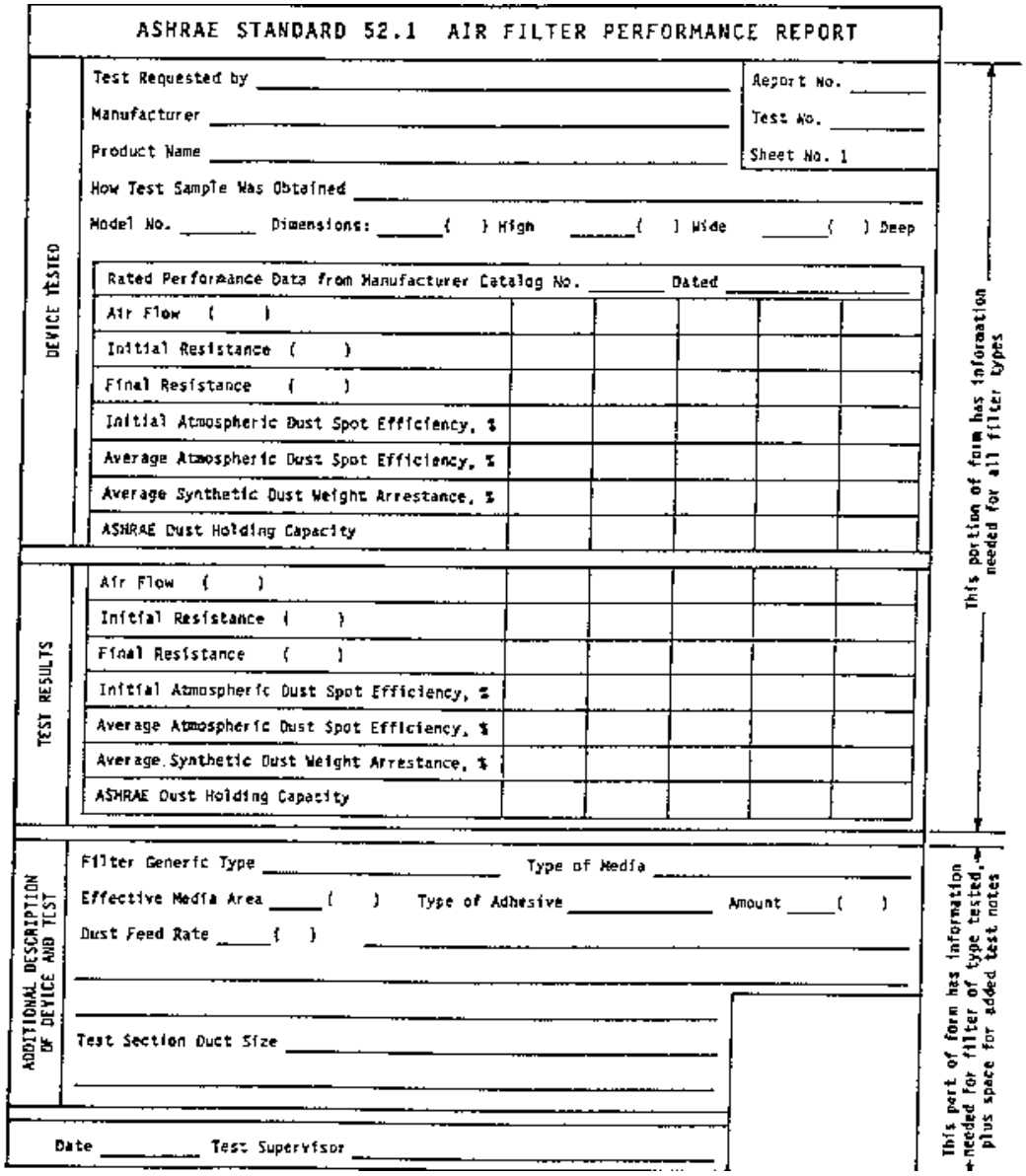
Average Atmospheric Dust Spot Efficiency: It is the same test as above but is an average over the life of the filter. This is often referred to as the ASHRAE Efficiency. It is important to understand that this test does not really indicate the test filters efficiency on a specific size particle but is really just a comparative measurement to compare one filter versus another.

Average Synthetic Dust Weight Arrestance: This test reflects the percent value of weight collected by the test filter when synthetic dirt is fed to it. There are two basic faults with this test: First, the artificial test dusts are quite different from atmospheric dusts and, secondly, even low efficiency filters rate quite high by percentage, not offering a good evaluation between low and high efficiency filters.

ASHRAE Dust: ASHRAE synthetic dust consist of 72% standardized air-cleaner test dust fine by weight: 23% by weight Molocco black: and 5% by weight No.7 cotton linters ground in a wiley mill with a 4mm screen.

Sample Test Report:

ASHRAE 52.1-1992 OVERVIEW



ASHRAE STANDARD 52.1 AIR FILTER PERFORMANCE REPORT

DEVICE TESTED

Test Requested by _____ Report No. _____

Manufacturer _____ Test No. _____

Product Name _____ Sheet No. 1

How Test Sample Was Obtained _____

Model No. _____ Dimensions: _____( ) High _____( ) Wide _____( ) Deep

Rated Performance Data from Manufacturer Catalog No. _____ Dated _____					
Air Flow ( )					
Initial Resistance ( )					
Final Resistance ( )					
Initial Atmospheric Dust Spot Efficiency, %					
Average Atmospheric Dust Spot Efficiency, %					
Average Synthetic Dust Weight Arrestance, %					
ASHRAE Dust Holding Capacity					

TEST RESULTS

Air Flow ( )					
Initial Resistance ( )					
Final Resistance ( )					
Initial Atmospheric Dust Spot Efficiency, %					
Average Atmospheric Dust Spot Efficiency, %					
Average Synthetic Dust Weight Arrestance, %					
ASHRAE Dust Holding Capacity					

This portion of form has information needed for all filter types

ADDITIONAL DESCRIPTION OF DEVICE AND TEST

Filter Generic Type _____ Type of Media _____

Effective Media Area _____( ) Type of Adhesive _____ Amount _____( )

Dust Feed Rate _____( ) _____

_____

_____

Test Section Duct Size _____

_____

Date _____ Test Supervisor _____

This part of form has information needed for filter of type tested, plus space for added test notes

If you have any questions or need additional information please contact us at info@tridim.com or 1-800-458-9835.