Air Filter Test Methods Comparing ASHRAE Method 52.2 and European Method EN 779

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National Air Filtration Association

25th Anniversary

Kentucky UNBRIDLED SPIRIT™

First, Some Philosophy…..

Everything should be as simple as it needs to be;
– but not simpler.

Albert Einstein

Black Holes;
– where God divided by zero.

Steven Wright

Focus

Abstract:

The contemporary use of ASHRAE test method 52.2 has grown and steadily become established in the US market over the last five years. EN 779 has been proposed as an international ISO method with a fundamentally different philosophy.

Focus

Abstract:

The comparative details of the two methods are outlined in this presentation. The proposed and projected timing for implementation is discussed. The intent is to give the attendee sufficient fact and understanding to deal with the potential confusion that may result from a globally applied method in the North American market.

Take Home Points

- The ASHRAE method 52.2
  - Is domestic in application
  - Currently does not distinguish charged products
  - Uses a solid aerosol challenge
- European method EN 779:2002
  - Global application is being sought
  - Does provide charged fiber characterization
  - Uses a liquid aerosol challenge
- Significant other differences

Details Summary

- Interrelationship with other standards
- Ranking / Reporting / Rating Systems
- Efficiency Challenge Aerosol
- Particle Counting Specifics
- Arrestance Challenge Dust
- Use in product certifications
- Airflow application
- Arrestance / DHC /ΔP relationship
- Final ΔP specifics
- Addressing charged fiber
- Addressing media fiber attrition
- Performance qualifications

The Standards

ANSI/ASHRAE Standard 52.2-1999

ASHRAE STANDARD

Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

Approved by the ASHRAE Standards Committee June 19, 1999; by the ASHRAE Board of Directors June 24, 1999; and by the American National Standards Institute December 3, 1999.

ASHRAE Standards are updated on a five-year cycle; the date following the standard number is the year of ASHRAE Board of Directors approval. The latest copies may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: *orders@ashrae.org*. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide) or toll free 1-800-527-4723 (for orders in U.S. and Canada).

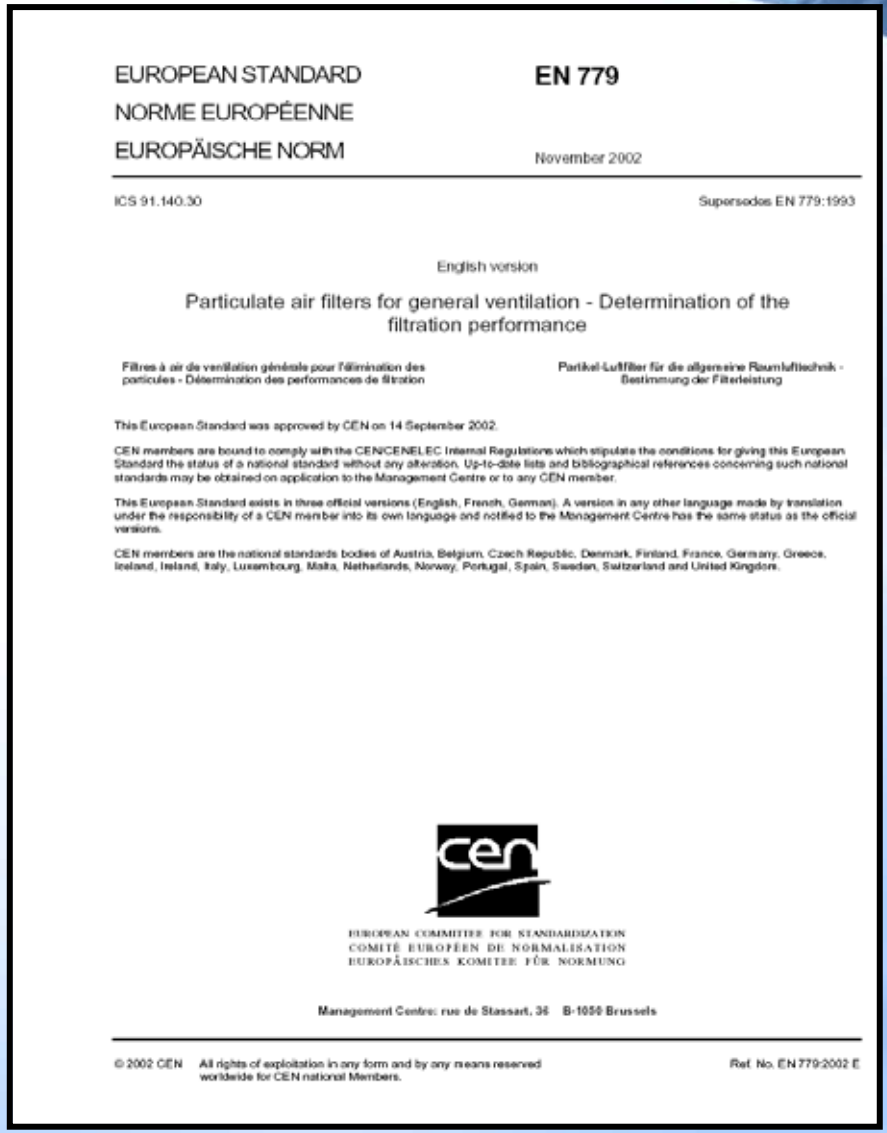
ISSN 1041-2336

When addenda or interpretations to this standard have been approved, they can be downloaded free of charge from the ASHRAE Home Page at *www.ashrae.org/STANDARDS/addenda.htm* or *www.ashrae.org/STANDARDS/intpsted.htm*.

ANSI

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

1791 Tullie Circle, NE • Atlanta, GA 30329



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 779

November 2002

ICS 91.140.30

Supersedes EN 779:1993

English version

Particulate air filters for general ventilation - Determination of the filtration performance

Filtres à air de ventilation générale pour l'élimination des particules - Détermination des performances de filtration

Partikel-Luftfilter für die allgemeine Raumlufttechnik - Bestimmung der Filterleistung

This European Standard was approved by CEN on 14 September 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

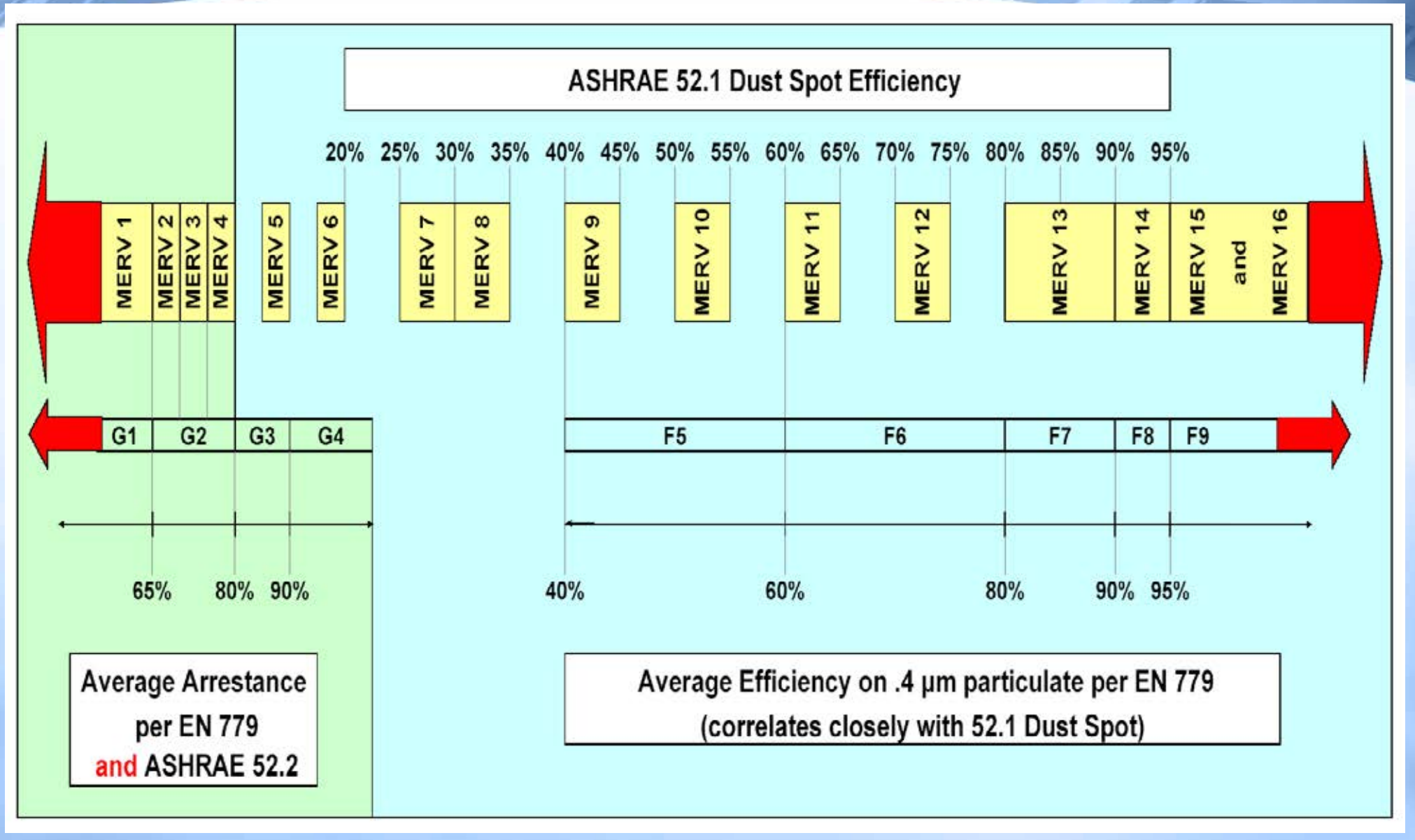
cen

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 779:2002 E

Comparison Chart



Detailed Comparison –Point 1 of 12

INTERRELATIONSHIPS WITH OTHER STANDARDS

52.2-1999

- Co-exists with 52.1- 1992, an optical and gravimetric standard
- References the older standard methods for "coarse" grade filters

EN 779:2002

- Replaced prior versions of the standard
- Ranking system ties to EN 1822 HEPA

Detailed Comparison –Point 2 of 12

RANKING / REPORTING / RATING SYSTEMS

52.2-1999

- 16 reporting values called "MERV"
- Values derived from table 12-1 in the standard
- Table compares minimum efficiency of three groupings of twelve "bands" of raw data (E1, E2, E3)

EN 779:2002

- Nine filter classes, G1 through G4 and F5 through F9
- Values derived from Table 1 in the standard
- Table compares efficiency at .4 µm at the end of the test

Detailed Comparison –Point 3 of 12

EFFICIENCY CHALLENGE AEROSOL

52.2-1999

- Potassium Chloride (solid KCL) in aqueous solution
- Particle diameter range from .3 to 10 µm
- Charge neutralized

EN 779:2002

- Diethylhexylsebacate (Liquid DEHS) or equivalent
- Particle diameter range from .2 to 3 µm
- Charge neutralized

Detailed Comparison –Point 4 of 12

PARTICLE COUNTING SPECIFICS

52.2-1999

- Counting done alternately with dust loading intervals
- 12 bands measured at each interval
- First four bands averaged for E1 (.3 to 1 μm)
- Second four bands averaged for E2 (1 to 3 μm)
- Last four bands averaged for E3 (3 to 10 μm)
- Minimum numbers used to judge MERV

EN 779:2002

- Counting done alternately with dust loading intervals
- Minimum 5 bands measured at each interval
- Weighted average efficiency at the .4 μm band used to judge classification

Detailed Comparison –Point 5 of 12

ARRESTANCE CHALLENGE DUST

52.2-1999

- ASHRAE dust
- (Arizona road dust, carbon black and cotton linters)

THE SAME !!

EN 779:2002

- ASHRAE dust
- (Arizona road dust, carbon black and cotton linters)

Detailed Comparison –Point 6 of 12

USE IN PRODUCT CERTIFICATIONS

52.2-1999

- Yes; in NAFA program under ETV auspices
- Others potentially

EN 779:2002

- Yes; in Swedish "P" certification program
- Others potentially

Detailed Comparison –Point 7 of 12

AIR FLOW APPLICATION

52.2-1999

- Forced draft
- (positive pressure) only

EN 779:2002

- Forced draft or induced draft
- (positive or negative pressure)

Detailed Comparison –Point 8 of 12

ARRESTANCE / DHC / DP RELATIONSHIP

52.2-1999

- Initial preload of 30 grams (or pressure increase of 10+ Pa)
- Load to 25%, 50%, 75% and 100% of final ΔP
- Arrestance reported on MERV 1 - 4
- No specific provision for reporting DHC

EN 779:2002

- Initial preload of 30 grams
- Minimum of four evenly distributed measuring points
- Arrestance and DHC reported on all tests.

Detailed Comparison –Point 9 of 12

FINAL PRESSURE DROP SPECIFICS

52.2-1999

- At least twice the initial ΔP or as below, whichever is greater
- Minimum final resistance
  - 75 pa for MERV 1 – 4
  - 150 pa for MERV 4 – 8
  - 250 pa for MERV 9 – 12
  - 350 pa for MERV 13 – 16

EN 779:2002

- Maximum 250 Pa for "coarse" grade filters (G1 – G4)
- Maximum 450 Pa for "fine" grade filters (F5 – F9)

Detailed Comparison –Point 10 of 12

ADDRESSING CHARGED FIBER

52.2-1999

- No effective provision to neutralize fiber charge
- Current public review of proposed "conditioning" step

EN 779:2002

- Neutralized performance is reported
- Methodology in Annex "A" allows for flat sheet or whole filter discharge.
- Annex "A" also allows several discharge medium

Detailed Comparison –Point 11 of 12

ADDRESSING FIBER ATTRITION

52.2-1999

- No provision for determining "fiber shedding"

EN 779:2002

- Informative annex "B" addresses three types of shedding from filters
  - From particle "bounce" (large particle kinetics)
  - From media components (fiber or binder systems)
  - From particle unloading (due to heavy load or physical changes)
- No provision for testing, only recommendations for future standards research

Detailed Comparison –Point 12 of 12

PERFORMANCE QUALIFICATIONS

52.2-1999

- Data quality methods clearly identified
- Round Robin participation required activity

EN 779:2002

- Section 8 "Qualification of test rig and apparatus"
- Annual self certification assumed

Status of Publication:

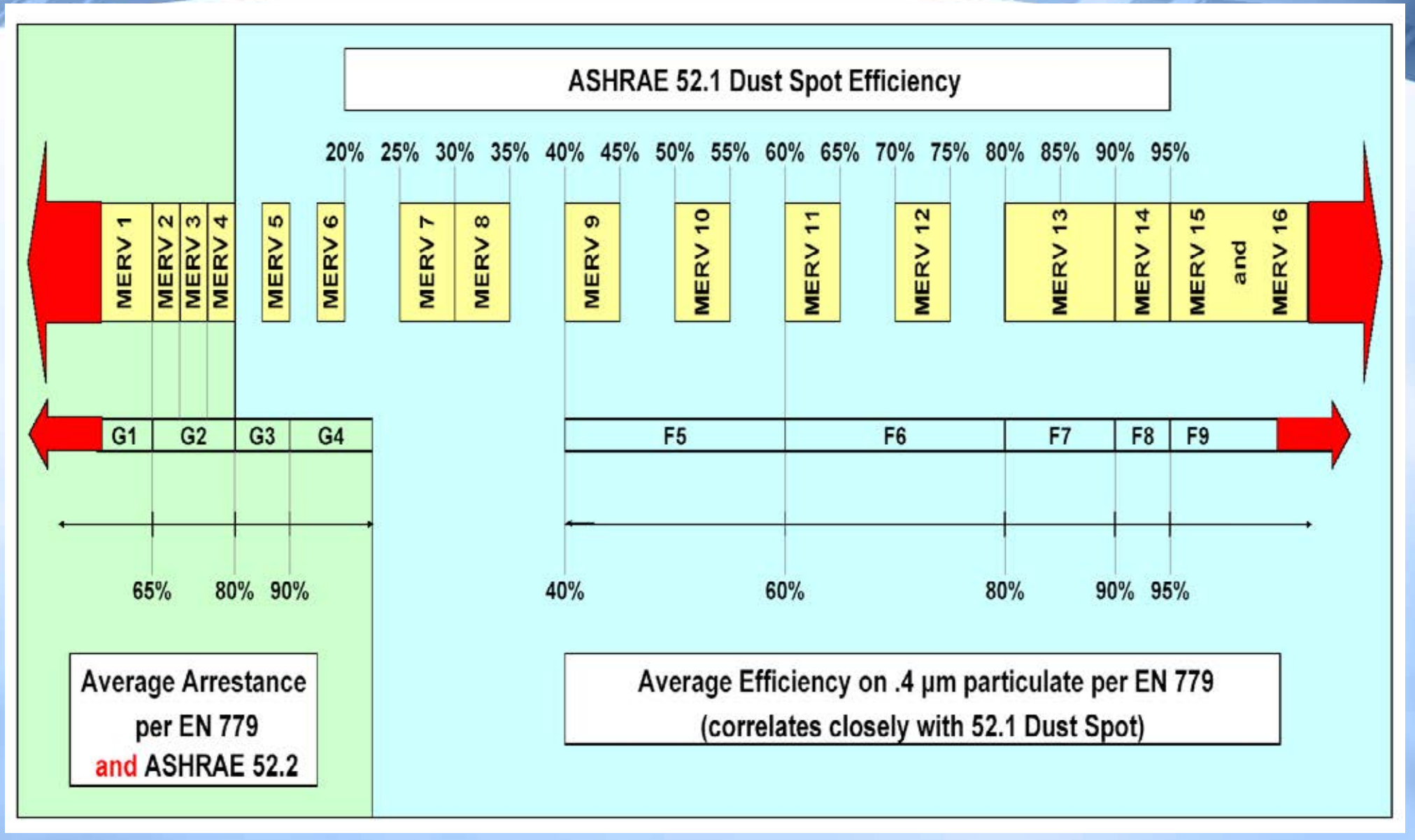
52.2-1999

- 2006 planned republication
- Conditioning step currently in public review
- Independently funded round robin in progress

EN 779:2002

- ISO application currently in progress
- Working group met 10 March 2005
- U.S. advisory group forming
- Estimated time frame of ????

Comparison Chart



In Closing - Take Home Points Revisited

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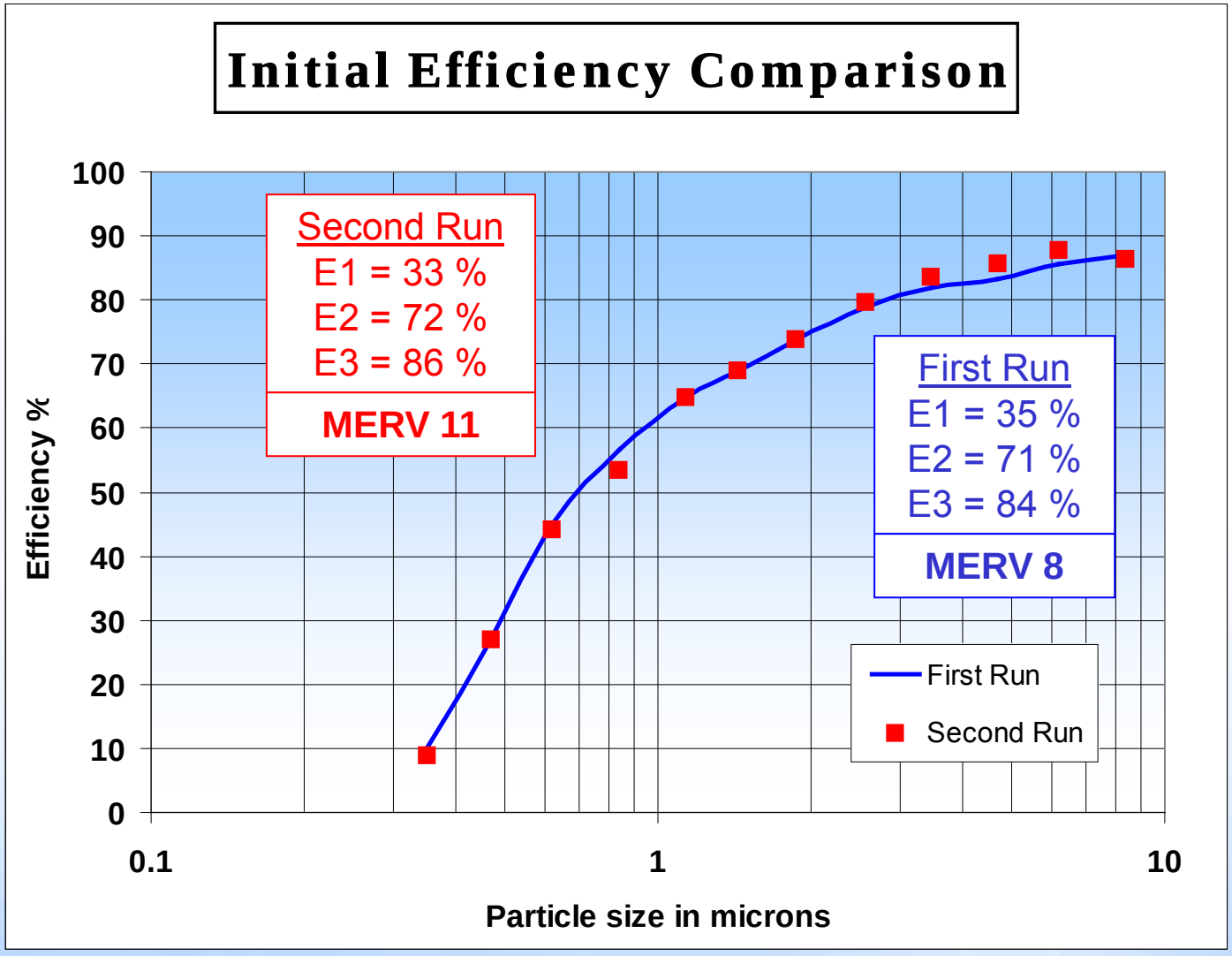
- KNOW THE DIFFERENCE

An Example……


Initial Efficiency Comparison
Second Run
E1 = 33 %
E2 = 72 %
E3 = 86 %
MERV 11
First Run
E1 = 35 %
E2 = 71 %
E3 = 84 %
MERV 8
First Run
Second Run
Efficiency %
100
90
80
70
60
50
40
30
20
10
0
0.1
1
10
Particle size in microns

Some Closing Philosophy…..

Jane Hathaway: *Chief, haven't you ever heard of the saying "It's not whether you win or lose, it's how you play the game"?*

Mr. Drysdale: *Yes, I've heard it. And I consider it one of the most ridiculous statements ever made.*

The Beverly Hillbillies

Questions and Comments……

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