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National Emission Standards for Hazardous Air Pollutants
(NESHAP) for the Aerospace Manufacturing and Rework Industry -
Background Information for Promulgated Standards

ADDENDUM

July 1998

N E S H A P

National Emission Standards For Hazardous Air Pollutants (NESHAP) for the Aerospace Manufacturing and Rework Industry - Background Information for Promulgated Standards

ADDENDUM

Emission Standards Division

U S ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

July 1998

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National Emission Standards for Hazardous Air Pollutants from
the Aerospace Manufacturing and Rework Industry --
Background Information for Promulgated Standards

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7/14/98
(Date)

1. The final National Emission Standards for Hazardous Air Pollutants (NESHAP) will regulate emissions of hazardous air pollutants from cleaning operations; primer, topcoat, and chemical milling maskant application operations; depainting operations; and handling and storage of waste at aerospace manufacturing and rework facilities. Only those operations that are part of major sources under section 112(d) of the Clean Air Act as amended in 1990 will be regulated.

2. Copies of this document have been sent to the following Federal Departments: Labor, Health and Human Services, Defense, Transportation, Agriculture, Commerce, Interior, and Energy; the National Science Foundation; and the Council on Environmental Quality; members of the State and Territorial Air Pollution Program Administrators; the Association of Local Air Pollution Control Officials; EPA Regional Administrators; and other interested parties.

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1.0 SUMMARY

On September 1, 1995, the U. S Environmental Protection Agency (EPA) promulgated national emission standards for hazardous air pollutant (HAP) emissions from major sources in the aerospace industry (60 FR 45948). These final standards implemented Section 112(d) of the Clean Air Act as amended in 1990 (the Act) Amendments to the final rule were promulgated on March 27, 1998 (63 FR 15006). Also on March 27, 1998, the EPA proposed additional amendments to the final rule (63 FR 15034) Nineteen comment letters (see Table 1-1) were submitted by representatives from fifteen companies or organizations, consisting of general aviation rework and manufacturing facilities, paint arrestor and filtration product manufacturers, filter testing laboratories, major aerospace (equipment) manufacturers, and industry trade associations Table 1-1 lists the commenters and their respective affiliations Summaries of the comments and the EPA's responses are presented in this document, which serves as the basis for the revisions (amendments) made to the final NESHAP This document is an addendum to Volume II of "National Emission Standard for Hazardous Air Pollutants (NESHAP) for the Aerospace Industry - Background Information for Promulgated Standards," July 1995, EPA Document No EPA/R-97-003b (Docket A-92-20, item III-B-1)

The proposed amendments requested comments regarding the addition of definitions for "General Aviation (GA)," and "general aviation rework facility"; a revised definition for "waterwash system", alternative emission limits for topcoat and primer applications for GA rework facilities; clarification of the relationship between NESHAP and Federal Aviation Administration (FAA) regulations, removal of references to Section 112(l) of the Act for hand-wipe cleaning and the equipment volume reduction demonstration, an exemption for cleaning of automated spray equipment nozzle tips; clarification of the monitoring requirements for pumpless waterwash systems, and the exclusion of charged media certification using Test Method 319.

TABLE 1-1 LIST OF COMMENTERS ON THE PROPOSED AMENDMENTS TO THE AEROSPACE NESHAP (63 FR 15034)

Item No. in Docket A-92-20	Commenter, affiliation, and date
VI-D-01	Keith P. Gutreuter, Air Technologies, Inc., Ottawa, KS. April 28, 1998.
VI-D-02	George H Southland, Hazardous Material/Safety Specialist, Kal-Aero, Duncan Aviation, Battle Creek, MI May 13, 1998
VI-D-03	James E Clifford, Vice President and Senior Executive Assistant, Kal-Aero, Duncan Aviation, Battle Creek, MI. May 13, 1998
VI-D-04	John M Ellis, III, President, Kal-Aero, Duncan Aviation, Battle Creek, MI May 13, 1998
VI-D-05	Michael K Haufe, P.E , Columbus Industries, Inc., Asheville, OH May 11, 1998
VI-D-06	Tom Justice, Vice President of Operations, Purolator Products Air Filtration Company, Henderson, NC May 21, 1998
VI-D-07	Glynn Rountree, Director, Environment, Safety, and Health, Aerospace Industries Association, Washington, D C May 26, 1998
VI-D-08	Cheryl Russell, Federal Affairs Director, Boeing Company, Arlington, VA May 26, 1998
VI-D-09	Charlie Johnson, President and COO, Cessna Aircraft Company, Wichita, KS May 19, 1998
VI-D-10	Stephen P Risotto, Executive Director, Halogenated Solvents Industry Alliance (HSIA), (via e-mail) May 26, 1998
VI-D-11	Andrew V Cebula, Vice President, National Air Transportation Association (NATA), Alexandria, VA (via e-mail) May 25, 1998
VI-G-01	Walter L Desrosier, Manager, Maintenance and Engineering, General Aviation Manufacturers Association, Washington, D C May 26, 1998
VI-G-02	Mark A Thompson, Environmental Specialist, Bombardier Aerospace Learjet Inc , Wichita, KS May 22, 1998
VI-G-03	Al Vatine, Technical Representative, LMS Technologies, Inc , Edina, MN May 22, 1998
VI-G-04	Gary G Maxwell, Division Administrative Coordinator, Atlantic Aviation Corporation, Wilmington, DE May 27, 1998
VI-G-05	Mark J Matthes, Vice President - Operations, Duncan Aviation, Lincoln, NE May 22, 1998
VI-G-06	Gary Hartwig, General Manager, K-C Aviation, Appleton, WI. May 26, 1998
VI-G-07	Duplicate entry of VI-D-10 (hardcopy of previously submitted e-mail comments)
VI-G-08	Jim Burress, Paint Shop Crew Chief, Garrett Aviation, Springfield, IL May 26, 1998

Comments were received on all of these issues except on the definition of "general aviation rework facility", the removal of references to Section 112(l) of the Act for hand-wipe cleaning, and the equipment volume reduction demonstration

2.0 COMMENTS

2 1 DEFINITION OF GENERAL AVIATION

Comment Eight commenters (VI-D-02, VI-D-03, VI-D-04, VI-D-11, VI-G-04, VI-G-05, VI-G-06, and VI-G-08) suggested that the definition of general aviation be changed to read as follows "General Aviation (GA) means that segment of civil aviation that encompasses all facets of aviation except air carriers, commuters, and military General Aviation includes charter and corporate-executive transportation, instruction, rental, aerial application, aerial observation, business, pleasure and other special uses " (Reference EPA Air Transportation Industry Sector Notebook, EPA/310-R-97-001) Two commenters (IV-G-01 and VI-G-02) agreed with the definition of general aviation provided in the proposed amendments. Commenter IV-G-02 also agreed with EPA's statement that "the Agency believes that the proposed definition for GA will accurately describe the segment of the aerospace industry servicing those smaller aircraft for which the alternative primer and topcoat standards are intended "

Response The Agency has decided to change the definition of General Aviation as suggested by the group of eight commenters The revised definition still accurately describes the segment of the aerospace industry involving smaller aircraft for which the alternative primer and topcoat standards are intended (See following Section 2 2 for specific comments and responses related to the alternative standards for primer and topcoat application operations used at GA rework facilities.) The revised definition also has the advantage (as noted by the commenters) of being consistent with another recent EPA document addressing and describing this same segment of the aerospace industry

2.2 STANDARDS FOR PRIMERS AND TOPCOATS

Comment Seven commenters (VI-D-02, VI-D-03, VI-D-04, VI-G-04, VI-G-05, VI-G-06, and VI-G-08) agreed with the proposed alternative volatile organic compound (VOC) limits for primer and topcoat applications on GA aircraft because they lift the restraints of the

coating limitations The commenters noted that GA aviation aircraft rework is based on the customer, the owner/operator specifies the acceptable quality, not the rework facility They stated that the higher VOC limits are acceptable and encourage paint manufacturers to provide quality primers and topcoats that give a quality finish acceptable to the owners/operators of the aircraft

Commenter VI-G-04 noted that the higher VOC limits will have a minimal effect on the total emissions from a facility, but will have a dramatic effect on the final aircraft topcoat finish. The commenter noted that coating manufacturers have developed and are commercializing excellent high solids products; however all technologies have their limits The commenter's field experience indicates that this small VOC change will hasten the acceptance of superior coatings, increased application latitude and efficiency and ultimately customer satisfaction and regulatory compliance Although the commenter is not directly covered by the NESHAP, VOC/HAP standards established in the NESHAP and control techniques guideline (CTG) and adopted by their state limit the commenter's operations now The commenter currently complies with VOC limits at 2 8 and 3 5 for primers and coatings, respectively The facility has been using compliant primers (corrosion and sanding) applied with high-volume low-pressure (HVLP) equipment for nearly a year with excellent results after a 2 to 3 month learning/training period However, the commenter stated that compliant topcoat application has been more difficult, and a small increase in the VOC limit will open the solvent combinations available and help to consistently produce a beautiful finish for which the coatings are designed

Response The Agency appreciates the commenters' support on this issue and has decided to finalize the alternative primer and topcoat limits as proposed.

Comment: Four commenters (VI-D-07, VI-D-08, VI-G-01, and VI-G-02) agreed with the increased VOC limits for primer and topcoat applications for general aviation (GA) rework facilities, but the commenters suggested that these limits be extended to GA manufacturers as well Commenter VI-D-07 argued that manufacturers have the same need for high quality finish and may be put at a competitive disadvantage without the benefit of the higher limits Manufacturers, if forced to abide with lower VOC and HAP limits for their paints, would lack the increased painting operations flexibility that rework facilities would have and would not be able to offer the best appearance available from their painting operations. Commenter VI-D-08 argued

that differentiation between rework facilities and manufacturing facilities would establish an obviously unfair business climate, with the advantage given to rework facilities in the case where a manufacturer returns customer aircraft to the manufacturing factory for rework.

Commenter VI-D-07 noted that the number of GA manufacturing facilities that are major sources for HAPs are less than the number of rework facilities that are major sources; extending the higher limits to GA manufacturers should not greatly increase emissions and would eliminate the competitive business advantage afforded to GA rework facilities under the proposed amendment

Commenter VI-D-09 stated that the task of developing compliant coatings and strippers has challenged manufacturers of GA aircraft who must find materials compliant with the NESHAP, while enhancing the appearance of the aircraft and not jeopardizing the airworthiness of the aircraft The commenter expressed concern that if rework facilities are allowed an alternate standard as proposed, airworthiness certificates would be meaningless following rework of GA aircraft

Commenter VI-D-02 stated that it would be a burden to expect their company to differentiate between production and rework painting operations and to use different types of coating for each operation The commenter stated that including manufacturing facilities would more accurately reflect the Agency's stated intent to allow GA facilities to continue to provide the type of world-class paint systems that their customers expect

Commenter VI-G-01 argued that the necessity to provide customer-specified coatings is applicable for all stages of aircraft exterior finishing, both the first completing/outfitting paint job as well as subsequent service depaint and repaint jobs It is not unusual for an aircraft to be painted five to seven times during its lifetime, and the implication of the present definition is that the first paint job on new U. S. manufactured GA aircraft cannot provide the appearance and finish customers require The commenter stated that customers of GA aircraft manufacturers deserve and pay for the same, if not better, quality than work performed at a rework facility; and, differentiation between rework and manufacturing facilities would establish an unfair business climate, with the advantage given to foreign aircraft manufacturers and rework facilities The commenter noted that there are fewer than 10 GA manufacturers that would be considered major sources

Response: In considering these comments from GA manufacturers, the Agency noted that such comments were not provided during the regulatory development process, nor were they raised during any of the industry roundtable discussions During the last industry roundtable discussions and prior to the proposed amendments, GA rework industry representatives stated that rework facilities have to deal with a wide variety of coatings and aircraft (from all of the different GA manufacturers), and client requirements on a time-critical basis. In comparing GA manufacturing and GA rework painting operations, the Agency found that manufacturing facilities typically deal with fewer types of coatings and fewer types of aircraft Each manufacturer produces a limited subset of the planes on the market The GA manufacturers generally perform rework only on planes that they manufacture; GA rework facilities, in contrast, may work on planes from a variety of manufacturers Thus, unlike GA rework facilities, GA manufacturing facilities have fairly predictable coating needs This allows manufacturers to be more proficient in coating application and minimizes the variability of coating-related issues in their day-to-day operations Because of these factors, GA manufacturers are better able than GA rework facilities to comply with the coating limits in the NESHAP as originally promulgated The data collected from the GA manufacturers during the past 2 years of the project indicated that several, if not most, of the GA manufacturers are already using compliant coatings as part of their standard manufacturing processes No additional technical data has been submitted to support the commenters' argument for extending the alternative coating standards to GA manufacturers Based on these comments and the information provided by the various industry segments involving GA aircraft, the Agency has decided to finalize the primer and topcoat requirements as proposed

2.3 DEPAINTING STANDARDS

Comment: Commenter VI-D-11 stated that the rework of GA aircraft is uniquely customer driven The commenter noted that in the industry segment most affected by the NESHAP, the owner/operator of the aircraft develops and maintains their own FAA-approved maintenance instructions. In general aviation, the facility must follow the aircraft manufacturer's instructions. The owner/operator of GA aircraft specifies the coating and acceptable quality of the finish, not the owner/operator of the rework facility. The manufacturer of the aircraft specifies what materials may be used to remove the coatings The commenter stated that the

proposed amendments must address the manufacturer's prohibition against using NESHAP compliant chemicals in the rework of GA aircraft.

Response The Agency does not believe that this issue is unique to the GA segment of the aerospace industry. See Section 2.4 for additional discussion of the alternative solutions to any aircraft manufacturer's prohibition against using NESHAP compliant materials for depainting operations.

Comment: Commenter VI-D-10 expressed concern that EPA has not proposed to establish a separate MACT floor for depainting operations at GA maintenance facilities. The commenter supported the Agency's proposal to establish separate VOC content limits for primer and topcoat applications at GA rework facilities. However, in the absence of separate HAP limits for depainting of these same GA aircraft, the commenter stated that EPA will be creating a "Catch 22" situation for rework facilities The commenter argues that the higher MACT floor for primers and topcoats for GA maintenance is based on the application of thicker coatings on many GA aircraft, yet, it is these thicker coatings that have severely limited the success of non-HAP strippers in the GA market The commenter stated that the halogenated solvents industry has submitted a significant amount of information to the Agency indicating that the alternative strippers are not effective on coatings that are greater than 3 or 4 mils thick. In fact, the use of non-HAP chemical strippers may make these coatings even more difficult to remove The commenter argued that incomplete removal may create significant safety issues by preventing thorough inspection of the aircraft surface

Because the coating that EPA is proposing to allow on GA will have to be removed, the commenter suggested that EPA establish a separate MACT floor for depainting operations at GA rework facilities Without a separate, more appropriate limit, those facilities subject to MACT requirements for depainting may be put at a significant disadvantage when competing with the majority of the industry that will not be required to comply with the NESHAP. Since these smaller aircraft require considerably less stripper than commercial jets, the commenter suggested that establishing a MACT floor for depainting of GA aircraft may be as simple as removing the limitation on the use of HAP-based stripper formulations for spot stripping and decal removal only

Response: The Agency does not agree with the commenter's argument. The final rule as promulgated and subsequently amended includes a great deal of flexibility in the depainting requirements. The alternative primer and topcoat limits for GA rework facilities allow different coating formulations to be used in achieving the type of finish required by their customers on a variety of aircraft from different manufacturers Manufacturers and rework operators are not limited by the NESHAP in any way with regards to coating thickness.

The commenter's assertion that the alternative strippers are not effective on coatings that are greater than 3 or 4 mils thick has also been argued against by several technical studies documented during the development of the NESHAP where non-HAP and low-HAP chemical strippers have been used effectively on GA and/or military aircraft with coating thicknesses in excess of 10 mils The Agency has no technical justification for establishing a separate MACT floor for depainting operations at GA rework facilities The compliance options for the spot stripping and decal removal allowance are based on an average "per aircraft" annual HAP (stripper) usage and provide additional flexibility to all depainting operations As defined in the final rule, "spot stripping" means the depainting of an area where it is not technically feasible to use a nonchemical depainting technique

2 4 CLARIFICATION OF RELATIONSHIP BETWEEN NESHAP AND FAA REGULATIONS

Comment Seven commenters (VI-D-02, VI-D-03, VI-D-04, VI-D-11, VI-G-05, VI-G-06, and VI-G-08) suggested that chemicals that contain HAP required by the FAA Airworthiness Directives (AD's) should be exempt The commenters stated that if, because of aviation safety, the FAA cannot eliminate the use of a HAP in an AD, the use should be considered exempt. Commenter VI-D-11 believes that the protection of the flying public must take precedence over the minimal use of chemicals containing HAP's when used to correct a known aviation hazard. Commenter VI-G-04 stated that airworthiness concerns should continue to be foremost in all change evaluations This commenter encouraged continued cooperation between the FAA and the EPA to resolve conflicting directives and regulations. One commenter (VI-G-01) strongly suggested that the process to be identified by the FAA for the substantiation of alternative means of compliance by repair stations and mechanics be addressed to specific products. The commenter stated that the long-term impact of alternative chemical usage on

various aircraft structures is not consistent across various products and manufacturers. A clear statement is needed stating that an alternative to a HAP-restricted chemical identified by one organization or manufacturer is not acceptable for use on another aircraft or product without specific approval. The commenter noted that this process is identical to that available to certificate holders and is necessary to preserve safety and establish a commercial level playing field

Response: The EPA has continued to work closely with the FAA during the development of the final NESHAP and the amendments to the NESHAP for the aerospace manufacturing and rework source category. Both agencies recognize the importance of continuing airworthiness and the safety of the flying public as repair facilities modify their procedures to comply with the NESHAP The EPA is committed to minimizing the impact on airworthiness while maximizing the reduction of HAP emissions under the NESHAP

Since promulgation of the NESHAP on September 1, 1995, many of the aircraft manufacturers (principally those manufacturing transport category aircraft) have made the necessary revisions to their maintenance manuals to provide for non-HAP materials (chemical strippers) to be used for depainting Those revisions have been FAA approved or will be submitted for FAA approval, when required For the other manufacturers (principally General Aviation manufacturers), once the necessary information (revised/updated maintenance manuals, service bulletins, and/or advisory circulars) is approved by the FAA and is distributed to the regulated community, the potential regulatory conflict should be at a minimum, and aerospace rework facilities will be able to use various products to comply with most EPA and FAA requirements The EPA and FAA have agreed that the potential problems and issues raised by the commenters can be and, in many cases already have been, resolved through the procedures established in the existing regulations, and no further changes are needed to the NESHAP (except for the exemption for those GA aircraft where the manufacturer is out of business which is being addressed in these amendments -- see following comment/response)

Should any manufacturers still in business not revise their maintenance instructions to allow use of NESHAP-compliant materials, the FAA has committed to issue an advisory circular publicizing the process by which repair facilities can request approval for alternatives. In addition, many existing Airworthiness Directives (AD's), issued under part 39 of Title 14 of the CFR,

specify the use of HAP (AD's are regulations addressing safety of flight, and compliance with them is mandatory.) However, most AD's contain a provision for requesting an alternative means of compliance. The FAA Notice N8100.13, "Alternative Means of Compliance (AMOC) for Airworthiness Directives that Require the Use of Volatile Organic Compounds and/or Hazardous Air Pollutants," (dated January 26, 1998), addresses the process by which repair stations, mechanics and operators can obtain alternative means of compliance for other AD's for the purpose of approving substitution of non-HAP materials.

Comment: Commenter VI-D-10 agreed with EPA's proposal to exempt rework of aircraft whose manufacturers are out of business and to provide a process for addressing existing AD's The commenter noted that the AD's specify the use of methylene chloride-based strippers for one reason--their proven effectiveness at removing built-up coatings and for allowing visual inspection of aircraft skins for cracks or fissures The commenter stated that until alternatives have been tested and proven to be at least equally effective, the EPA and the FAA should be extremely cautious in approving any alternative means for compliance with existing AD's requiring the use of methylene chloride-based strippers The commenter expressed concern over the potential conflict if EPA prohibits methylene chloride-based strippers when the maintenance manuals for those aircraft specify that only methylene chloride-based strippers may be used, this conflict could jeopardize aircraft airworthiness.

Response The EPA has coordinated efforts with the FAA to identify other alternatives that can be used and define those types of aircraft where the existing procedures (e g . changes/revisions to maintenance manuals or AD's) would be difficult and/or burdensome to implement. The resulting exemption for those aircraft where the manufacturer is no longer in business addresses the only concern identified not adequately addressed by existing regulations Since promulgation of the NESHAP, many of the aircraft manufacturers have made the necessary revisions to their maintenance manuals to provide for non-HAP chemical strippers to be used for depainting Those revisions have been FAA approved or will be submitted for FAA approval, when required. Because of the small numbers of aircraft affected and the considerable expense of testing alternative materials for use on aircraft whose manufacturers are out of business, the Agency decided to finalize the exemption for rework of aircraft whose manufacturers are out of business--see § 63 741(f) of the amended final rule.

2 5 EXEMPTION FOR CLEANING OF AUTOMATED SPRAY EQUIPMENT NOZZLE TIPS

Comment Commenter VI-D-08 agreed with the proposed exemption for cleaning of automated spray equipment nozzle tips. The commenter stated that under the present NESHAP language, owners or operators are forced to disassemble the equipment for cleaning, which is economically unreasonable

Response The Agency appreciates the commenter's support on this issue

2 6 MONITORING PARAMETERS FOR PUMPLESS WATERWASH SYSTEMS

Comment Commenter VI-D-08 stated that it would be impossible for pumpless waterwash systems to comply with the monitoring requirements of the NESHAP as currently written. The commenter fully supported EPA's effort to address the unique challenges presented by pumpless waterwash systems and encouraged EPA to adopt the proposed language changes as soon as possible

Response The Agency appreciates the commenter's support on this issue and decided to finalize the additional and revised recordkeeping and monitoring requirements as proposed.

2 7 EXCLUSION OF CHARGED MEDIA CERTIFICATION USING TEST METHOD 319

Comment In regard to the proposed exclusion of charged media certification under Test Method 319, two commenters (VI-D-01 and VI-D-05) concurred with the proposed exclusion, two commenters (VI-D-06 and VI-D-08) opposed the exclusion, and one commenter (VI-G-03) suggested the Agency re-visit the issue and consider adding a new mechanism within Method 319 to evaluate paint arrestor performance after loading (and over a given time period) Due to the technical arguments associated with the comments involving Method 319, most of the summary comments from the individual commenters are included in the following paragraphs As a manufacturer of paint arrestors, as well as air filters and other filtration products, commenter VI-D-05 does not believe that charged-fiber media are appropriate for use in aerospace MACT filtration products for the following reasons. Typically, charged-fiber media display a higher initial (i e., clean filter) efficiency than similar media not composed of charged fiber However, the efficiency of charged-fiber media often decreases upon filter loading as the charged fibers themselves become coated with paint, defeating their electrostatic feature. With some paints (i.e., those that hit the filter "wet"), this charge-dampening effect may be even more pronounced

Conversely, noncharged-fiber media are generally at lowest efficiency when clean (i e., this medium becomes more efficient as it is loaded with paint) Method 319 evaluates the initial particle size dependent filtration efficiency of paint arrestors over the particle diameter range from 0.3 to 10 micron. Therefore, noncharged-fiber media evaluated by Method 319 and found to meet the fractional efficiency requirements (when clean) will probably also meet these standards in the field during paint loading However, charged-fiber media that is evaluated by Method 319 and found to meet the fractional efficiency requirements (when clean), may or may not meet these standards in the field during paint loading.

Commenter IV-D-01 also supported the proposed amendment to exclude charged media from certification based on factual test data which show that charged media has a high initial atmospheric dust spot efficiency but decreases in efficiency as the filter is loaded with contaminant The commenter enclosed copies of test reports on two pleated type air filters, one using Electrete charged media and the other using a cotton/polyester blend of media. The test on the charged media was discontinued due to rapid efficiency decline after loading 30 grams of test dust into the filter The cotton/polyester filter showed an increase in efficiency as the filter was loaded with dust, which is typical for noncharged media

Commenter VI-D-08 disagreed with the proposal to eliminate the use of Test Method 319 to approve charged media filters The commenter argued that a decision by EPA to withdraw Test Method 319, without a valid replacement or test results that prove the method is invalid, is inappropriate and unfounded The commenter's company has invested roughly half a million dollars installing over 100 Purolator charged media filters in keeping with the 1996 proposal to use Test Method 319 to approve filters Replacement of these filters would be a costly and time-consuming process Many of the filters are in specially designed booths used to paint central fuel tanks, wings, radomes, or other odd-shaped pieces. The filter systems have already been modified to accommodate the Purolator filters, and additional modifications would be needed to accommodate other types of filters

The commenter also noted that test data from the only existing methods that measure particle size, Test Method 319 and the proposed ASHRAE 52.2, show that the Purolator charged media filter(s) meet the efficiency curves. The commenter noted that although the ASHRAE 52 2 test is only a proposal and is designed for a different type of filter, it is the only test available that

is designed to demonstrate how filters perform for different particle sizes after multiple loadings The commenter stated that the Purolator filters not only passed the test but showed increased efficiency with additional loadings; furthermore, the pressure resistance differential in the test indicated that the filters would have to be changed out before loadings could occur beyond the parameters of the ASHRAE test.

Commenter VI-D-08 disagreed with the basis for EPA's decision--an indoor air ventilation type filter designed to capture air particulates, not paint. The commenter believed that these filters are not designed to capture paint and should not be used to determine whether filters designed for paints will perform in the same fashion

Commenter VI-D-06 also opposed the exclusion of charged media certification under Test Method 319 The commenter stated that charged media are currently in use in numerous applications worldwide both for HVAC and paint arrestance The increased use of these media in recent years is a result of improved "fine fiber" technology, as well as more economic methods of production

As a manufacturer of both charged-fiber and conventional media filters, commenter VI-D-06 stated that charged-fiber filters are preferred in applications where

1 High initial efficiencies and low pressure drops are required The commenter enclosed a test report for a conventional uncharged product that was performance tested in accordance with ASHRAE Standard 52 1 An 85 percent bag filter started out at a 62.1 percent efficiency, climbing to 85 percent at the end of the life cycle, which is a typical scenario for a fibrous filter relying on aerodynamic particle capture The problem of low initial efficiencies has been overcome to a degree by using charged fibers to enhance filtration early in the life cycle of the system until enough particulate loading has occurred that conventional aerodynamic capture or mechanical loading becomes the primary mechanism driving the efficiency. The commenter also enclosed efficiency curves showing that this charged-fiber filter overcame much of the early inefficiencies raising the initial efficiency to 83 7 percent However, after 1/4 to 1/3 of the useful life, the same aerodynamic mechanisms are dominating the performance of this media as seen in the uncharged filter, the efficiency curves at this point are very similar.

2 Coarser fibers are required to support heavy particulate loading as in the case of a paint over spray filter. The commenter enclosed copies of test results from four separate manufacturers

showing that the performance of uncharged filters exhibit either a drop in the dust spot efficiency (ASHRAE 52 1) and/or arrestance from the initial measurement of the clean filter. The commenter attributed these results to weak fibers, poor fiber bonding, or a combination of both. The result is a media web that is structurally unable to support the accumulated particulate, hence a drop in the efficiency or arrestance. In the case of some charged media, there may also be a sudden drop in efficiency early in the life cycle of the filter; however, the deterioration in the efficiency was more likely the result of the weak web structure, not the charge

3. Energy consumption or low initial pressure drops are critical factors in the design and/or operation of a system. By starting out at a lower initial pressure drop, the charged-fiber filter results in higher efficiencies within the operating parameters of certain critical systems.

The commenter's greatest concern is that one unsubstantiated comment has led to the proposal to exclude charged-fiber arrestors from Method 319 certification The commenter believed that the conclusions in this case may have been made prior to complete substantiating data to support such a statement The commenter noted the following problems associated with these preconceptions

1. There is currently no test protocol for comparing the "nontypical filtration efficiency curves" of charged media Nontypical performance would have to be defined as higher initial efficiencies at lower pressure drops, which is the primary goal of those who design filtration systems

2 The position favoring exclusion assumes that all charged medias perform similarly This commenter's experience is that several charged media have exhibited consistent premature failure or unloading while others have performed exceptionally well (The commenter enclosed test reports supporting this claim)

3. In almost all cases, the failures of charged-media filters could be pinpointed to weak fiber structure and/or poor fiber bonding This type of failure or drop in efficiency can be seen in charged medias, as well as conventional uncharged filters. (The commenter enclosed test reports supporting this claim.)

4. A major issue not yet resolved by the broad exclusion of charge media is: How much charge warrants exclusion? And, what is the proposed technique for measuring this charge? The charge in this case is a static charge, which is applied as either a permanent charge during fiber

formation or as a corona charge applied to the formed media web. The commenter noted that all synthetic medias exhibit some static charge

5. The commenter that objected to charged media pointed to "the rapid accumulation of paint over spray" as creating "nontypical filtration efficiency curves over short time periods." Theoretically, if a scenario were to be presented to support performance degradation in charged media it would be on an extended life filter of about 6 to 12 months in an application of extremely small particle concentrations. However, in the specific application of paint arrestance, there are high concentrations of larger particles (than typical ambient) and short life cycles The rapid loading of the filters accelerate the aerodynamic or mechanical mechanisms of particle entrainment as the fibers are being coated

6 The opposing comment refers to "nontypical filtration efficiency curves over short time periods " Method 319 however does not deal with "short time periods" or any other time periods It only measures the initial or "clean" efficiency of the filter and does not reflect what occurs during the life of the product ASHRAE 52 2P and SAE 1669 measure performance over the effective life of the filter

Commenter VI-D-06 stated that development of an extended Method 319, which would measure performance at different points over the life of the filter, is critical The commenter enclosed results from several tests that were initiated to ensure that the company's products were performing to actual conditions in these applications, including products tested for two-stage and three-stage compliance with Method 319 under worse-case scenarios Commenter VI-D-06 stated that any new technology is likely to represent "nontypical" performance if measured against conventional products rather than written performance requirements The commenter suggested that "nontypical" in the case of charged-fiber media for paint over spray applications could be defined as an improvement in performance, and exclusion of this or any other new technology would relegate this industry to a selection of media that have essentially remained unchanged for over twenty years

Commenter VI-G-03, an independent filter and particulate testing firm with experience in paint overspray filtration tests and full-scale Method 319 tests, stated that there are some new hybrid types of media and filters that possess both mechanical and electrostatic properties which generally have better filtration characteristics than other single- and multi-stage filters that are

promoted only as either "mechanical" filters or "electrostatic" filters. The commenter believes that the filtration and filter-life efficiencies of these hybrid "mechano-electrostatic" filters are substantial enough that the Agency may do well to re-visit the issue of whether or not to test and certify electrostatic filters under the protocol of Method 319.

The commenter stated that these new hybrid media are basically mechanical media with a small amount of electrostatic charging of the media fibers, not so strongly charged as in standard electrostatic media (filters). The commenter is aware of at least two competing, independent manufacturing firms that have developed this type of product, made typically as second-stage or third-stage filters With the new hybrid media, removal of paint and dust particles is accomplished mainly by mechanical (physical) action, but when tested with KCl, electrostatic charge plays a somewhat greater role that is most operative in the earliest phases of filter life The commenter offered the following explanation

Typical "mechanical" filters get better with time, filtration (fractional efficiency) starts out low, but as challenge particulates such as paint or dust build up on the fibers, the fractional efficiency increases because the size of air passages between fibers is decreased With conventional "electrostatic" filters, the opposite occurs, fractional efficiency starts out high, but as challenge particles coat the fibers, fractional efficiency actually decreases because the static charges are blinded and not enough particle coating has accumulated to restrict the air passage ways Now, however, with hybrid "mechano-electrostatic" media, fractional efficiency starts out high, increases over time, and has not been found to decrease What apparently occurs is that when new hybrid filters are first challenged with aerosols, the electrostatic charges readily attract and trap the particles, quickly reducing the inter-fiber airways. Then, as particles build up on the fibers and the charges are masked, the amount of coating already built up on the fibers is sufficient to permit the filter to act chiefly as a mechanical filter with high particle removal characteristics.

While the data obtained in both Method 319 and chromate paint loading tests are confidential, the commenter stated that both the multistage 319 fractional efficiency and the paint removal efficiency results using these new hybrid filters are better than that obtained for several of the more conventional "mechanical" two- and three-stage filter systems currently qualifying by Method 319. Accordingly, the commenter recommended that the Agency make an allowance for

these hybrid "mechano-electrostatic" filters (and, for that matter, any future filter system yet to be developed) to be tested by Method 319 procedures, and to be certified as such if they pass.

To satisfy the concerns of those who would want to be certain that any prospective hybrid filter system must never decrease in fractional efficiency over time, the commenter recommended that the complete test of a prospective filter system, such as one of these hybrid mechano-electrostatic filters, should not only include the full Method 319 analysis but also a standard dust-loading-efficiency test, or an additional fractional efficiency test using actual paint. Adding one of these additional tests would demonstrate whether the filter in question continues to increase in efficiency over time or not One approach would be that the additional test could be done once on a mechano-electrostatic filter (set) and once on an identical uncharged mechanical filter (which should be readily provided by the manufacturer), both of which had been tested by Method 319. If dust loading is used, then a loading-efficiency test similar to the ASHRAE 52 2 procedure used for HVAC filters would show whether efficiency decreases by loading to mimic the paint loading condition If the test for fractional efficiency with actual paint is used, this would provide comparative data of both mechano-electrostatic and mechanical conditions and authenticate whether these filters are good for use as paint overspray filters

The commenter noted that, if the proposed amendment were finalized, Method 319 would exclude electrostatic filters from testing However, when the method was first written, the working definition of electrostatic media did not take into consideration or anticipate these newer hybrid media because they were not yet available at that time The commenter believed that new inventions that fully meet Method 319 testing requirements and improve upon conventional filtration technologies would be automatically excluded from testing and certification under Method 319 Assuming the goal of Method 319 testing is not only to approve certain filters under certain conditions but also to reduce the amount of hazardous particles impacting the environment and workers' health, the EPA should allow and even encourage the testing and utilization of best available technologies to accomplish these goals At a minimum, a mechanism within Method 319, such as the dust-loading or paint fractional efficiency test described above, should be available for new alternative technologies to be tested and given certification if they truly accomplish what Method 319 requires them to do

Response The Agency has decided that the proposed amendment to exclude electrostatically-charged filter media from Method 319 testing (based on the possibility that their efficiency in use will drop below that measured in Method 319 testing) will not be finalized based on the fact that there are insufficient data at this time to warrant this exclusion. No data were submitted illustrating that electrostatically charged filter media will actually drop in efficiency during use in aerospace painting and depainting facilities. Furthermore, no data were submitted showing that, even if such drops in efficiency do occur, similar drops would not also occur in uncharged media (i.e., the drop in efficiency may not be solely due to a loss of electrostatic enhancement but may also be due to other physical changes in the media, which occur over time). The Agency recognizes that this is an area of current, active, and ongoing research The Agency is also aware of studies conducted on electrostatically charged filters used in general ventilation that do, for some charged-fiber filters under certain operating/exposure conditions, show drops in efficiency for electrostatically-charged media However, the relevance of these findings to arrestors used in aerospace painting and depainting facilities is uncertain and is, therefore, insufficient to exclude, as a category of arrestors, electrostatically charged media from Method 319 testing

Two commenters suggested expanding Method 319 to include not only the initial efficiency, but also one or more steps of paint loading followed by a repeated filtration efficiency measurement after each step, by doing so, changes in electrostatically charged filtration efficiencies, if present, would be measured One of the commenters recommended that Method 319 be expanded to include standard dust loading efficiency tests, or an additional fractional efficiency test using actual paint. These type of tests would need to account for the replacement frequency of the various stages in a multistage system, and load the filter with representative paint oversprays, as well as depainting-generated aerosols and ambient aerosols which may be drawn into a spray booth, perhaps with some level of prefiltration There are no standardized methods that adequately address these issues relative to conditioning or aerosol-loading of multistaged arrestors for the purposes of quantifying potential changes in fractional efficiency with use. In light of the Aerospace NESHAP compliance date of September 1, 1998, it is beyond the scope of this project at this time to continue modifications to Method 319. Thus,

use of Method 319, as stated in the final amendments to the aerospace rule published in the Federal Register on March 27, 1998, is retained.

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15 SUPPLEMENTARY NOTES

EPA Task Order Project Officer: Barbara Driscoll, ESD/PPSG

16 ABSTRACT

National emission standards for control of HAP emissions from aerospace manufacturing and rework facilities were published in 60 FR 45948, September 1, 1995. Proposed amendments to the final rule were published in 63 FR 15034, March 27, 1998. This addendum to the background information document provides: the basis for the revisions (amendments) made to the standards since promulgation; a summary of the comments submitted and the responses to these comments; and a summary of the changes made since promulgation.

17 KEY WORDS AND DOCUMENT ANALYSIS

a DESCRIPTORS		b IDENTIFIERS/OPEN ENDED TERMS	c COSATI Field/Group
Air Pollution Aerospace Manufacturing and Rework Hazardous Air Pollutants	Cleaning Operations Surface Coating (Painting) Depainting	Air Pollution Control MACT Coating Operations Cleaning Operations	

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