DOCKETED

Docket Number:	17-BSTD-01
Project Title:	2019 Building Energy Efficiency Standards PreRulemaking
TN #:	219897
Document Title:	Air Resources Board Staff Comments on Proposed 2019 Residential Standards
Description:	N/A
Filer:	System
Organization:	Air Resources Board
Submitter Role:	Public Agency
Submission Date:	6/23/2017 10:29:59 PM
Docketed Date:	6/26/2017

Comment Received From: Qunfang (Zoe) Zhang
Submitted On: 6/23/2017
Docket Number: 17-BSTD-01

Air Resources Board Staff Comments on Proposed 2019 Residential Standards

Please see the attached document for the specific comments from ARB staff on the proposed 2019 Residential Standards. Thank you.

Additional submitted attachment is included below.

Air Resources Board

Mary D. Nichols, Chair
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Matthew Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

June 23, 2017

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 17-BSTD-01
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: Air Resources Board Staff Comments on Proposed 2019 Residential Standards

Thank you for providing an opportunity to comment on the Commission staff's proposed revisions for the 2019 Title 24, Part 6, Building Energy Efficiency Standards presented at the June 6, 2017 workshop, which focused on ventilation and indoor air quality for both residential and non-residential buildings.

We fully support your efforts to maintain and improve indoor air quality while pursuing increased energy efficiency in California buildings. We especially support the proposal to require higher efficiency air filters for all new and renovated buildings statewide, and the proposal for verification of kitchen range hood performance certification. We also support provisions for multi-family dwellings that will provide the same level of protection from outdoor air pollution as for single family homes. Our specific comments are attached.

If you have any questions regarding our comments, please contact me at (916) 323-4519, or bart.croes@arb.ca.gov. You may also contact Peggy Jenkins at (916) 323-1504 or peggy.jenkins@arb.ca.gov.

Sincerely,

Bart E. Croes

Bart E. Croes, P.E.
Chief, Research Division

Attachment

cc: Peggy Jenkins
Manager, Indoor Exposure Assessment Section
Research Division

CALIFORNIA AIR RESOURES BOARD COMMENTS
Title 24, Energy, California Code of Regulations
Part 6, California Building Energy Efficiency Standards

June 23, 2017

The California Air Resources Board (CARB) staff fully supports the efforts of the California Energy Commission (CEC) staff to maintain and improve indoor air quality while improving the energy efficiency of California's buildings. At the June 6 workshop, CARB staff appreciated CEC staff's highlighting of the sections of the California Public Resources Code and Health and Safety Code that directly require the CEC to protect indoor air quality and public health while pursuing its energy efficiency mandates. CARB staff's specific comments on CEC's proposed changes to ventilation standards for nonresidential and residential buildings are provided below.

1. CARB staff agrees with CEC that higher air filter efficiency, at least a Minimum Efficiency Rating Value (MERV) of 13, and a 2-inch depth filter grille should be required for all new/renovated residential and non-residential buildings statewide.

    1.1 Higher air filter efficiency requirements for residential and non-residential buildings will reduce Californians' exposures to small particles, such as PM2.5, which have been associated with the greatest health risks in California.[1] It is estimated that there are about 9,200 premature deaths per year due to PM2.5 exposure. According to the MERV rating chart attached (see Appendix A), filters meeting current requirements for air filter efficiency in Title 24 – MERV 6 for residential buildings and MERV 8 for non-residential buildings – provide minimal protection against PM2.5. MERV 13 filters can remove substantially more PM2.5, and will have a clear benefit to protect Californians from exposures to PM2.5, especially considering that Californians spend, on average, about 90% of their time indoors.

    1.2 CARB staff prefers a requirement for MERV 16 filters over MERV 13 filters for most applications, because MERV 16 filters have a higher removal efficiency for particles larger than 0.3 µm, as seen in the attached MERV rating chart. Additionally, MERV 16 filters capture more of the particles smaller than 0.3 µm as well. In a recent study funded by CARB, Brett Singer of Lawrence Berkeley National Laboratory found that MERV 16 filtration on a supply ventilation system reduced PM2.5 by 96-97% and ultrafine particles (UFP) by 97-99% relative to outdoors, compared to 63-67% for PM2.5 and for 77-82% for UFP from supply MERV 13 filtration.[2] However, CARB staff agrees that ease of implementation

[1] California Air Resources Board, 2010. Estimate of Premature Deaths Associated with Fine Particle Pollution (PM2.5) in California Using a U.S. Environmental Protection Agency Methodology. Available at https://www.arb.ca.gov/research/health/pm-mort/pm-report_2010.pdf.

[2] Singer B.C., Delp W.W., Black D.R., and Walker I.S. 2016. Measured performance of filtration and ventilation systems for fine and ultrafine particles and ozone in an unoccupied modern California house. Indoor Air. doi:10.1111/ina.12359. Available at http://onlinelibrary.wiley.com/doi/10.1111/ina.12359/full.

and enforceability are important criteria to consider as well, and agree that moving from MERV 6 and MERV 8 to MERV 13 will provide a substantial improvement in protection of indoor air quality and occupant health. Accordingly, CARB staff supports a move to MERV 13 on a statewide basis at this time, but recommends that CEC pursue a higher MERV requirement in future code revision cycles.

1.3 CARB staff also agrees that MERV 13 should be required in all ducted buildings statewide, rather than just in PM2.5 non-attainment areas, because that would provide equal protection to all areas and population groups of concern and would be a much easier requirement to implement and enforce. Despite many regulations to reduce ambient PM concentrations in California, the time needed for full implementation of these regulations means that our State will continue to have non-attainment areas for many years. Even within attainment areas, homes and buildings may have PM levels that exceed the California Ambient Air Quality Standards due to their close proximity to local sources, such as busy roadways, rail yards, ports, airports, and stationary sources. Studies have shown that the impacts of traffic emissions from freeways can extend 300 meters from the roadway during the day time and up to 2600 meters before sunrise.[3] One study showed that the emissions from aircraft arrivals and departures at LAX airport may increase the concentrations of UFPs over an area of 60 km^2 by 2 times.[4] Statistically significant higher concentrations of PM2.5 were also measured on the downwind sites of rail yards compared to the upwind side.[5] People living close to these sources have higher risks of adverse health outcomes, such as asthma and cardiovascular diseases.[6] This is especially true for environmental justice communities, where the population often experiences higher exposures than others. In addition, implementation of the Sustainable Communities and Climate Protection Act (Senate Bill 375) promotes the siting of new developments in infill areas. While most infill areas will be located in non-attainment areas or near busy roadways, some will not. Therefore, having a statewide requirement for higher MERV-rated filters would assure equal protection for everyone in possible high-exposure areas of concern.

---

[3] Choi, W., et al., 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. Atmospheric Environment, 62: p. 318-327. Available at http://www.sciencedirect.com/science/article/pii/S1352231012007753.

[4] Hudda, et al., 2014. Emissions from an International Airport Increase Particle Number Concentrations 4-fold at 10 km Downwind. Environmental Science & Technology, 48(12): 6628-6635. Available at http://pubs.acs.org/doi/abs/10.1021/es5001566.

[5] Placer County Air Pollution Control District, 2008. Summary of Data Analysis on the Roseville Rail Yard Air Monitoring Project – 2007. Available at https://www.placer.ca.gov/~/media/apc/documents/up/2008/august/rrampboardmemo081408.pdf?la=en.

[6] Health Effects Institute, 2010. Traffic-related air pollution: A critical review of the literature on emissions, exposure, and health effects. Available at https://www.healtheffects.org/publication/traffic-related-air-pollution-critical-review-literature-emissions-exposure-and-health.

1.4 Requiring a 2-inch depth filter grille will facilitate the adoption of MERV 13 filters now and higher MERV filters in future code cycles. A commonly raised concern regarding higher MERV filters is that they may have higher airflow resistance, and therefore trigger a need for bigger fans and larger ducts, which may increase the first costs and energy use. However, in a recent study conducted for CARB, Brett Singer at the Lawrence Berkeley National Laboratory found that a deep pleat MERV 16 filter reduced airflow by just 2.7%, and a 1-inch MERV 13 filter reduced airflow by 4.9%.[7] A deeper filter grille will enable the installation of a deeper pleated filter with larger surface area and accordingly lower air resistance, and address the concerns regarding airflow resistance.

1.5 CARB staff believes that the estimate of $117 for incremental costs associated with the higher MERV requirement is reasonable. Because using a 2-inch depth filter can largely reduce the air pressure drop across the filter, there should not be a need to increase duct size or power to compensate higher airflow resistance that may be observed for a 1-inch depth, higher MERV filter. Therefore, there should be no cost for larger size ducts. The incremental costs should mainly result from the higher unit price of MERV 13 filters, which is small, and extra materials related to a deeper filter grille.

2. CARB staff supports the proposal to update kitchen range hood performance requirements to meet the slightly refined ASHRAE 62.2-2016 requirements and to have Home Energy Savings System (HERS) Program raters verify that kitchen range hoods are certified by the Home Ventilating Institute (HVI) to meet the 100 cfm minimum airflow and 3 sone maximum sound requirements. Hundreds of chemicals, many of which are toxic, have been identified in the emissions from cooking activities. Range hoods are commonly used to remove air pollutants and moisture generated during cooking activities.[8] To achieve air pollutant and moisture removal and encourage their usage, kitchen range hoods should be operated at a sufficient air flow rate and a reasonable noise level, and vented to the outdoors. Accordingly, the current code requires use of kitchen range hoods certified by HVI to provide at least 100 cfm airflow at no more than 3 sones. However, the required HVI certification is often not enforced. The proposed requirement for HERS verification of HVI certification would help ensure that appropriate kitchen range hoods will be installed to mitigate air pollutant emissions from cooking activities. Therefore, CARB staff fully supports the proposed requirement. In addition, CARB staff acknowledges that air flow rate is not the ideal metric to determine the performance of kitchen range hoods for air pollutant removal. Therefore, CARB staff recommends that once the ASTM testing method for kitchen range hood capture efficiency becomes

[7] Singer et al., 2016. Reducing in-home exposure to air pollution. Available at https://www.arb.ca.gov/research/single-project.php?row_id=65080.

[8] A list of references about air pollutants generated by cooking activities and the effectiveness of kitchen range hood can be found at https://www.arb.ca.gov/research/indoor/cooking/cooking_range_hoods.htm.

available, the code should be updated to require a minimum removal efficiency for kitchen range hoods.

3. CARB staff supports CEC staff's efforts to require the same level of protection against outdoor air pollution for multi-family dwellings as for single-family homes. Requiring MERV 13 or higher filters on any supply air system used in multi-family dwellings will largely reduce particle concentrations in the air brought into the indoor environment, and provide protection for people living in these buildings equal to that of people living in single-family homes.

APPENDIX A
MERV Rating Chart

Table 1. Filter Data Comparison: MERV Ratings*					
MERV Rating	**Average Particle Size Efficiency (PSE), microns – Removal**			**Typical Controlled Contaminant or Material Sources (ASHRAE 52.2)**	**Typical Building Applications**
	0.3-1.0	**1.0-3.0**	**3.0-10.0**		
1-4			<20	**> 10 Microns** Textile Fibers Carpet Fibers, Dust Mites, Spray Paint Dust, Sanding Dust, Pollen	Window AC units Residential Minimal Filtration
5			20-35	**3.0 to 10.0 Microns** Cement Dust, Pudding Mix, Mold Spores, Hair Spray, Dusting Aids, Snuff	Paint Booth Inlet Industrial Workplace Better Residential Commercial
6			35-50		
7			50-70		
8			>70		
9		<50	>85	**1.0 to 3.0 Microns** Welding Fumes, Legionella, Some Auto Emissions, Milled Flour, Humidifier Dust	Hospital Laboratories Better Commercial Superior Residential
10		50-65	>85		
11		65-80	>85		
12		>80	>90		
13	<75	>90	>90	**0.3 to 1.0 Microns** Bacteria, Droplet Nuclei (sneeze), Most Tobacco Smoke, Copier Toner, Insecticide Dust, Most Paint Pigments	Superior Commercial Smoking Lounge Hospital Care General Surgery
14	75-85	>90	>90		
15	85-95	>90	>90		
16	>95	>95	>90		
The following classes are determined by a different methodology**					
17	≥ 99.97			**<0.3 Microns (HEPA/ULPA filters)**** Viruses, Carbon Dust, Sea Salt, Fine Combustion Smoke, Radon Progeny	Clean Rooms Carcinogenic & Radioactive Materials, Pharmaceutical Manufacturing, Orthopedic Surgery
18	≥ 99.99				
19, 20	≥ 99.999				

* Adapted from EPA 2009; originally from ANSI/ASHRAE Standard 52.2-2007.

** Not part of the official ASHRAE Standard 52.2 test, but added by ASHRAE for comparison purposes.