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Customer Name: Boeing Correspondence

Message Owner: Julie Chang

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Message #: MOM-MOM-20-0053-01B(R8)

Communication Type: Multi Operator Message

Due: No Action Required

Subject: Information - 2019-nCoV Coronavirus Infection Control Guidance as Related to Commercial Aircraft - Corrected Copy

Body:

FROM: THE BOEING COMPANY
TO: Boeing Correspondence (MOM)
[MESSAGE NUMBER:MOM-MOM-20-0053-01B(R8)] Multi Operator Message
MESSAGE DATE: 10 Jul 2020 1713 US PACIFIC TIME / 11 Jul 2020 0013 GMT

CORRECTED COPY

This message supersedes Message Number MOM-MOM-20-0053-01B(R7) dated 22-Jun-2020 17:37:10 US PACIFIC TIME. Please destroy all copies of Message Number MOM-MOM-20-0053-01B(R7).

Reason for Corrected Copy:
1. Added electrostatic sprayer No Technical Objection (NTO) for use in cargo compartment and limited use in flight deck.
2. Provided procedure for 737NG/737MAX power-off settings during electrostatic sprayer procedure to allow for cabin lighting from ground power.
3. Added NTO for Bacoban as anti-microbial coating.
4. Separated out the Flight Deck Disinfection section into Ref /I/ attachment.
5. Separated out the Passenger Cabin, Cargo Compartment, and Aircraft Exterior Disinfection section into Ref /J/ attachment.
6. Clarified that when using ground conditioned air, operators should follow the FCOM Supplementary Procedure recirculation fan guidance for 777 and 787 models.
7. Added warning about possible safety issue if Sani-Cide EX3 is applied to fabrics in the passenger cabin.
8. Added Ref /K/ Cabin Cleaning Map attachment to show high-touch areas.
9. Added NTO for 254nm UV disinfection use on flight deck surfaces, except windows and seatbelts.

This message is sent to all Customers, Regional Directors, Regional Managers and Boeing Field Service Bases.

CATEGORY: Maintenance, Engineering

SERVICE REQUEST ID: 3-4630932392
ACCOUNT: Boeing Correspondence (MOM)
DUE DATE: No Action Required
PRODUCT TYPE: Airplane
PRODUCT LINE: SEVERAL
PRODUCT: SEVERAL
ATA: 2100-00

SUBJECT: Information - 2019-nCoV Coronavirus Infection Control Guidance as Related to Commercial Aircraft

REFERENCES:
/A/ MOM-MOM-09-0204-01B(R2) Swine Influenza A (H1N1) Discussion
/B/ MOM-MOM-16-0098-01B(R1) Insecticides/Disinsectants and Disinfectants to Combat the Zika Virus
/C/ 737NG-FTD-21-03002 Severe Acute Respiratory Syndrome (SARS) Recommendations
/D/ Attachment CDC Guidance about SARS
/E/ Attachment WHO 2019-nCoV Infection Prevention and Control
/F/ Attachment Boeing Recommended Cabin Air Filters
/G/ Attachment Issues Seen from Boeing Preliminary Flight Deck Testing with Sani-Cide EX3
/H/ Attachment Lavatory Cleaning and Disinfecting Breakdown
/I/ Attachment Flight Deck Disinfection
/J/ Attachment Passenger Cabin, Cargo Compartment, and Aircraft Exterior Disinfection
/K/ Attachment Cabin Cleaning Map

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SUMMARY:

This message provides information about disinfectant material that can be used on airplanes associated with suspect cases of 2019 Novel Coronavirus (2019-nCoV). Boeing also provides information on High-Efficiency Particulate Air (HEPA) Filters, additional disinfection technologies, flight deck cleaning, and operational considerations.

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DESCRIPTION:

Boeing has received questions concerning cabin air filtration and use of disinfectants relative to the 2019-nCoV. We have reviewed the information about 2019-nCoV that is currently available from the United States Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO). At this time, Boeing believes that the information previously provided by Boeing for Severe Acute Respiratory Syndrome (SARS), Swine Influenza A (H1N1), and ZIKA virus is also applicable for 2019-nCoV. Please see the Reference /A/ and /B/ Multi Operator Messages (MOM) and the Ref /C/ Fleet Team Digest (FTD) article.

Operators are encouraged to keep updated on this issue through the press releases of the WHO (https://www.who.int/emergencies/diseases/novel-coronavirus-2019) and the CDC (https://www.cdc.gov/coronavirus/2019-nCoV/index.html).

The CDC released the Ref /D/ document for SARS (https://www.cdc.gov/sars/travel/airpersonnel.pdf), which Boeing believes is applicable for 2019-nCoV.

The CDC also established the following website that provides interim recommendations/guidance for airlines and airline crew for 2019-nCoV: https://www.cdc.gov/quarantine/air/managing-sick-travelers/ncov-airlines.html Boeing suggests that operators frequently check this web site for the updates on CDC recommendations for dealing with 2019-nCoV. The CDC has already updated it on multiple occasions, and future additions are possible.

In addition, the WHO released the Ref /E/ article: "Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected." This article can be found at the following WHO website: https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected

Boeing recommends that operators review these websites. The CDC and WHO will update their websites with the latest recommendations as new information becomes available.

Boeing has the following comments regarding disinfectants, cabin air filtration, and operational considerations:

General Information on Use of Disinfectant Products
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As an airplane manufacturer, Boeing is not qualified to specify the disinfectant materials that may be effective for a given disease or the specific disinfection frequency. We must refer operators to the WHO, the CDC, other public health authorities, or International Air Transport Association (IATA) to provide this type of information. However, if the interior of the aircraft is visibly soiled, it must be cleaned and some components may need replacement.

In the Ref /E/ WHO article, recommendations are made that contaminated surfaces are cleaned "with water and detergent and applying commonly used hospital level disinfectants." Boeing has concerns regarding the effect a disinfectant material may have upon the aircraft systems and structure. Accordingly, we recommend that any disinfectant material under consideration should be tested against the requirements in the Boeing Chemical Compatibility documents BSS7432 "Evaluation of Airplane Maintenance Materials" and BSS7434 "Chemical Compatibility of Cleaning Products and Interior Parts/Materials of Commercial Transport Aircraft", which contain the information previously provided in the Boeing D6-17487 Revision T and D6-7127 Revision P documents. The BSS7432 and BSS7434 documents are available to operators through their MyBoeingFleet portal. The D6-17487 and D6-7127 documents have been canceled.

When using disinfectants on the aircraft, operators should consider the guidance below and the EPA "List N: Disinfectants for Use Against SARS-CoV-2" for applicable disinfectant contact time (sometimes referred to as dwell time) to disinfect 2019-nCoV (SARS-CoV-2). This can be found at the following website: https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2.

Please note that there is a difference between cleaning, disinfecting, and sanitizing. Operators can refer to the CDC or other public health authorities for definitions and guidance.

For operator convenience, some of the products listed in this MOM are available at the following link: https://shop.boeing.com/aviation-supply/.

Flight Deck Disinfection

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Please see Ref /I/ for guidelines on flight deck disinfection.

Passenger Cabin, Cargo Compartment, and Aircraft Exterior Disinfection

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Please see Ref /J/ for guidelines regarding disinfection of the passenger cabin, cargo compartment, and aircraft exterior surfaces.

Persistent Disinfectants and Anti-microbial Coatings

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Boeing is in the process of evaluating some products that act as persistent disinfectants or anti-microbial coatings. From results of testing and evaluation, Boeing has No Technical Objection to the use of the below listed anti-microbial coatings on surfaces in the PASSENGER CABIN (including thermoplastic, rubber, sealant, PVF, vinyl, fabric, carpet, leather, naugahyde, painted surfaces, polycarbonate and metals listed in BSS7434). Boeing is aware that seats, IFE, galleys, and lavatories may have materials and coatings produced to processes not covered by BSS7434. Therefore, Boeing cannot guarantee that the use of the below listed anti-microbial coatings will not create aesthetic damage to these custom materials. Visual effects may be observed on transparent materials. In order to avoid these effects, it is recommended that IFE be covered and window shades be closed during application.

Boeing will continue to evaluate similar products and provide more information in future revisions of this MOM.

a. mPale
   mPact Environmental Solutions
   Phone: 1-864-724-0000
   www.mpactusa.com

b. Bacoban
   Frasers Aerospace
   Phone: 44 (0)20 8597 8781

https://www.frasersaerospace.com/

Additional Disinfection Technologies
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Boeing is aware that some operators have been using techniques other than the traditional wiping of surfaces with disinfectant chemicals. These additional disinfection techniques may include "fogging" or electrostatic spraying (described in more detail below), Ultra-Violet (UV) lights, ozone disinfection, and ion generators. The most recent CDC guidance on use of alternative disinfection techniques, issued in May 2019 related to SARS, has stated generally: "More research is required to clarify the effectiveness and reliability of fogging, UV irradiation, and ozone mists to reduce norovirus environmental contamination. (No recommendation/unresolved issue)" and that "this issue will be revisited as additional evidence becomes available".

(https://www.cdc.gov/infectioncontrol/pdf/guidelines/disinfection-guidelines-H.pdf)

In addition, Boeing has specific concerns about some of these techniques. In some cases, there are concerns of possible health effects upon cleaning personnel, maintenance personnel, and passengers; and in some cases there are concerns that use of these techniques could damage the aircraft systems or aircraft interior and exterior.

Boeing is currently working to determine the compatibility of these and other technologies with parts on the aircraft in order to provide operators with a broader list of approved techniques that can be used to disinfect the aircraft. As previously noted, Boeing is not qualified to specify the disinfectant techniques that may be effective for a given disease or the specific disinfection frequency. Boeing refers operators to public health authorities or IATA to provide this type of information.

Electrostatic Sprayers and Misters:
Boeing is evaluating electrostatic sprayers and electrostatic misters. These devices dispense the chemical into the air as a mist of small droplets allowing the chemicals to be sprayed over a wide area using an electrostatic charge on the droplets with the intention of attracting the droplets to surfaces.

NOTE: Boeing experience has shown that use of electrostatic sprayers is very technique dependent. Special attention must be given to prevent pooling or running (dripping) of fluid on the surfaces being sprayed. Failure to monitor application levels may result in hazardous effects as detailed below. Boeing has completed initial evaluations of the Maxcharge ESS SC-EB electrostatic sprayer and found that it is possible to use this model correctly. Airline operators should ensure that they are properly trained and capable of applying chemicals in a manner that avoids pooling, running (dripping), crazing, etc. prior to using them on an aircraft.

Based on an initial assessment of the use of electrostatic sprayers and misters, Boeing has concluded:
.Use of alcohol based products like Isopropyl Alcohol with an electrostatic sprayer or mister poses a significant flammability risk to the personnel and aircraft.
.Repeated exposure to disinfectant chemicals may degrade, stain, discolor, or corrode material in the aircraft

ducting and interior components.
.Chemical discharge while the equipment cooling fans or recirculation fans are operating could allow the chemicals to migrate and damage critical flight hardware and/or the HEPA filtration system.
.Repeated exposure to sprays or aerosols could lead to false fire/smoke alarms or permanent damage to the fire and smoke detection systems.
.The use of sprayers or misters poses a risk of electrical shorts, especially if these devices oversaturate electrical hardware components.

Based on initial evaluations, Boeing has observed that the following spray practices to be successful:
.Apply a uniform coating over the surface being disinfected.
.Target the application to apply the heaviest film possible without allowing the film to drip or pool.
.Limit spraying/misting to two passes with 2-3 minute intervals between each pass.
.The sprayer/mister remains at a minimum distance of 18 inches from the targeted surface.
.Spraying/misting with a 40 um droplet size.

Based on assessments and evaluations to date, Boeing has No Technical Objection (NTO) to using an electrostatic sprayer or an electrostatic mister product under the following conditions:
.Use of the electrostatic sprayer or electrostatic mister in the passenger cabin and cargo compartment is limited to either the Calla 1452 Neutral Disinfectant Concentrated Cleaner or Matrix Disinfectant/Cleaner #3 disinfectant. Please note that other disinfectant manufacturers may not allow the use of electrostatic sprayers or misters with their fluids.
.Use of the electrostatic sprayer or electrostatic mister in the flight deck with either the Calla 1452 Neutral Disinfectant Concentrated Cleaner or Matrix Disinfectant/Cleaner #3 disinfectant is limited to only twelve total applications within twelve months (applied once per month).
.The airplane must be de-powered during the spraying or misting application. This is to prevent potential damage that may occur if spraying or misting chemicals are ingested by the Environmental Control System (ECS) and distributed to sensitive ECS (especially HEPA filters) and Avionics equipment throughout the airplane, including Electronic Equipment (EE) bay(s) and the Flight Deck. For 737NG and 737MAX, a power-off procedure to allow for use of ground power to provide lighting is provided below.
.Ensure the sprayer/mister does not apply chemicals in a manner that oversaturates equipment or allows the chemical to pool or run (drip) on the surfaces, particularly electronic hardware. Laboratory testing with Calla 1452 indicated that the manufacturer's 10 minute wet dwell time cannot be met without pooling of fluid leading to possible liquid ingress into components. For this reason, Calla 1452 can only be considered acceptable for flight deck cleaning, not disinfection.
.When cleaning or disinfecting flight deck windows and/or passenger cabin window dust covers, place a dry wiper on the bottom of the flight deck window and/or passenger cabin window dust cover pane to absorb any excess cleaner/disinfectant. The cleaner/disinfectant should be wiped off with a dry wiper, with minimal pressure. Note that applying Calla 1452 or Matrix Disinfectant/Cleaner #3 may produce a film on the flight deck window and/or passenger cabin window dust cover surface. The film can be removed by applying deionized water with a wetted cloth, and then wiping dry with a dry wiper.

737NG and 737MAX Power-off Procedure for Disinfecting Cabin

The following procedure will shut off all EE cooling, recirculation fans, EE bay and flight deck equipment. Cabin lighting will be available for use during disinfecting procedure. Reverse steps as required to restore aircraft to normal configuration.

1.Turn off any pre-conditioned air supply (ground cart or similar).
2.Turn off main engines, APU, and air conditioning.
3.Ensure ground electrical power is available.
4.Turn off flight deck BATT switch.
5.Set flight attendant panel GROUND SERVICE POWER switch to "ON".
6.Switch EE Cooling Exhaust Fan Switch to "ALTN".

Recommended Maintenance Actions

.Monitor the condition of decorative surfaces including, but not limited to: stow bin faces, sidewalls, carpets, galley mats, and window shades. Look for color shift, discoloration, staining, flaking or peeling of coatings, or other visual abnormalities. Where visual changes in decorative surfaces appear to have occurred, verify via inspection in accordance with the appropriate sub-section of BAC5150 Section 11.
.Monitor the performance of window dust covers for crazing or cracking. Boeing suggests cabin interior window dust cover inspection after every 100 applications of cleaners/disinfectants or 30 operating days, whichever is greater.
.Inspect and test the fire/smoke detection every 1200-2400 flight hours. This is more frequent than the current interval of 12,000 hours.
.On 787 aircraft, monitor the appearance and performance of the Electronically Dimmable Window (EDW) controllers (window dimming switch). Check the controller surface for discoloration, flaking, peeling or any other visual abnormalities. Validate EDW function after every 20 applications of cleaners/disinfectants or 10 operating days, whichever is greater.
.Perform a functional check of all the switches in the flight deck after every 6 applications.
.If the flight deck displays are not covered during the electrostatic sprayer or electrostatic mister procedure, and build-up of Calla 1452 or Matrix Disinfectant/Cleaner #3 occurs on the displays, Isopropyl Alcohol should be used to wipe off the build-up.

Fogging:

One approach that some operators have reported using is to disperse a chemical disinfectant with a technique sometimes called "fogging". The term "fogging" can be used interchangeably with "fumigation" in different parts of the world. This technique passes the chemical through a device that dispenses the chemical into the air as a fog of small droplets that can be dispersed over a wide area.

Boeing has several concerns about this disinfection technique that operators may wish to consider and seek further guidance from appropriate medical personnel or the disinfectant manufacturer, as appropriate. If an operator does choose to use the fogging technique, the disinfectant used should pass the Boeing material compatibility requirements and should be applied in accordance with the manufacturer's instructions.

First - Boeing would question the use of this technique with any disinfectant chemical whose manufacturer

does not include it as a recommended method of application, especially if the manufacturer's recommendations include wiping the disinfectant on a surface and then wiping it off the surface after a specified time.

Second - The Safety Data Sheets (SDS) for many disinfectant chemicals warn against inhalation and skin contact. Accordingly, the disinfectant chemicals may present hazards to personnel applying those chemicals via the fogging technique, unless personal protective equipment specified for this purpose is used. In addition, since the vapor droplets will deposit on all surfaces, including fabrics such as seats and carpets, residue of the chemical may remain on fabric surfaces and come into contact with the skin of passengers and maintenance personnel.

Third - Some chemicals are much more flammable in vapor form, so operators should follow all instructions on the product label and SDS and take precautions against static electricity and other ignition sources if they choose to use this technique.

Fourth - The vapor may collect as droplets and settle into locations that are inaccessible and difficult to see, especially when being applied with high humidity in the aircraft, resulting in accelerated corrosion and potential impact upon electrical connectors and other equipment.

Fifth - Boeing does not have data regarding the effects that the residuals of some disinfectant chemicals applied in this manner may have upon the flammability of seat covers and some other fabrics.

Sixth - The airplane must be de-powered during fogging application. This is to prevent potential damage that may occur if dispersed chemicals are ingested by the Environmental Control System (ECS) and distributed to sensitive ECS (especially HEPA filters) and Avionics equipment throughout the airplane, including Electronic Equipment (EE) bay(s) and the Flight Deck.

Seventh - Unless the recirculation fans are turned off until all mist and vapor has settled out, Boeing would be concerned that some of the disinfectant chemical would be drawn through the recirculation filters and that the liquid might affect the filter material, potentially degrading the future efficiency of the filters.

UV Light:
Boeing is in the process of evaluating the effects of UV light in the Flight Deck. From preliminary testing results, Boeing has No Technical Objection (NTO) to the use of 254nm commercial off-the-shelf, industrial grade, ultraviolet wands for flight deck disinfection purposes as defined below. The wands should include a 254nm-specific UV filter to prevent other wavelengths of UV from reaching flight deck surfaces and equipment. For safety reasons, this NTO is only valid for a cumulative 240 disinfection operations - which equates to total energy exposure of about 2,400 mJ/cm^2 to achieve 10 mJ/cm^2 on each surface. The limitation on total energy is due to the nature of ultraviolet radiation accumulation over time, requiring further Boeing testing to ensure no safety of flight issues occur. Boeing will continue to perform testing to extend the validity of this NTO through revisions of this MOM.

When performing the flight deck disinfection with 254nm UV, Boeing has NTO to exposing the flight deck displays, control columns, and Line Replaceable Units (LRUs) in the aisle stand, overhead console, Electronic Flight Bag (EFB), and glare shield. The flight deck windows and pilot/co-pilot seat restraints must NOT be directly exposed to 254nm UV radiation, as there may be a long-term potential safety of flight concern. The flight deck windows and seat restraints must be shielded from 254nm UV during the disinfection operation. Boeing is conducting further testing on the windows and restraints, and Boeing will provide information as it becomes available.

Full Personal Protective Equipment (PPE) should be used by the wand operator and any other personnel that will be in or near the flight deck while disinfection is occurring as 254nm UV is known to be harmful to human eyes and skin. At a minimum, PPE should include full covering of the skin with long sleeves, gloves, and long pants. The operator should also utilize a polycarbonate face mask and protective glasses to prevent injury to the eyes. All safety precautions specified by the UV wand manufacturer should also be followed.

Note that power output of 254nm commercial off-the-shelf products may vary by manufacturer. Boeing recommends adjusting the time and distance that the flight deck materials and equipment are exposed, such that surfaces do not exceed 10 mJ/cm^2 during one disinfection operation.

Boeing is also in the process of development and testing for 222nm UV applications. More information will be provided as it becomes available.

Ozone:
The FAA Centers of Excellence for Aircraft Cabin Environmental Research (FAA CoE ACER) has studied the effects of ozone within the aircraft cabin. The results show that ozone aggressively reacts with all surfaces within the airplane cabin, which can result in aging of surfaces and finishes within the cabin including seats, carpets, walls, and plastic materials within the cabin (Colman et. al 2008), and can generate significant quantities of stable and highly irritating compounds (Weschler 2006). Boeing believes that this same finding would also hold true for the flight deck.

Ion Generators:
Finally, Boeing has studied the effectiveness of ion generators within the airplane cabin environment. Due to the very high air exchange rates within the airplane, which limits the amount of ions that stay in the system and their effectiveness, Boeing believes at this time that ion generators do not offer significant benefit for the airplane cabin or flight deck. With some ion generators, ozone can also be generated as a byproduct, and can potentially damage the surfaces within the airplane. However, Boeing is continuing to evaluate ion generator technology.

Cabin Air Filtration and Recirculation
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Also in the Ref /E/ WHO article, recommendations are made to "use a particulate respirator at least as protective as a NIOSH-certified N95, EU FFP2 or equivalent." Boeing notes that the cabin air filters listed in the Ref /F/ attachment are Boeing approved and meet the 0.3um particulate size requirement of that

specification. Boeing is aware that there are other HEPA filter suppliers that offer a part for installation on Boeing aircraft. Operators should confirm that these filters have Parts Manufacturer Approval (PMA) and meet performance requirements for system installation and certification requirements for their Regulatory Agencies before installation.

Boeing recommends the use of HEPA filters on our airplanes, as listed in Ref /F/ or equivalent filters. This is not to say that a HEPA filter on the airplane will provide the same level of protection against transmittal from an infectious source in close proximity as the 'personal respiratory protection device' or mask worn by the individual. We recommend using HEPA filters because they remove more than 99 percent of contaminants from the recirculated air.

Unless directed differently by a non-normal (emergency) procedure, Boeing recommends leaving the recirculation fans "ON" with HEPA filters installed, even when there is a suspected 2019-nCoV case on board. The HEPA filters are effective against viruses and bacteria. The recirculation airflow contributes to the total airflow in the passenger cabin, diluting the contaminant level in the passenger cabin, and minimizes the fore and aft airflow within the main passenger cabin (aisle flow). Turning "OFF" the recirculation fans may decrease the total airflow to the cabin and increase aisle flow as the cabin air migrates to the outflow valve(s).

For additional information regarding airflow and filtration in the cabin, please refer to the following webpage link: http://www.boeing.com/nosearch/Confident-Travel-Initiative/.

Please note: If there is a suspected 2019-nCoV case on board an airplane that is NOT fitted with HEPA filters, Boeing DOES recommend turning off the applicable recirculation fans.

Fully operational engine bleeds (or Cabin Air Compressors on 787), air conditioning packs, and recirculation fans provide the best overall cabin ventilation performance. Boeing suggests minimizing dispatch with engine bleeds (or Cabin Air Compressors on 787), air conditioning packs, or recirculation fans inoperative. Fully operational cabin pressure control outflow valves provide best overall cabin airflow management performance. Boeing suggests minimizing dispatch with a cabin pressure outflow valve inoperative.

If use of supplementary normal procedures for (1) packs-off takeoff, (2) APU-to-pack takeoff, or (3) packs-off landing are deemed necessary for a given flight, attempt to minimize the duration that the packs are either selected off or supplied by the APU bleed. It is likely that the pack flow will be lower when it is supplied by the APU bleed than when it is supplied by engine bleed. Recirculation fans should remain on when HEPA filters are installed. Recirculation fans should be turned off if HEPA filters are not installed.

During ground operations with passengers onboard, Boeing recommends maximizing total air flow by using air conditioning packs or pre-conditioned ground supply. For the 777 and 787, follow the Flight Crew Operations Manual (FCOM) Supplementary procedure recirculation fan guidance when applicable. For other models, recirculation fans should be left "ON" with HEPA filters installed, and should be turned "OFF" if HEPA filters are not installed.

Boeing recommends that operators continue to utilize the existing remove and replace intervals for the filters as specified in the respective model Maintenance Planning Data (MPD) document, or as established in their own customized maintenance program.

Boeing aircraft may be delivered with HEPA filters in the recirculation system. Since the recirculation filters are replaced at an MPD interval, operators should check their maintenance records to ensure they are using HEPA cabin air filters. The HEPA filters should trap the 2019-nCoV molecules and retain them unless the filters are left in place beyond their useful life.

Accordingly, as long as the filters are changed before they reach their end of useful life, no real advantage is expected from changing the filters more frequently than normal. The useful life of the HEPA filters will not be changed because of transport of individuals who may be infected with 2019-nCoV.

Please note that, as always, the removal of all filters should be performed according to the relevant Aircraft Maintenance Manual (AMM) tasks to protect maintenance personnel against being affected by any material trapped by the filter. Specifically, operators should obey all safety precautions, wear the recommended personal safety equipment and dispose of the filters properly. The warnings in the AMM include the following comments:

PUT ON THE PERSONAL PROTECTIVE EQUIPMENT BEFORE YOU TOUCH THE FILTER. THE FILTER REMOVES SMALL PARTICLES (SMOKE, DUST, LINT, FIBERS, POLLEN) AND INFECTIOUS MATERIALS (BACTERIA, VIRUSES, MOLD SPORES, FUNGI) FROM THE AIR WHICH CAN CAUSE ILLNESSES AND INJURIES TO PERSONS.

DO NOT LET THE FILTER TOUCH YOUR SKIN. DO NOT SHAKE OR HIT THE FILTER. DO NOT LET THE FILTER FALL. DO NOT USE COMPRESSED AIR TO CLEAN THE FILTER OR FILTER HOUSING. THIS CAN CAUSE THE INFECTIOUS MATERIAL TO BECOME AIRBORNE. DISCARD THE FILTER IN A PLASTIC DISPOSAL BAG. OBEY THESE INSTRUCTIONS TO PREVENT INJURIES TO PERSONNEL.

Recirculation Fan and High Pack Flow Usage Related to EASA Guidance

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On 2 April 2020, EASA published EASA SIB No: 2020-02R3 - Coronavirus 'SARS-CoV-2' Infections - Operational Recommendations. This document recommended turning off recirculation fans even when HEPA filters are installed on the aircraft, which conflicts with Boeing's recommendation.

Several operators contacted Boeing regarding the conflict between the above EASA publication and the recommendations from Boeing in this Multi-Operator Message. As a result, Boeing coordinated with EASA about this subject and explained the reasons behind Boeing's guidance. Since that time, EASA released Revision 4 of EASA SIB No: 2020-02 on 7 April 2020, which aligned their guidance with Boeing's guidance provided in this message.

Guidance from medical authorities is that HEPA filters are highly effective at removing bacteria and viruses

from air. Any air passing through these filters is medically equivalent to air from outside the aircraft. Accordingly, if HEPA filters are installed, the effective air exchange rate will be optimized by maximizing the sum total of outside air and recirculated air.

As a consequence, unless directed differently by a non-normal (emergency) procedure, Boeing recommends: a) if HEPA filters are installed in the aircraft recirculation system, leave the recirculation fans ON during all phases of flight; b) If HEPA filters are NOT installed, the recirculation filters should be switched OFF.

Boeing recommends that airlines select High Flow Mode for 747-8, MD-80 and MD-90 passenger aircraft, as this will maximize total ventilation rate in the cabin. Note that this will increase fuel burn. However, for the 747-300/-400 and 737, High Flow Mode should not be selected as this does not result in an increase in total ventilation rate. Please note that on other aircraft models, High Flow Mode is not available, and it is not possible to increase the flow of outside air without turning off the recirculation fans. On those models, the maximum total air exchange rate will be obtained by providing the normal flow of outside air and leaving the recirculation fans running. For all models, recirculation fans should remain on when HEPA filters are installed. Recirculation fans should be turned off if HEPA filters are not installed.

Oxygen Masks

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Replacement of some oxygen masks is recommended if used on a flight with a suspected viral/bacterial infection.

If an airplane experiences a depressurization event, requiring the use of oxygen masks, on a flight suspected of having a suspected viral/bacterial infected passenger, Boeing recommends replacement of oxygen mask/regulator assemblies within a six (6) foot radius of the suspected passenger. This includes the mask, bag, and tubing. Removed masks should be put in a biohazard disposal bag.

If a crew member suspected of having a viral/bacterial infection is on a flight with a depressurization event requiring the use of oxygen masks or portable equipment, Boeing recommends disinfection or replacement of the equipment used by that crew member. If a crew member suspected of having a viral/bacterial infection serves on an aircraft with an older crew oxygen system that requires donning an oxygen mask for the pre-flight check, Boeing recommends disinfection or replacement of the equipment used by that crew member. Flight deck crew oxygen masks should be cleaned in accordance with the procedures in the supplier CMMs.

Julie Chang, Service Engineering - Environmental Control Systems
Vitor Amorim, Manager - Systems Service Engineering - Environmental Control
Mario Mimbella, Senior Manager - Hydro-Mechanical, Landing Gear, Payloads, and Environmental Systems
Customer Support
The Boeing CompanyCorrected copy

If attachments are referred to, and are not present, please access them by logging into MyBoeingFleet Service Request System using the link below. If you have further questions, you may contact the appropriate Airline

Support Manager.

Service Request System: https://myboeingfleet.boeing.com/bsrs/client/index.html#/momDetail/3-26TAPO9
(Note: MyBoeingFleet portal login is required to access link in the Service Request System)