COVID-19 (Corona Virus) and Middle East Respiratory Syndrome (MERS)

Reference: 21.00.00119 Issue date: 12-MAR-2020 Last check date: 12-MAR-2020 Status: Open
A/C type/serie: A300, A300-600, A310, A318, A319, ...
ATA: 21-00
Engine manufacturer:
Supplier:
Purpose / Reason for revision: Update Disinfection Paragraph

Engineering Support

Status: Open

Applicability

All Aircraft

References

OIT 999.0008/20

Background

Airlines can ask for recommendations regarding MERS Corona virus and the current COVID-19 Corona virus outbreak with respect to;

- Disinfection, procedures and materials
- On-board Transmission
- Operational Techniques needed (eg. turning off recirc fans) ?

Description

We would like to provide you with the following information in relation to questions on the MERS Corona virus, the COVID-19 Corona virus, and Corona viruses in general.

Based on the currently available information, we consider that the OIT 999.0008/20 (attached) is equally applicable to the MERS and COVID-19 Corona virus. However, the hyperlinks in that OIT are updated and replaced by the following updated specific links. In addition to the specific links below you may also want to refer to the World Health Organisation (WHO) for additional information.

IATA : This page includes Corona virus updates, and some aviation specific information.
www.iata.org/en/programs/safety/health/diseases

European Centre for Disease Control : This page has Corona virus update, and a section called - *Risk assessment guidelines for infectious diseases transmitted on aircraft (RAGIDA) - Middle East Respiratory Syndrome Coronavirus (MERS-CoV)*.
https://www.ecdc.europa.eu/en/novel-coronavirus-china

US Centre for Disease Control : This is a link for information related to aviation aspects of communicable diseases. This contains latest information on Virus outbreaks and further links including "Preventing

Spread of Disease on Commercial Aircraft: Guidance for Cabin Crew". Additionally, you will find from this page *"Updated Interim Guidance for Airlines and Airline Crew: Coronavirus Disease 2019 (COVID-19)"* https://www.cdc.gov/quarantine/air/index.html

Additionally, the following US Centre for Disease Control (CDC) link gives some information relating to in-flight and post-flight clean-up/disinfection:

http://www.cdc.gov/quarantine/air/managing-sick-travelers/commercial-aircraft/infection-control-cabin-crew.html

Airbus Disinfection Recommendations

In Airbus knowledge, the existing AMM cleaning and disinfection procedures and disinfection materials approved for use on aircraft should be sufficient to deal with Corona virus removal, however airlines must consult with the responsible health authorities to understand when such cleaning and disinfection should be done, the scope of such activity, and whether any specific products are to be used.

To be clear on this aspect, Airbus will assist regarding;

- If there is a doubt regarding aircraft material compatibility with a specifically recommended cleaning or disinfection product.
- If a clarification, improvement or scope increase is needed for an existing decontamination procedure at request of the airline or health authority.

Airbus cannot, directly answer questions such as the following, but instead recommends airlines to review relevant WHO/CDC/IATA material;

- Efficiency or effectiveness of a specific disinfectant product?
  A document produced by the European CDC entitled - *Interim guidance for environmental cleaning in non-healthcare facilities exposed to SARS-CoV-2 18 February 2020* may be helpful.

  https://www.ecdc.europa.eu/en/publications-data/interim-guidanceenvironmental-cleaning-non-healthcare-facilities-exposed-2019

- After a flight has carried a passenger/crew who has, or is suspected of having Corona virus, must we disinfect the aircraft before the next flight?

- Which areas have to be disinfected (whole cabin or local area), or what is the scope of disinfection following flight with Corona virus infection suspected or reported.

If operators are required by their medical authorities to disinfect an aircraft following a flight with an infected person, they are reminded that disinfection procedures together with Airbus currently approved disinfection agents are contained in each relevant Aircraft Maintenance Manual (AMM) chapter 12 or 25 (depending on aircraft type) or line maintenance document Chapter 12.

Airbus operators are reminded that they can use any disinfectant product that complies with the widely used industry specifications AMS1452 or AMS1453.
Refer to CML codes 11AAA2, 11CAA1, 11CBA1
Note that the product "ENVIROTRU
1453" meets the requirements of AMS1452 and AMS1453. Disinfection agents that do not comply with AMS1452 or AMS1453 may not be compatible with the aircraft and any operator finding it necessary to use such a disinfectant agent should follow the following basic precautions and refer to Airbus customer support for further information. If you still find necessary to use such disinfectant agent which does not comply with AMS1452 or AMS1453 please note that we recommend you to respect the following basic precautions in order to mitigate the potential damage/alteration that these product may cause on the exposed components or structures of the aircraft:

1) Disinfectant must only be used for cabin and cargo area, not on external structures.
2) Efforts should be made to ensure that the product does not come into contact with the aircraft main or secondary structure. If they do, do not allow the products to dwell longer than necessary.
3) If the aircraft structure is contaminated by any of these products the area should be rinsed immediately with water. Ensure correct rinsing with water and wipes. Do not use high pressure water.
4) No contact is allowed on high strength steel or carbon brake units.
5) The materials may affect the cabin interior furnishing causing color fading, or cracking in some plastic items.
6) Materials should be applied where possible using pre-impregnated wipes to keep the materials localized.
7) Personnel using such products should follow the manufacturer's safety advice and use gloves or other protective equipment as necessary.
8) Disinfectant application shall follow the manufacturer instructions for the minimum required contact time before wiping off.

Note: Airbus understand that alcohol is recommended as a disinfectant by some authorities (such as the ECDC). Airbus would like to state that:

- Alcohol such as Isopropyl Alcohol (IPA, CML 08BBD1) or ethanol at 70% may be used as a disinfectant on non porous surfaces.

- Avoid using alcohol on transparent plastics, but if used, wipe the part with a wipe dampened with water.

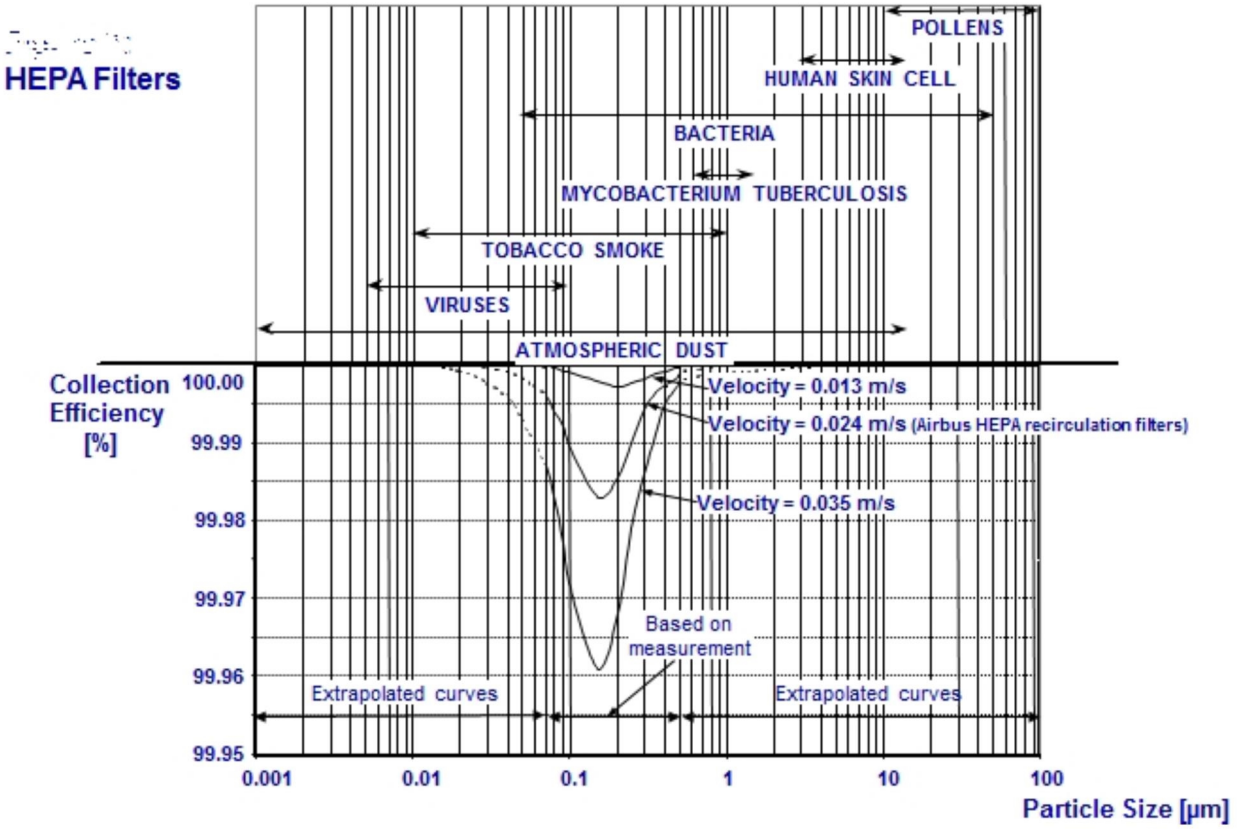
Products according to AMS1550 are typically not used as a disinfectant.
If desired, please check with your local health authorities if it can be considered as disinfectant efficient on Coronavirus-COVID19.

Next, we would like to provide the following background information which is relevant to all Airbus current production aircraft.

Background (Air Quality)

All of the air in Airbus cabins is, on average, completely changed every 3 minutes (during cruise) - even after taking account of filtered and recirculated air. This is a much higher rate of flow than people experience in other indoor environments, and means that passengers are provided with about 80 times as much air as they need to breathe.

The air in Airbus aircraft cabins is a mix of fresh air drawn from outside, and air that has been passed through extremely efficient filters, which remove particles in the air down to the size of microscopic bacteria and virus clusters (with an efficiency of better than 99.99 per cent). These filters – called High-Efficiency-Particulate Arrestors (HEPA) – have been shown in tests to provide air that meets the standards set for hospital operating theatres. With reference to the below efficiency chart, we can see that particles within the size range of typical Viruses are captured by the HEPA filters with in excess of 99.99% efficiency. You can also refer to the attached information from filter manufacturers PALL and Donaldson-Le Bozec.



As stated in the attached OIT we consider that the HEPA air recirculation filters capture viruses such as the MERS (Corona virus) and COVID-19 Corona virus with extremely high efficiency.

In normal operation, less than a half of the air is filtered and recirculated - the rest is fresh air drawn in from outside.

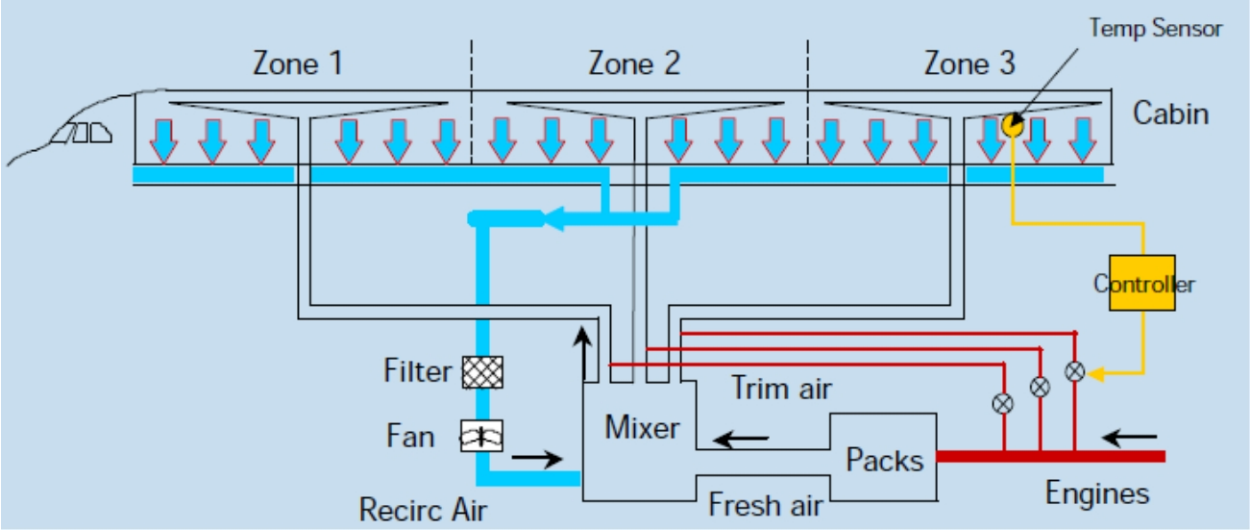
None of the air that is supplied to aircraft toilets, galleys and cargo-holds is filtered and re-circulated – instead it is dumped directly overboard.

The air supply to the cabin comes in at the level of the overhead stowage compartments – from above or underneath them, depending on the Airbus aircraft type – and is extracted at floor level, which means that it is drawn down rather than going up. Most importantly, there is no flow forward or rearward along the cabin.

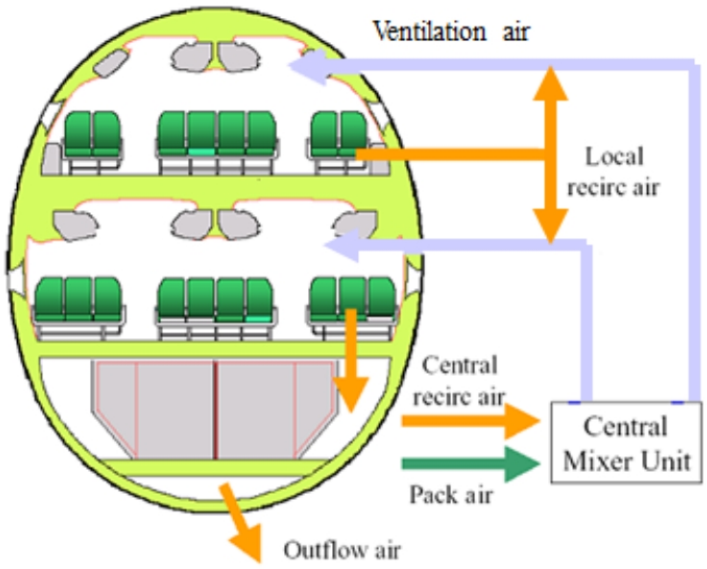
In order to understand how the airflow patterns within the cabin in relation to the possibility of spreading viruses, please see the following;

Fresh/Recirculation Airflow

In general, the fresh air (from outside) is mixed with recirculated air in a mixer unit and then this air is supplied to the cabin, and all occupied areas within the fuselage. This means that there is no specific recirculation airflow entering the cabin that is separate from the fresh air flow. There is only 1 airflow which is comprised of mixed fresh and recirculated air. See the diagram for A320 family below. The A330/A340/A350 family aircraft are similar.



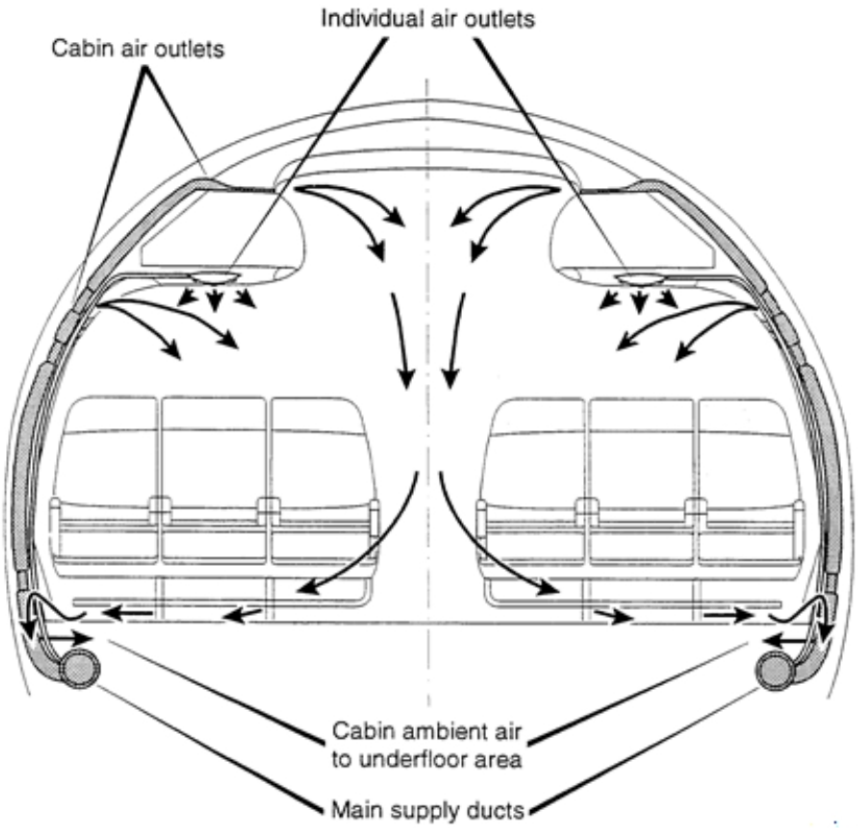
On A380, the airflow follows the same general principle, but is slightly more complicated, see below. In this case there is some additional local recirculation of air in the upper deck, but this is still mixed with air from the central mixer unit. Even though the diagram below does not show it, **all** recirculated air is passed through a HEPA filter before re-entering the cabin or being mixed with fresh air.



A320 Family

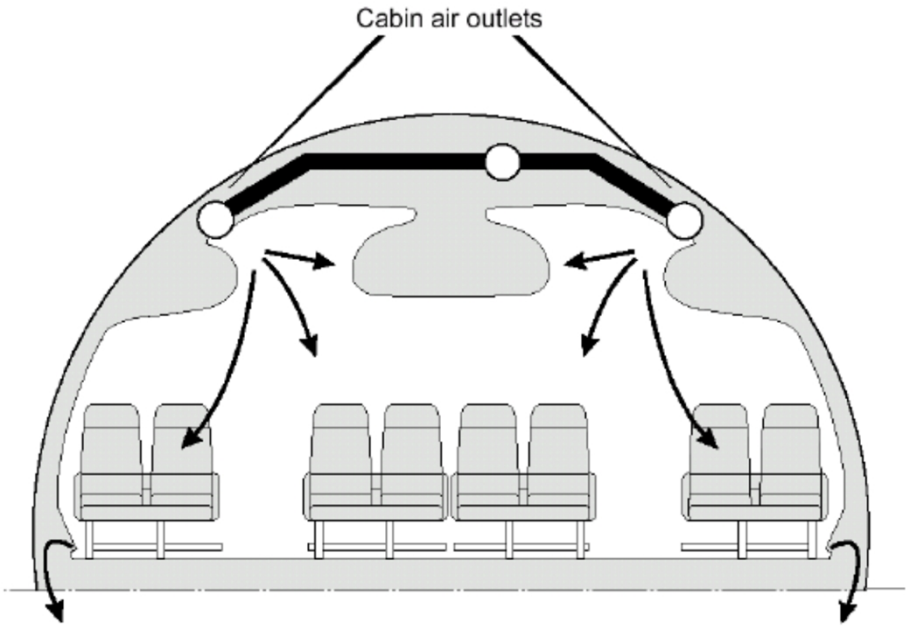
The ventilation system of the Airbus Single Aisle Aircraft (A318/ 319/ 320/ 321) have got two air outlets per side. The lower one ensures a sufficient flow to the passenger seats, the other one to the upper cabin space, which is the head space for working flight attendants or walking passengers:

- Flow from upper part of the cabin downwards
- Two air outlets per cabin side
- Lower outlets ensure good ventilation to seat area
- Upper outlets ensure good ventilation for persons standing/ working in the aisle



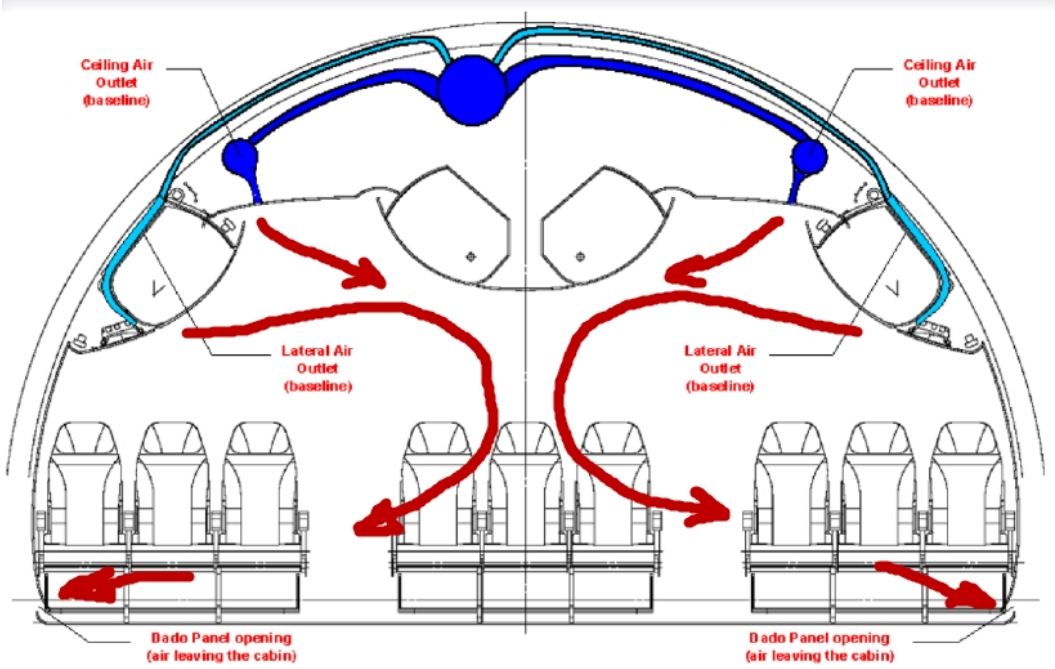
A330/A340 Family

The ventilation system of the Airbus Wide Body and Long Range Aircraft (A300, A310, A330, A340) have got one air outlet per side, which was proven to be appropriate to get an equal distribution of the air within the cabin.



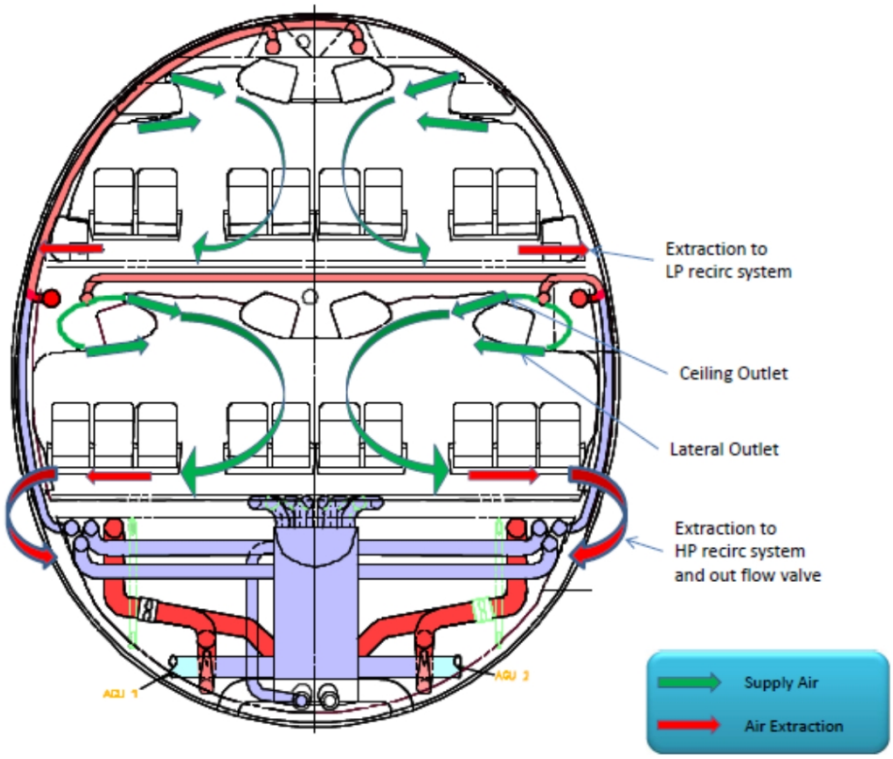
A350

On A350 there are Aisle ceiling outlets and also outlets between the baggage bins and the sidewall.



A380

On A380 there are 2 air outlets per side, making the airflow pattern similar to that of the A320 family.



Can Recirculated Air Spread the Corona Virus ?

This is unlikely. As mentioned above, the airflow induced by the recirculation system is mixed with fresh air in the mixer unit, and the combined air enters the cabin through the air outlets. This airflow passes over the occupants as it passes towards the floor level where it is extracted. This air will then go overboard via the pressurization outflow valves(s), or will pass through a HEPA filter for injection back into the mixer unit. Therefore, because the HEPA filters have an extremely high efficiency in capturing the Corona virus, the recirculation airflow does not spread the Corona virus throughout the cabin.

Can Fresh Air entering the Cabin Spread the Corona Virus?

No. The fresh air comes from either the engine or APU bleed system, and then through the ECS packs. This fresh air gets sterilized by the high temperatures experienced in these systems, and no virus or bacteria are expected to survive. This means the fresh air part of the cabin and flightdeck airflow does not need to be filtered to remove any virus or bacteria.

Special Operating Procedures?

No. In reference to the information provided above, there are no special aircraft operating techniques recommended by Airbus in relation to MERS or NOVID-19 Corona virus transmission on board the aircraft. Airbus does not recommend turning off the air recirculation fans.

ECS Pack OFF take-off as per normal procedures should not be a cause for concern because the recirculation airflow will maintain the flow patterns previously mentioned.

There may, however be relevant crew procedures recommended by IATA, CDC etc. relating to hygiene matters because the most likely way that such virus transmission on board the aircraft could theoretically happen, would be due to direct physical contact between passengers and cabin crew, and we recommend the operator to review the internet links we previously provided at the beginning of this message.

Time to Replace (purge) Cabin Air on Ground

In case it is requested to run the ECS on the ground after passenger disembarking in order to ensure the complete cabin air is purged we have to consider the following.

It makes a difference whether you are using APU or engine bleed to supply the ECS packs. Typically, the airflow supplied by the APU is less than the engines, and it is usually the APU that would be used to run the ECS at the gate. If you were to use a HP ground cart to run the ECS in the subject scenario, the flowrate and therefore cabin air exchange rate would be related on the HP ground cart flow.

Additionally, if you want to know the cabin air exchange rate, we would normally only consider the fresh air flow, and ignore the recirculation airflow, eg. For carbon dioxide replacement. In this case where we are concerned by virus removal, and knowing that the recirculation filters catch viruses very efficiently, it is arguable whether you should consider only fresh air or fresh+recirculation air to calculate the air exchange rate, because the recirculation airflow can also be considered as removing viruses in this scenario.

For this discussion we will take a conservative approach and consider only the fresh airflow using the APU as the bleed source. This means that if the recirc fans are on, or engine bleed is used, the exchange rate will be a lot faster.

Note also that the ambient temperature can affect the bleed air flow rates achieved from APU and engines, therefore we have tried to take the worst case scenario (hot day performance) where possible.

A319/320/321

On ground the ECS flow (both ECS packs ON, Norm flow) when using the APU will be approx. 0.5 kg/sec. Using the engines on ground this would increase to 1.1 kg/second.
For APU bleed, the cabin fresh air exchange on the ground takes approx. 5 minutes,

A330-200/300
On ground the ECS flow (both ECS packs ON, Norm flow) when using the APU will be approx. 2.1 kg/sec. Using the engines on ground this would increase to 2.4 kg/second.
For APU bleed, the cabin fresh air exchange on the ground takes approx. 3 minutes

A350
On ground the ECS flow (both ECS packs ON, Norm flow) when using the APU will be approx. 1.6 kg/sec. Using the engines on ground this would increase to 2.2 kg/second.
For APU bleed, the cabin fresh air exchange on the ground takes approx. 6 minutes

A380
On ground the ECS flow (both ECS packs ON, Norm flow) when using the APU will be approx. 3.6 kg/sec. This is assuming a worst case (lowest) flow from the APU. For APU bleed, the cabin fresh air exchange on the ground takes approx. 5 minutes.

The above figures are for the cabin, and represent a conservative approach. For the flightdeck, the air exchange rates are faster, due to a higher fresh air flow relative to the volume of the flightdeck area.

In case only 1 ECS pack is operating, the fresh air flow will drop by not more than 50%. In that case, a conservative approach would be to double the above exchange rate figure.

Survey for the Engineering Support section

Annex

General Information

Potential impact:	Maintenance				
Key information:					
Solution benefit:					
First issue date:	04-JUN-2015	Issue date:	12-MAR-2020	Last check date:	12-MAR-2020

Technical parameters

ATA:	21-00
A/C type/serie:	A300, A300-600, A310, A318, A319, A320, A321, A330, A340, A350, A380, AST
Engine:	
Engine manufacturer:	
Fault code/ECAM warning:	
FIN:	
Part Number:	
Supplier:	

Attachments

General:

- ISI_21.00.00119_Summary.docx

Engineering Support:

- AECAHEPENc(released).pdf
- PATTLNK_11282005_1544-Donaldson - Le Bozec HEPA filter facts.pdf
- OIT-999-0008-20-00.pdf

Links

N/A

Frasers Aerospace - Internal Notes:
Bacoban for Aerospace only available from Frasers Aerospace
Bacoban for Aerospace 1% DL Hand Spray Application Bottle - https://www.frasersaerospace.com/product/bacoban-for-aerospace-disinfectant/
Bacoban for Aerospace 1% DL Pack of Wipes - https://www.frasersaerospace.com/product/bacoban-for-aerospace-wipes/
Bacoban for Aerospace 3% DL Fogging / Nebuliser type - https://www.frasersaerospace.com/product/bacoban-for-aerospace-3-fogging-type/