

TWO OF THE MOST SIGNIFICANT
GLOBAL SOCIAL THREATS
ARE LINKED DANGEROUSLY
VIA
HVAC VENTILATION ALTERATIONS
COVID VIRUS/GLOBAL WARMING

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PREFACE

Two of the most significant global social threats, Climate Change and COVID virus transmission, are dangerously linked via COVID HVAC ventilation solutions.

Authorities have suggested HVAC systems be altered to full fresh air and/or abort Demand Controlled Ventilation (DCV), reverting back to design constant supply air temperatures. This applies to both thermal and CO₂ load variation responses. (DCV varies the amount of fresh air above minimum code requirement based on conditions in the building.)

These HVAC ventilation changes will have two severe environmental repercussions:

1. They will increase the HVAC systems' atmospheric heating input directly, via increased associated HVAC exhaust, ranging from 417% to 670% over conservation circuit performance.
2. They will also increase GHG production ranging from 333% to 700% to produce the required heating of the increased outdoor air.

We have searched for data regarding live virus content in the HVAC supply air as it enters the occupied space with the HVAC dampers at maximum and minimum outdoor air conditions, with no such data being found.

Authorities claim the live virus tends to be killed during attempted collection caused by turbulence. If they are correct, the turbulence of going through the spinning blades of the return and supply fans will also kill the live virus.

The net result allows no live virus leaving the HVAC system diffusers before or after the suggested HVAC ventilation changes; however, the changes escalate global warming impact of millions of fan systems.

Based on available current data the COVID HVAC ventilation solutions are extremely destructive regarding Climate Change, with likelihood of no benefit addressing COVID virus transmission.

This paper suggests a testing method assessing the live virus content in the HVAC system establishing a non-turbulent supply air environment at full air recirculation and no recirculation scenarios. Complete data is required. With over forty years of redesigning HVAC conservation control logic, APS will volunteer its time assisting a credible laboratory and donate \$10,000.00 toward the performance of the required testing.

WHY CARE?

BBC NEWS:

September 14, 2021

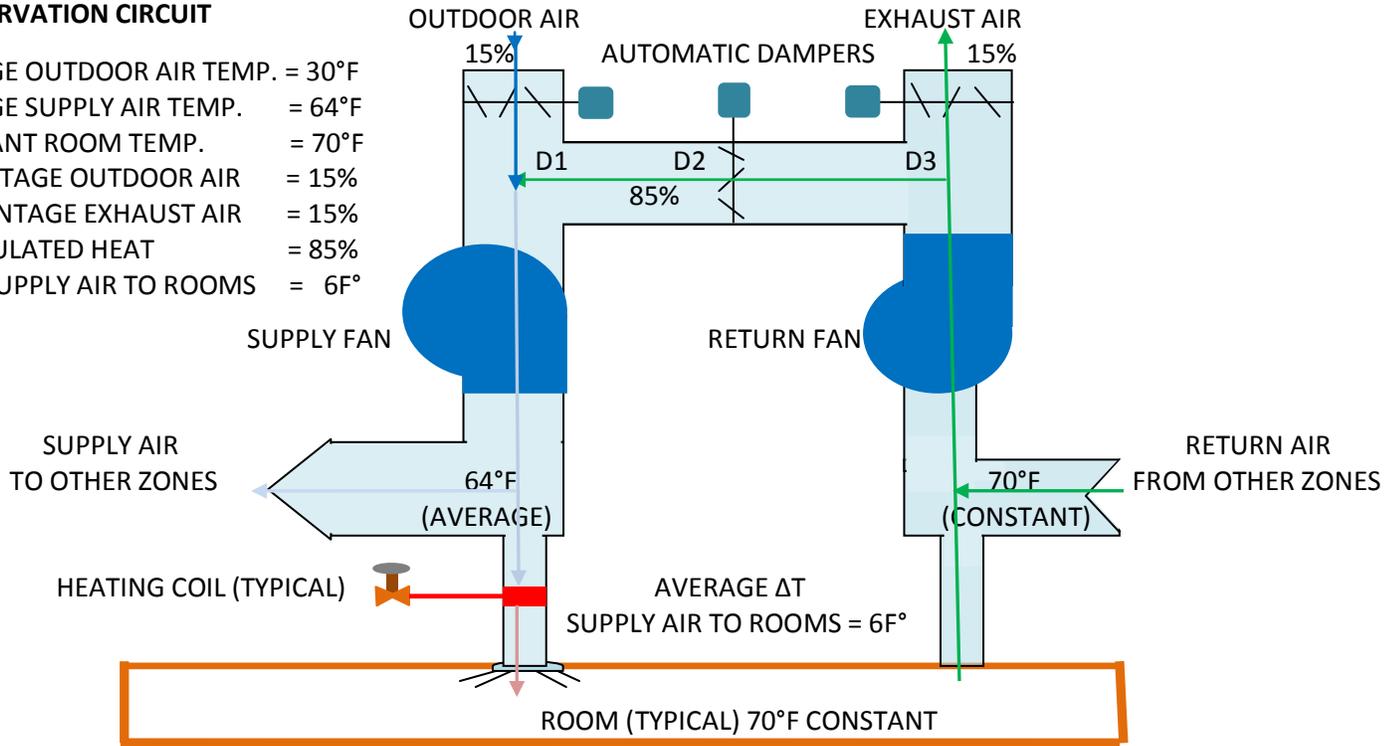
A new global survey illustrates the depth of anxiety many young people are feeling about climate change.

- Nearly 60% of young people approached said they felt very worried or extremely worried.
- More than 45% of those questioned said feelings about the climate affected their daily lives.
- Three-quarters of them said they thought the future was frightening. Over half (56%) say they think humanity is doomed.
- Two-thirds reported feeling sad, afraid and anxious. Many felt fear, anger, despair, grief and shame - as well as hope.
- One 16-year-old said: "It's different for young people - for us, the destruction of the planet is personal."

EXPLANATION OF HOW SUGGESTED HVAC VENTILATION INCREASE IMPACTS GLOBAL WARMING

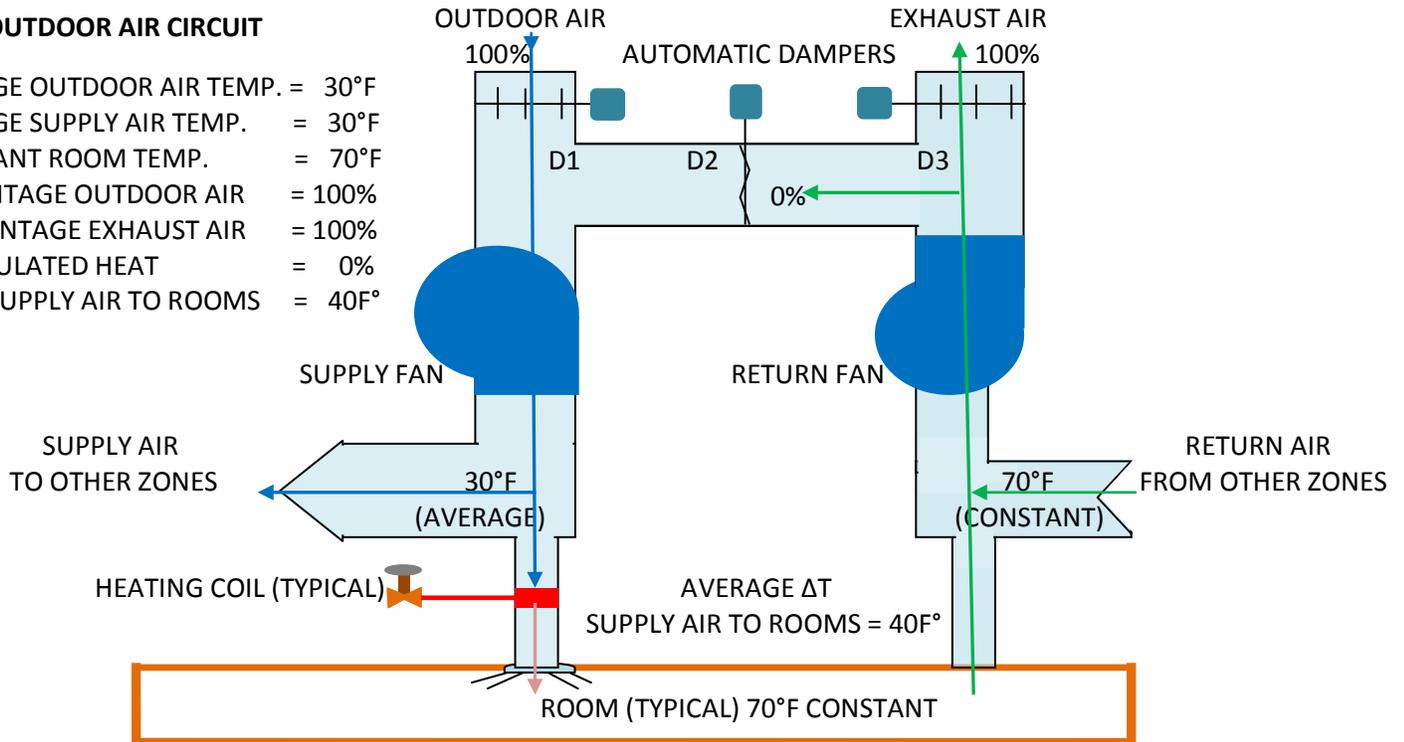
CONSERVATION CIRCUIT

AVERAGE OUTDOOR AIR TEMP. = 30°F
 AVERAGE SUPPLY AIR TEMP. = 64°F
 CONSTANT ROOM TEMP. = 70°F
 PERCENTAGE OUTDOOR AIR = 15%
 PERCENTAGE EXHAUST AIR = 15%
 RECIRCULATED HEAT = 85%
 ΔT OF SUPPLY AIR TO ROOMS = 6°F



100% OUTDOOR AIR CIRCUIT

AVERAGE OUTDOOR AIR TEMP. = 30°F
 AVERAGE SUPPLY AIR TEMP. = 30°F
 CONSTANT ROOM TEMP. = 70°F
 PERCENTAGE OUTDOOR AIR = 100%
 PERCENTAGE EXHAUST AIR = 100%
 RECIRCULATED HEAT = 0%
 ΔT OF SUPPLY AIR TO ROOMS = 40°F



NOTE: INCREASED CLIMATE CHANGE DAMAGE AT TWO DIFFERENT POINTS:

The direct heat increase, via exhaust air, into the atmosphere from altering to the 100% outdoor air circuit is 670%.

The increased GHG emissions, caused by increasing the ΔT of the supply air to the rooms is 700%.

This is worst case scenario, as most systems' safeties disallow this alteration, but various percentages are achievable. Disabling all Demand Control Ventilation (DCV), as per ASHRAE suggestions, reverts to minimum supply temperature set point causing about a 417% increase in exhaust heat and at about a 333% increase in GHG emissions into the atmosphere. This is best case scenario.

ASHRAE altered from suggesting 100% outdoor air, but many governing authorities do not know this fact. ASHRAE's position of disabling DCV remains, based on available papers. **If the live virus cannot travel through the turbulence of the HVAC fans and return alive to the occupied spaces, the alterations in the HVAC equipment presents no benefit, as the supply air should have the same live virus content before and after the alterations; however, the alterations are extremely damaging regarding global warming.**

We could not find data on live COVID virus quantities at various locations in HVAC systems. We did find reports indicating the live virus could not travel from occupied spaces, through the HVAC system and back to the occupied space. This communication is one from an ASHRAE member on their Epidemic TASK Force. We need to know where the virus survives in HVAC systems before setting plans. The accompanying papers may assist in that requirement.

Subject: RE: COVID-19 transmission consideration

Hello,

Please see the following response from a member of the ASHRAE Epidemic Task Force:

Hello David.

Thank you for your question to the ASHRAE Epidemic Task Force (ETF) and for forwarding the interesting attachments.

*The science surrounding the possibility and likelihood of airborne transport and transmission of COVID-19 is rapidly changing. As time goes on, more and more respected scientists are convinced that the airborne pathway for transmission is likely. For instance, in early July, 239 well-respected scientists (including some serving on the ASHRAE ETF) from 32 countries petitioned the World Health Organization (WHO) to rethink the importance of airborne transmission of the SARS-CoV-2 virus. Their letter can be found [here](#). It prompted the WHO to change their [position](#) and recognize the airborne pathway in the ongoing pandemic. As you mentioned, there is not a lot of hard evidence showing that airborne viral particles can travel long distances and through HVAC systems. However, this lack of evidence is not proof that airborne transmission cannot happen. **Sampling and culturing viable virus (any virus) from the air is extremely difficult to do. The relatively turbulent act of sampling tends to kill the virus, making true viability very difficult to ascertain.** Given those limitations, it is likely viable SARS-CoV-2 viral particles are traveling further in the air than we can concretely prove. **HIGHLIGHTING ADDED.***

After reviewing all of the literature we have available (and doing our best to keep up with new reports), the conclusions of our group of experts is that the transmission through the air is likely enough that we believe countermeasures are warranted. That is why we put together what we hope are practical suggestions for ways for owners/managers/occupants to proceed. We also tell people to use the suggestions with caution. As you suggest, difficulty maintaining the RH level is one reason to consider limiting the amount of incoming outdoor air.

We also wholeheartedly agree with your assertion that more research is needed to be sure our recommendations are the best possible. However, in the throes of a global pandemic, we firmly believe we need to be intelligently proactive and not wait for absolute proof before acting. There is a significant amount of research going on currently, and there will likely be much more in the future. Eventually, we may learn more about how effective our guidance truly was during the pandemic. In the meantime, we are choosing to err on the side of caution.

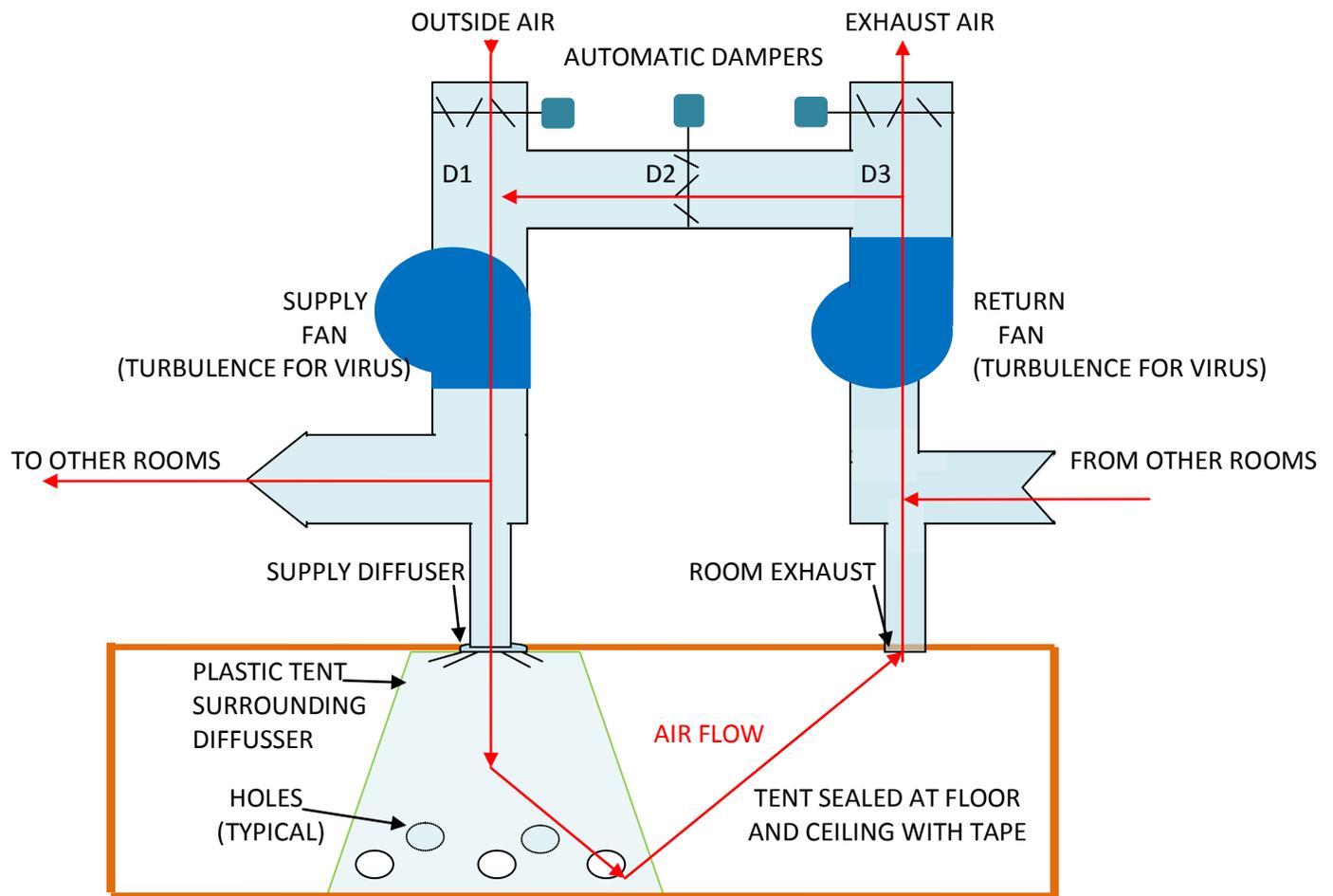
Regards,
Steve Hammerling
ASHRAE Manager of Technical Services

Answers to technical inquiries are provided as a service to the public. While every effort is made to provide accurate and reliable information, they are advisory, are provided for informational purposes only, and may represent only one person's view. They are not intended and should not be relied upon as official statements of ASHRAE.

SUGGESTED TEST COMPLETING REQUIRED DATA

COVID VIRUS TEST IN NON-TURBULENT HVAC FAN SUPPLY AIR

CONSIDERING ESCALATED GLOBAL WARMING AND POSSIBLE VIRUS TRANSMISSION IMPACTS



THE PROBLEM----- Increasing outdoor air ventilation is escalating global warming in two manners:

- 1- The increased heating required increases GHG emissions caused by the HVAC system up to about 700%
- 2- The increased exhaust air increases atmospheric heat input via the HVAC system up to about 670%.

The only information we have found indicates that no testing has been done in all the appropriate locations on typical HVAC systems for live COVID virus, supporting the maximum ventilation position of much of governing society. Opinions expressed by authorities indicate that the virus cannot live through turbulent environments. The reports found indicate the live virus cannot travel through the typical HVAC system and return to the occupied space as a threat.

REQUIRED TESTING---The illustration above presents a means of creating a relatively non-turbulent supply air environment to determine if live virus can survive the turbulence of the HVAC fans and return to the occupied areas.

- TEST METHOD
- 1- Build a tent as illustrated and run system until the air in the tent matches supply air quality.
 - 2- Alter the HVAC automatic dampers to have D1 and D3 closed and D2 open (full recirculation) if fan CFM's allow.
 - 3- Test the tent air and the room air for the live virus.
 - 4- Introduce the live virus into the room outside of the tent.
 - 5- Run for enough time to have tent refilled completely with return air that had the live virus introduced.
 - 6- Test again for the live virus in the tent and the room. Record the quantity of live virus at both locations.
 - 7- Alter the HVAC automatic dampers to have D1 and D3 open and D2 closed.(full outdoor air) if allowable. Repeat testing.

CONSIDERATION---If the tent live virus is absent in both the full outdoor air and full recirculation scenarios there is no benefit in altered ventilation: however, the full outdoor air position will have significant damage implications regarding Climate Change. If there is benefit in extra ventilation, it should be weighed against the negative impact, regarding Climate Change.

SUMMARY

1. All in the industry have been on a learning curve regarding COVID and HVAC; therefore negative comments are not helpful and everyone with a positive solution or input should speak up.
2. The ASHRAE-suggested ventilation changes initially had HVAC systems altered to maximum outdoor air where possible, which was a reasonable first position reaction.
3. ASHRAE altered their position in some steps as new information became available, which is also a logical path.
4. The current ASHRAE suggestion of disabling DCV will prevent conservation circuits from recirculating a lot of heat in buildings, which will dramatically increase HVAC systems' direct heat atmospheric input and also increase GHG emissions.
5. The current understanding of experts is that the virus is killed by the turbulent act of collecting samples. Accepting this, the turbulence of going through the return and supply fan blades should kill the virus.
6. Knowing whether there is live virus coming through the diffusers feeding the rooms is critical. If the diffuser air has no live virus before the HVAC ventilation changes and no live virus after the ventilation changes, the changes at the fan systems are of no benefit regarding COVID protection; however, the changes are very damaging regarding Climate Change. The suggested testing method on page three of this paper will allow a non-turbulent environment in the HVAC supply air, providing the required information relating to the HVAC ventilation alterations.
7. If the HVAC alterations provide benefit, it should be weighed against the negative impact on Climate Change created by these alterations.

Please send questions or comments to:

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