IECC Committee Hearing Agenda  
August 1, 2019 2pm-5pm  
City and County of Denver, Room 4i5

1. Roll Call and Introductions

2. Discussion and voting on **Chapter C4 of the IECC and/or DBC-IECC**
   a. (P66)364: CA 103.6 and 103.7 (tabled solar ready appendix proposal)
   b. (P83)381: C401.2
   c. (P82)380: C401.2
   d. (P169) (previously P108): C402.2
   e. (P167)485: C402.5.1  
   g. (P122)440: C402.5.2.1 
   h. (P95)400: C403
   i. (P49)347: C403.3
   k. (P133)451: C403.7.1.2
   l. (P126)444: C403.7.4
   m. (P121)439: C403.7.4 exception 8
   n. (P123)441: Table C403.7.4
   o. (P125)443: Table C403.7.4
   p. (P124)442: Table C403.7.4
   q. (P63)361: C403.8.5
   r. (P60)358: C404.2.1
   s. (P67)365: C404.2.2

Please note that any items that we do not get to in this hearing will be automatically transferred to the next scheduled hearing date and will be the first items on the agenda for that hearing.

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https://global.gotomeeting.com/install/375634997
Proposal # P66 (Revisions Received)
The purpose of this proposal is to modify Appendix CA to create requirements that will make it easier to add onsite storage to buildings in the future.

Public Testimony in Support: One main revision and a couple of small editorial revisions. The substantial revision is to take out interconnection pathway requirement based on committee feedback. There were concerns about how you define that storage and the implications having battery storage in the buildings. Committee didn’t feel this was needed. The physical space in the panel was found to be reasonable, so that was retained. In addition to solar readiness in the building there would be one energy storage readiness requirement, just for physical space in the building.

Public Testimony in Opposition: None

Questions from the Committee to Proponent: None

Original Motion: As-Submitted (AS)

Reason: Seems revisions are consistent with what we requested to keep solar ready provisions and changes to the storage provisions.

Final Motion: As Submitted

Final Vote: AS 12-0

Additional staff or committee comments for the record:

Proposal # P83 (Tabled due to committee not having adequate time to review)
The purpose of this proposal is to limit ASHRAE Standard 90.1 compliance to the Appendix G approach and to ensure that the ASHRAE compliance path meets Denver’s energy code goals.

Proposal # P82(Tabled to August 15th due to committee not having adequate time to review)
The purpose of this proposal is to limit the number of compliance paths available in order to improve the consistency of energy outcomes among various compliance paths and to improve the usability and enforceability of the code.

Public Testimony in Support: Further discussion in local modeling community and what they would like to see, original P82 and P83 work to limit modeling-based options.

Proposal # P169 (Revisions Received).
The purpose of this proposal is to properly account for common thermal bridging in exterior assemblies that are not currently penalized in the IECC.

Public Testimony in Support: Minor revisions eliminated some of the words that didn’t make this proposal clear. Fundamentally just to address steel girts and how you deal with that and insulation value that’s between. Not intended to increase or decrease insulation, simply a clarification so users know what to do with insulation between steel girts. Fills a gap that has been ignored in IECC. Without this people are submitting assemblies that don’t comply, this give them a way to use metal girt but take appropriate penalty when using cavity insulation between girts.

Public Testimony in Opposition: None

Questions from the Committee to Proponent:

1. This appears to modify a different code section from the original proposal is that correct?
   a. Yes, it is different. This location is a much better location because it’s providing the same equation already used in this section to establish thermal performance of the assembly with z girts.

2. Committee had some structural questions last time have those concerns been addressed?
   a. This proposal shouldn’t have any structural implications.

3. High Rise Application where they need more substantial structural connections, would there be any issues preventing them from going another attachment method?
   a. No, it doesn’t prevent that.

4. Does it penalize any specific building type without a solution?
   a. Ran calculations to make sure reasonable solutions for a broad range of insulation products would work and this would allow that. There is going to be some changes to get the performance intended. But wouldn’t change the ability to use girts or alternatives.
5. As construction moves more to pre fab panels how will this impact those pre fab panels?
   a. If they are using z girts as part of that system, it would be treated just like a site-built assembly. Wouldn’t prevent from using it would just ensure the system was compliant.

6. Do we need to make any changes to Comcheck?
   a. Yes, this would be a change to Comcheck. ASHRAE 90.1 is working on something more complex than this. As soon as change is made Comcheck will adjust the programming to support the change.

7. What do we consider intermittent, included in the language of the exception?
   a. Space clips out as far as you can, but it will vary, not sure we should put a definition on it, based on forces that the clip sees.

Original Motion: As-Submitted (AS)
Reason: Agree that this fills a gap in the code. This fills in better to create more accuracy in load calculations.
Final Motion: AM
Final Vote: AM Approved 10-3-1
Additional staff or committee comments for the record:

Proposal # P167 (Still working on revisions for this proposal)
This amendment basically codifies what has been standard practice in Denver for years, as code officials have looked the other way and not enforced the air barrier requirement at heated plenums. This amendment would align the rules around heated plenums with that of ASHRAE 90.1.

Committee Feedback:
Options for this proposal revisions:
Option 1
Allow lack of air barrier at bottom of plenum but to change from ASHRAE with same qualifications of semi heated space. Allow lower level of insulation tight to the bottom of the slab and then allow 90.1 levels of bat insulation at the bottom of the plenum but still meeting ASHRAE requirements of substantial contact. Bat insulation has to be solidly clipped to grid ceiling. When those move over time, we’ve still protected our building above by adding bat insulation to the slab above.

Option 2
To not do insulation at the slab, allow a lower level of insulation at the bottom of the grid, instead of bat insulation, require some upgrades. Require bat insulation be perfectly sized and attached to the ceiling tile individually or have the ceiling tile itself be insulated itself.

Spoke with stakeholders, architects, designers, contractors felt this was achievable. Want to keep option of hard lid ceiling but reducing amount of insulation required that gives it a benefit to what’s in the IECC right now. Propose allowing to drop to mass R13 to reward for adding air barrier.

Discussion:
Why would we need to consider dropped hard lid as metal framed floor when we have in the code amendment that allows you to take insulation required to be in contact with subfloor can now be dropped to the bottom as long as you have that hard lid. If you are required R12 you could still have R12. You have to have a continuous layer and a sealed plenum.

Conditioned space with in the plenum is the reason you would have to have the R value at your thermal envelope, because thermal envelope is below your plenum.

Possibly pick one option and put the other option as an exception. It comes down to a cost impact item whether you pin to underside or insulated tiles. So, leave that up to the design and construction team.
Proximity of air barrier and the insulation doesn’t achieve it’s intent when it’s separated from its air
barrier. Concerns understanding put all insulation at the level of ceiling and keeping slab as air barrier and having a solution that allows no insulation to be located at the slab. Would like to see information on the function loss.

Where does it require the air barrier to be adjacent?

It’s common and good practice.

May need to look at info on insulated panels regarding air tightness and improvement with those. End up being more air tight than conventional.

Yes, the panels themselves do, when you have the pressure those can lift. Tiles aren’t going to sit tightly against each other in the grid, as time goes on, they will shift.

Moving air barrier down to the ceiling is one option.

Yes, that would be an option but not a requirement.

If that’s an option would we then have a double air barrier one at the concrete top and one at ceiling grid.

Concrete would act as an air barrier, but you wouldn’t have to connect them.

If you’re heating that plenum your thermal envelope moves.

Radiant floor system, heating dwelling unit below this would not change anything right?

You would bury everything under the insulation.

**Proposal # P122 (Revisions sent during meeting)**

Require Leakage Calculations on the plans similar to ventilation calculations. There are maximum leakage requirements in Table C402.5.2 and Section C402.5.1.2.2. It would be simple to use those values and require the leakage rates be published on the construction documents so there is a benchmark for envelope testing and building pressurization design requirements.

**Public Testimony in Support:** Air leakage needs to be on the plans if for nothing else than liability when things don’t work. A building with all garage doors will have different leakage rates than a building with 1 door and no windows. Even though we are testing now to .4 CFM per sq. foot leakage. Building with no windows or doors, .4 is a disaster. This allows you to work through those different options. Really the intent is just to start coordination between architects and engineers, so we don’t have massive heating problems in winter. We put in a few more calculations to make this more user friendly. Added miscellaneous openings not covered. Biggest reason to consider, as Denver moves forward, the design community will see the benefit and make this a staple. Maximum allowable code gives a number to contractor to look at leakage. Few formulas normal operating conditions and other possible calculations. This is a suggested table. Allows for evolution in the process.

The engineering communities uses computerized program for heat loss, heat gain calculations, none of those programs calculate in filtration, only rule of thumb-based location of room and type of systems based on air changes, very little to do with infiltration or exfiltration. After you do load calculations you don’t get feedback on infiltration or exfiltration rates in terms of CFM per square foot at a certain static pressure. None of the engineers are aware of the problem they are going to be getting in to when they have to face fact that this building has to be tested and pass at .4 CFM at 75 pascals.

**Public Testimony in Opposition:** None

**Questions from the Committee to Proponent:**

1. Is this a requirement to submit something or put maximum leakage that’s allowed where the code doesn’t?
   a. The new adopted testing is .4 CFM per square foot. Based on our previous amendment. Middle requirement not a design requirement, just looking for something to be written on plans.

2. If this is not used in mechanical load calculations, what’s the purpose of putting this on the drawings?
   a. Just like when LEED was adopted this will move the design industry. People will see
the benefit. If you did air balance on most buildings you would see pretty negative buildings with more air going in then exhausting out, this would help with that.

3. Does this suggest that because this is limited to fenestration, that if you hit fenestration at .4 you think you’re ok, but there is other contributing leakage? Could this give false confidence in the ability to pass the testing requirement?
   a. 1 addition we made is the 31,000 and 4,445 based on what code says, this is right out of the table in the current code for allowed leakage 402.4. Gives an engineer a good idea of what it should be.

4. Is this somewhat in line with what’s in residential with this same table for how to seal leakage?
   a. No. Look at high speed doors they leak at 1.3 CFM per sq. ft. So, if you’re testing to .4 CFM and you have all high-speed doors you’re going to fail. A lot of 1 CFM per square feet and then some .2 this allows engineer and architect to coordinate what is that value.

5. No requirement between this table and the calculation vs what’s in the field?
   a. The value is to give guidance to engineer to work with architect regarding how much leakage the building should have.

*Original Motion: As-Submitted (AS)- Withdrawn Disapproval*

*Committee Discussion:*

Feel like this being suggested it will just be thrown on at the end of the project.

They may not use the number but something we could consider requiring in the future and gives them a step towards goal of them using it in the future.

Intention is good, don’t agree with methodology. Don’t want this to hold up projects for not having this chart included on plans, if not going to be required we are creating more work for architects.

It is the right direction but not necessarily the right path.

Design community doesn’t think about air infiltration during design process, this would force that conversation earlier in the project. See value getting this to be an item thought about in design process.

Think we already made a step towards encouraging the conversation about air infiltration by requiring the commissioning agent for envelope, should be having that conversation and bringing that table up. With a good building envelope commission agent should already have this table in the works. This would be a good 2nd step, maybe in the next cycle.

This table tells you 4,445 CFM, but code allows 31,000 and there are buildings that struggle to get to .4 CFM are we giving them false security and not addressing the extra 6,000 of leakage. No real way to capture all of those other elements in this table. Like the commissioning step to take this on instead of incorporating the table.

Creating a false sense of security is concerning. A lot of items not addressed in this table, think the commissioning agent should take this and the education part of what this table tries to address.

Might be better for next code cycle or within the stretch code.

To require a chart that they aren’t going to use is not fair and could potentially hold up jobs. If it was asked to be required and includes the mechanical load calculations it would be valuable.

There are software programs out there that can model so this would just be a guidance tool. Like to see more info on the software programs.
Final Motion: Disapproval
Final Vote: D Passes 13-1
Additional staff or committee comments for the record:

Proposal # P95 (Revisions Received)
Add new requirements to the code to address dehumidification efficiency for indoor horticulture.

Public Testimony in Support: Main purpose is to save energy in dehumidification process for indoor agriculture including cannabis growers and save energy through the dehumidification process.
Proposing to allow 3 options: Main on being separate standalone dehumidifiers (standard practice) doesn’t allow inefficient practice of heating and cooling with standard roof top air conditioners. By requiring the stand-alone unit’s vs standard roof top air conditioners, it would save 25-30% of energy used for dehumidification. We were asked to clarify whether this should apply to all indoor agriculture and we are saying Yes it should. Asked to clarify for 2nd and 3rd options the backup reheat allowance, that has been revised in 13.2. Says you can use electric or fossil fuel reheat as long as you design primary system to fulfill at least 60% of the facilities dehumidification needs during peak dehumidification periods. Put in to better code language in revision. Added reference to other code required cooling efficiencies, we added space cooling equipment should meet minimum requires in 403.3.2. Other change was to efficiency standard for standalone from 2.0 to 1.9.

Estimated energy savings – standard roof top air conditioning units accomplishes required reheat for dehumidification using electric resistance or natural gas, if you assume that out of that standard unit you get 30% latent cooling and 70% sensible. For lights off period (12 hours a day) you don’t have any sensible load. Putting out 70% of energy in form of cooling that you then have to reheat, large waste of energy. Stand alone (during those times) would save 50-60%. Overall, it’s going to save 25 to 30%.

Reached out to other plant growers don’t affect them because they don’t typically use dehumidification. In touch with cannabis industry members, executive director says changes were well received.

Public Testimony in Opposition: None

Questions from the Committee to Proponent:
1. Do we know how much response we got from the Cannabis Industry?
   a. Been discussed at group meetings for last 3-6 months, taken votes. Typical meetings are small 35-40, 250 licenses in Denver. So, 10% representation.
2. Is it possible that this is an educational issue, if people were educated on the cost savings it would be worthwhile to invest in these?
   a. Could say that about almost any requirement.
3. Logistically how will this be proven besides efficiency? Is there opportunity for manipulation?
   a. Assume they would look at the drawing and see heat recovery, if they’ve already invested in the equipment why wouldn’t they use it.
4. How do you measure the 60%?
   a. They would have to do some calculations, what is the peak dehumidification need is the system sized to deliver 60% of that. Relatively simple calculation.
5. We had asked for letters and response from marijuana industry but those were unable to be supplied because they are in opposition of all regulations, can we clearly say there is support?
   a. Just like an industry they don’t want to be regulated; the ones who do the stand-alone dehumidification already don’t want to force others to do so.

Original Motion: A/S with Intent to Modify (ASM)
Modification: Delete the Exception for Electric of Fossil Fuel Reheat
Reason: Great to bring to attention and regulate so system isn’t misused at the scale dehumidification is being used now. Needs to be more efficient. Delete exception, because we can’t regulate it.
Committee Discussion:
Concern about singling out this industry. Understand cost savings but don’t want the city to be singling out an industry that already struggles to get through our processes.

Concern about the percentage of this industry that was represented in the feedback provided.

The majority of these are already built, because there is a cap on number we can have in the city, the number this will affect is small.

Any extra work from city side to get these calculations?
Not sure the city will have to put in extra work, it would be the design side that would be added work.

Seems like it’s important when looking at where we want to be, decreasing our energy usage.

Marijuana took away the progress we made in energy savings, so to increase the energy savings is a good step.

Final Motion: As Modified
Final Vote: AM 13-0

Additional staff or committee comments for the record:

Proposal # P49
VRF Heat Recovery Systems. The purpose of the added exception would be to increase the efficiency of VRF Heat Recovery systems and reduce installation cost associated with having to add mixing boxes on fan coils.

Public Testimony in Support: From City of Seattle Energy Code, this amendment looks to increase the efficiency. General VRF – how heat recovery works. Consists of outdoor heat pump unit, we use a compressor we do reverse cycle on refrigeration to do both heating and cooling. Heat recovery systems pipe out to heat recovery boxes which allow system to reverse refrigerant floor to different indoor fan coil zones so you can heat and cool at one time. Can have up to 50 indoor units on single heat pump. VRF system uses heat recovery. 2 indoor units, 1 heating 1 cooling have it connected to 1 outdoor heat pump unit. Unit that is cooling, we take refrigerant and absorbing heat from that zone in to the refrigerant and redirecting it to indoor fan coil that is calling for heating. The compressor isn’t doing a lot and we aren’t using the outdoor unit, it’s just utilizing the pump to maintain pressure in the system. The code requires for any indoor unit over 54,00 BTUs need to add economizers on indoor units. If we put an economizer on this system, we would no longer be able to do heat recovery.

This is not manufacturer specific applies to any VRF system.

Support eliminating economizers for VRFs

Public Testimony in Opposition:
Code already has exception for heat recovery, this feels unnecessary. If you add 10% outside air in to a space that would result in about 1400 more hours in compression operation per year in a cooling mode. Most buildings go in to heating around 30-40 degrees, these are relatively small systems so the ability to heat is limited especially with low outside air where you are going to need more cooling in the space. Economizer is a big energy saver, unless you use the exception already in the code. With VRF systems they don’t talk about refrigerant line length, most systems 25-50 feet in ratings can be installed up to 500 feet. Big D rate not accounted for in this system.

Rebuttal in Support: Denver Weather Data from ASHRAE tables show we heat more often below 55 degrees.
Seeing systems in 5-10 story office buildings, plenty of space that needs cooling year-round.
Rebuttal in Opposition: Already in the code. If you could demonstrate that you are getting usable heat recovery in that condition it would be fine.

Questions from the Committee to Proponent:
1. How many manufacturers represented in support for this proposal?
   a. 4 manufacturers
2. A lot of buildings in cooling year-round, if you can show heat recovery, we would be on board with this exception to eliminate economizers.
   a. Find that hard to believe with older buildings, maybe not with newer buildings that are built tighter.
3. Proponent open to amending. Adding language to require calculations for heat recovery, to show they are performing heat recovery in order to eliminate economizers.
   a. One thing to consider if we add economizer, we have to increase the outside air. Adding complexity for a little bit of savings.

Original Motion: Disapprove (D)
Committee Discussion:
Economizers are not required they are prescriptive so you can always via performance method, use energy model to demonstrate VRF is better than economizer you don’t have to have one, so this isn’t necessary due to there already being a path for this.
Final Motion: Disapproval
Final Vote: D 13-0 Passes
Additional staff or committee comments for the record:

Proposal # P133 (Brought back by Proponent with revisions)
Public Testimony in Support: Air flow stations, worked to bring back revisions. To add air flow station to units that don’t currently require over 4000 CFM. A little under 5 year pay back on average. California requires air flow stations on any ventilation equipment. Current code requires on VAV units. The problem is you end up with more air flow than you need in the building. Modified proposal regarding measure and control of the air flow, question was whether an air flow station can control a VFD did research and found that it can happen. Pretty good carbon impact 10-15% range 7% heating BTUs 7% fan energy so overall good savings.
Public Testimony in Opposition: None
Original Motion: A/S with Intent to Modify (ASM) * This is to include previous modifications we made at May Meeting.
Committee Discussion:
These air flow stations are only as good as the location they are placed. So many buildings have a unit and then we go down three feet and start branching, no air flow unit that can read properly within that first three feet. Curious if engineer team can help locate on the drawings
   Engineer should be locating it where it meets the requirements of the device. Typically have X amount of straight duct work after.
Final Motion: As Modified
Final Vote: AM 13-0 Passes
Additional staff or committee comments for the record:
P126, P121, P125, P123, P124 4 proposals for same section and then 1 proposal that times them all together(P123). Committee had concerns with P125 so it will be heard first.
Proposal # P125

Public Testimony in Support: Regarding energy recovery, trying to simplify the table. Current table supply, air flow and then you look at percentage to figure out what the air flow is, simplified table to say if the outside air is more than 7500 CFM between 70-80% or if over 5000 CFM if 80% outside air you would have to do energy recovery. This was in 2012 IECC, taken out in 2015. Feel it was taken out to do confusion with modelers regarding energy recovery with demand control ventilation. When doing the math, it’s about 6 year pay backs on these. Great 50-75% range reduction for carbon. Great step towards Net Zero.

Public Testimony in Opposition: None

Questions from the Committee to Proponent:
1. Concern that this has actual energy savings, we understood it was taken out because it didn’t create energy savings.
   a. We have a tool that looks at effectiveness or efficiency. Code requires 50%, largest selling is heat recovery wheels, that product 70% effective. When you do the math and look at 50% vs 70% is a much larger savings. Not addressed in the code is the fan efficiency which has a big impact on energy recovery. Those concerns addressed in other portions of this series of proposals.
2. Change to outside or exhaust air flow, if you have a system that is 10,000 CFM at 70% outside air you would not need heat recovery?
   a. No. One hole in the code is you can do 2 exhaust fans and not do energy recovery (exception 8) If you have 7500 CFM going out of the building you would need to do heat recovery.
3. If you only have 7,000 on 10,000 CFM unit you wouldn’t need it?
   a. So, there is still an exception and the exception says 70%. This would add some sort of measurement where there is currently none.

Committee decided to address the proposal(P123) (that incorporates P121, P126, P125, and P126).

Proposal # P123

Original Motion: As-Submitted (AS)
Final Motion: As Submitted
Final Vote: AS Passes 12-0
Additional staff or committee comments for the record:

P121, P124, P125, P126 Withdrawn

Proposal # P63

The purpose of this proposal is to close a loophole by regulating the efficiency of small capacity fans that are currently unregulated in the IECC.

Public Testimony in Support: Stand on reason statement.
Public Testimony in Opposition: None

Questions from the Committee to Proponent:
1. How common are these different efficiencies?
   a. More than 1/2 or 3/4 of fans on the market can meet the limits set here.

Original Motion: As-Submitted (AS)
Final Motion: AS
Final Vote: 10-0-1 Passes AS
Additional staff or committee comments for the record:
Proposal # P60
The purpose of this proposal is advance the requirements for high output water heating systems to reflect advancements in the market.

Public Testimony in Support: Stand on reason statement.
Public Testimony in Opposition: None

Questions from the Committee to Proponent:
1. What is the cost impact of going from 90 to 92?
   a. Basically, minimal by the time you get to 90 you’ve already made the transition. Not a technology shift at this point.
2. Why 92 and not 95?
   a. Through different code process 92 was the level that was found to be the least opposed.

Original Motion: As-Submitted (AS)
Reason: Proponents reason statement.
Final Motion: AS
Final Vote: AS 11-0
Additional staff or committee comments for the record:

Proposal # P67(Move to Table)
Public Testimony in Support: Stand on reason statement.
Public Testimony in Opposition: None
Questions from the Committee to Proponent: Original Motion: Disapproval
Suggest a threshold of area of penetration relative to exterior wall of the building at which point exterior wall is 10%.
Final Motion:
Final Vote:
Additional staff or committee comments for the record: