IECC Committee Hearing Agenda
July 11, 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 Tabled until August 1 hearing
   c. (P82)380: C401.2 Tabled until August 1 hearing
   bb. (P46)341: C403.4.6 Moved up in the agenda due to travel concerns of proponent
   cc. (P47)342: C403.9.6 Added to the agenda due to travel concerns of proponent
   d. (P169) (previously P108): C402.2
   e. (P167)485: C402.5.1
   f. (P51)349: C402.5.1.3
   g. (P122)440: C402.5.2.1
   h. (P95)400: C403 (hope to get to these next few proposals as well)
   i. (P49)347: C403.3
   j. (P46)341: C403.4.6 Moved up in the agenda
   k. (P133)451: C403.7.1.2

Denver 2018 IECC Committee Hearings

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https://global.gotomeeting.com/install/375634997
Proposal # P46
The purpose of this code change proposal is to encourage optimized ΔT for water-chilling package system designs.

Public Testimony in Support: Encourage better more efficient shield water design. Delta T of at least 15 degrees and water set temp of at least 52. This requirement is currently in ASHRAE 90.1 but not in IECC. Saves energy in pumping water. The design philosophy of lower flow that saves energy is endorsed by ASHRAE.

Public Testimony in Opposition: It is fair to say at certain points, Delta T 15 could be more efficient, but limits our engineers to one design for energy efficiency. Chillers are still the biggest motor in the building, and they do effect energy efficiency in the building.

Agree with last person testimony. 15-degree Delta T in Colorado would work in some places and would be more efficient but not in every application. We use energy engineers, and this would limit them. 10 degree sometimes makes more sense in certain building applications. Opposed to limiting to 15-degree Delta T.

Generally, if you design with 45- or 42-degree water you can save some energy. Chiller savings outweighs the fan savings. Engineers should be able to look at this case by case.

Rebuttal in Support: Intent is not to specify it has to be exactly 15 degrees, just saying it has to be at least 15 degrees. Meant to encourage better coil design to accommodate wider Delta T. Agree that chiller efficiencies do matter, have dramatically increased. This is not a manufacturer specific design. Encourage better chilled water system.

Not a requirement for only way to design, minimum to keep our engineers out of things that are less efficient. Exemptions in code copied from ASHRAE. On ASHRAE committee there were representatives from most major chiller manufacturers they were involved in this whole process. This has industry support, not manufacturer specific. Looking at chiller plant looking at all energy consumed, numerous studies that show this requirement compared to 10 degree will save energy. Savings data available in San Francisco, Greenville South Carolina.

Rebuttal in Opposition: Appreciate all areas presented, however they are not the same environment as Denver. With this we are taking it out of engineer’s hands. This is written specifically to benefit 2 stage impeller centrifical. Changing start point and limiting them to greater Delta T’s.

Don’t believe 15 degree is universally acceptable. Efficient systems can be designed with lower Delta T. Climate in Denver is unique.

Mention of Roy Hubbard, he wrote multiple papers in opposition to 2 GPM per ton. Suggest we look at that literature, times where this makes sense, but the climate is unique.

Rebuttal in Support: Talking about KWH of building and central plant. Pump motors are least efficient, they are the smallest. Doesn’t matter where you are, load calculated for a building by designing lower flow rates reducing net cost of energy. The ASHRAE committee that was the framework for this had no negative comments. This included a wide range of people in the process.
Questions from the Committee to Proponent:

1. For clarity is everyone speaking from a manufacturer.
   a. Some are with TRANE and some on phone are engineers
2. Are there are manufacturers that may not have as advanced of a product?
   a. It’s not about the advanced product, more about the effect on energy use. Wouldn’t lock anyone out of bidding a job.
3. Why do we need to codify?
   a. We could ask that about most HVAC things.
4. To require every system to be at this level for tenant finish seems too much. Adding new chiller to building it’s a good idea to leave up to engineer to decide the most efficient without forcing them to go through modeling process.
   a. This is not intended to apply to a small tenant finish, based on core & shell of building that require energy efficiency.
5. Where is that exemption for small tenant finish?
   a. Exception 4 is just for coil selection not for chiller selection. In tenant finish the water is supplied from central plant.
6. Any examples of major cities that have adopted this?
   a. Any city that adopts ASHRAE 90.1 would have adopted this as a prescriptive requirement.
7. Could someone speak to this being proprietary to manufacturers?
   a. Every chiller manufacturer can do a higher Delta T. Problem is the idea of the Delta T increases the lift, this proposal designed to increase the lift of the chiller. Certain chillers designed to operate at higher lift. If you reduce the lift on any chiller, the KW per ton will go down. It’s what drives it. It will advantage them if you artificially increase the lift.
   b. If you adopted this chiller water and condenser water TRANE has 80% chance of selling a project.
   a. It shouldn’t. This is not for chillers for coil selection.
9. Are we going to hear about 407 being struck out of this? If this says 407 is alternative, and we remove it.
   a. We would need to look at that.
10. Would like to hear more about impact with life cycle costs from both support and opposition.
    a. Support: Upfront cost more. On jobs where we’ve done 15 degree more on chiller, they are then saving money on downsizing pumps. Less water and less water pump energy. Energy savings in the long run. Smaller motors lower KW peak beneficial for energy efficiency.
    b. Opposition: Pump energy is about 1/3 to ¼ of chiller energy. With higher lift it takes a lot of energy. There is some amount to be saved with pump energy. The biggest most expensive is the chiller, we are talking about running it harder than normal. This will inevitably affect the life cycle on your chiller and maintenance because you are intentionally running it harder. Important to understand that 15-degree Delta T can sometimes be more efficient and result in a lower life cycle cost but not always. No clear data on when it is and when it isn’t. Going to be more efficient sometimes but not every time.
11. Initial cost is greater with these chillers than a 10-degree Delta T?
    a. Not necessarily. It depends. The load has to be met one way or another, through some combination of equipment. Reduce consumption and add work to something
more efficient.

12. Does it shorten the life span of the chiller?
   a. No data to support that.
   b. 543 hours more a year on average vs 45-degree water. It is going to wear out quicker.

Moderator: C405 Mechanical Equipment – any replacements must comply with C403. This would not be a conflict with ASHRAE.

Support: Internally discussed and open to additional exemption language to allow modeling.

Sometimes these are more efficient at lower temp and we should leave to engineers.

Original Motion: Disapprove (D) Think there is a lot of opportunity, but there are other ways to get engineers to reduce points, percentages. Gives designers the opportunity to get there, this inhibits designers to get there. Make it challenging by tying engineers’ hands by design isn’t the right approach.

Final Motion: Disapproved (D)
Final Vote: D 13-0 Passes

Additional staff or committee comments for the record:

Proposal # P47

Public Testimony in Support: Similar proposal to last but talking about condenser water instead of chilled water. Delta T 15 degrees. Reducing water pumping and downsizing other components. Encourage better design.

Public Testimony in Opposition:
Believe this is tying people’s hands in design.

Should be left to design engineers.

Public refers to previous testimony about tying hands of engineers.

The analysis years ago, this only made sense if condenser was over 105 feet ahead, lower energy rates than today.

Rebuttal Testimony in Support: Studies and analysis being sited are very old. Not helpful for a forward-looking goal. The water side economizer more focused on KWH but only one part of plant design.

Questions from the Committee to Proponent:
   1. How does this affect life span of equipment?
      a. Designed specific, when designer selects conditions, they look for a chiller optimized to that condition.
   2. Water side economizers not minimal in Colorado?
      a. Not only thing that affects energy use.

Original Motion: Disapprove (D) Tying engineers’ hand, dictating their design.

Final Motion: Disapproved (D)
Final Vote: Disapproval Passes 13-0
Additional staff or committee comments for the record:

Proposal # P66 (Previously tabled proposal)
Tabled again to August Meeting Regarding Battery Storage and Conduit.

Proposal # P169
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: Only one way to get continuous insulation, adhere to building. Alternative ways to attach, each one violates the continuous barrier we are looking for. Always some element of broken thermal bridge. Asking designer to recognize mechanical attachment and should be used in calculation of R Value. Asking that R value be considered when looking at R8 continuous.

Public Testimony in Opposition: Approach being taken is concerning. Gets to similar conclusion but in a different way. Other than fasteners, which do have an impact. This material between would be cavity insulation. Could use cavity insulation factor. Needs to be addressed in U Factor. Approach here is to penalize continuous insulation. Like concept but not the approach. We should consider alternative proposal.

Rebuttal Testimony in Support: Intent to recognize that if you put mechanical it changes the R value, open to description that calls for accurate value including those elements.

Rebuttal Testimony in Opposition: Favor allowing committee to look at proposal or work with proponent on this one to come back with a different approach.

Committee Discussion:
Hearing that this should be something proponent and the opposition could work together to bring something back.

Motion: Motion to Table this proposal to get Jay Crandall and Mark Lessans to work together to bring this back. 13-0 Passes August 1st.

Committee Feedback:
Different fasteners are chosen by designers, when you rework it requires thicker insulation. Are we just making the problem worse? Fasteners become more heavy duty. May be some unintended structural consequences.

Be mindful of systems more complex with lots of technology. Multiple layers of insulation can also be an issue, try to address that in the rework of this proposal.

Committee needs to understand if this creates a need for a Comcheck change.

Proposal # P167
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.
**Public Testimony in Support:** Difference between IECC and ASHRAE no semi heated space category in IECC like there is in ASHRAE. Our thermal envelope is required to have an air barrier. In theory we should be having heated plenum should be an air barrier. Not happening now, it is challenging to build this way. Proposing to allow that to happen, follow language of ASHRAE 90.1. Allows you to not have this air barrier. Codify what is happening already.

**Public Testimony in Opposition:** None

**Questions from the Committee to Proponent:**
1. Would there be an alternative instead of eliminating the air barrier requirement? Would we could consider pinning insulation under the slab?
   a. The conditioned space is enclosed by air barrier, reasonable to require 2 layers of insulation. Best practice insulation should be adhered to ceiling surface. If we require that then the energy efficiency would be affected. Could go for that, still solves the problem.
2. What happens if someone uses slab as trade off as mass?
   a. Probably going to happen either way. Through Comcheck it would be hard to comply without doing something.
3. Could there be a happy medium to reduce to a lower R Value, but still requiring that other insulation knowing it will be moved.
   a. That would be the same as semi heated spaces, allow you to drop R Value. If you do 2 then you have reductions.
4. Already language for mechanical, as written it’s redundant. Falls in category of already covered, inside or outside of the building. Concern about repetition
   a. If mechanical is inside of that do, we really need to thermally isolate it?

**Feedback from Committee:**
Main system is working a lot harder.
Call out specific system you’re talking about.
Floor needs to be exterior wall.
IECC requiring we move that air barrier and we are not doing that.
Think of other spaces this could affect. Stair wells etc. Semi heated spaces.
Upper layer insulation is difficult from builder perspective.
There are products out their example of insulated ceiling tiles, could we find a happy medium.
Careful on product manufacturer.

Public – Podium slab edge insulation, might be potential to deal with this issue.

Tabled to be brought back with changes at August Meeting.

**Proposal # P51**
The purpose of this proposal is to improve the air leakage rates of commercial buildings through requiring third-party verification of the air barrier installation.

**Public Testimony in Support:** Proponent – Stand on reason statement.

**Public Testimony in Opposition:** None

**Original Motion:** A/S with Intent to Modify (ASM)

**Questions from the Committee to Proponent:**
1. Is this in line with testing we discussed before?
   a. Yes.
2. What qualifies as an approved agency?
   a. Both defined terms in the IECC.
Committee Discussion:
Requiring testing can help from people going through full construction and then have to tear something out to correct. By the final test everything should have already been carefully tested, and we should know it will pass.

Testing requirement for P52 was passed these two proposals in sync.

Testing doesn’t apply to all buildings excludes Group R and Group I.

Final Motion: As Submitted (AS)- 2nd – Seals the gap between just testing to include review of construction documents.
Modification: 10% MCG will write modification. Vote: 13-0 Passes
Final Vote: AM 13-0
Additional staff or committee comments for the record:

Proposal # P122
Require Leakage Calculations on the plans similar to ventilation calculations, this would require separate documentation for each building component.

Public Testimony in Support: Proponent – Big challenge with leakage testing, engineers hard to tell how much building leakage it should have. This C402.5.2 has allowable leakage numbers. Simple spreadsheet that you put in square footage and you calculate allowable leakage you would end up with.

From design standpoint when we design energy recovery systems they are designed with supply and exhaust recovery. Looks at what portion of ventilation air coming back in to the building we can utilize. Leaky buildings where return air is not what we had provided as large as 30-40%.

A lot of information here has to be used for Comcheck anyways, so it should be readily available.

Public Testimony in Opposition: None
Questions from the Committee to Proponent:
1. How often would this get updated? Where do we get that data from?
   a. If table changes in next code cycle you would modify then.
2. Like the allowable leakage at the bottom of the table. Is this information easy to find?
   a. Building load calculations figuring out wall area anyway.
3. The architect would fill this out.
   a. Mechanical Engineer.
   b. Most is architectural so ideally the architect.
4. What’s your opinion on this from an architect perspective?
   a. If this is for mechanical and architectural to better work together, all for it. If intent is to align design, not for it it’s locking us in.
5. Are you suggesting mechanical engineer would then use these for load calculations?
   a. Yes.
6. If design team downsizes what are the consequences?
   a. We could add another row here for a safety factor to take in to account penetrations.

Original Motion: As-Submitted (AS)-2nd
Modification: Add an additional column
Committee Discussion:
Intent to give a target number for design and testing. Starting here with this is what it should be would move the ball towards our Net Zero goal.

Question if needed from permit standpoint.

Testing and Commissioning- construction phase dependent. If we make things so tight in construction, should we be doing this in design phase.

Does this create more work from a permit standpoint, when we are going to be there for blower door testing as well? Forces the conversation earlier, this could prevent problems further in to design and construction process.

Would become busy work, part of permit scramble, just another form.

Could start people thinking about these things early in process. With blower door testing I think people will be thinking about this leakage.

It’s going to get pinned on the GC to make it easier for compliance.

The leakage is dependent not on the materials but more on the installation, may give people false hope.

Rather spend where we are getting more return on investment, we are asking for more work, but not sure this is worth it. Need to be getting benefit from what we are asking for.

Ventilation air using the most energy in building, you can’t get to net zero without fixing leakage. Nothing in here that’s pass fail, just makes them fill out the form.

Motion: Motion to table proposal and have proponent bring it back.

Proposal # P52
Public Testimony in Support:
Public Testimony in Opposition:
Questions from the Committee to Proponent:
Committee Discussion:
Original Motion: As-Submitted (AS); A/S with Intent to Modify (ASM); Disapprove (D)
Support:
Opposition:
Final Motion: As Submitted (AS); As Modified (AM); Disapproved (D)
Final Vote:
Additional staff or committee comments for the record: