Houston, TX | **ASHRAE TC 5.1 Meeting**
GRBCC
Rm: 371 DE | **Monday, 25 Jun 2018**
4:15 CDT

Agenda

1. Call to Order – 4:15 pm

2. Roll Call

The following are TC 5.1 voting members:

Franco Cincotti –Chair
Armin Hauer – Vice Chair
Joseph Brooks - Secretary
Harold Dubensky - Webmaster
Brian Reynolds – Research S/C Chair
Zhiping Wang – Handbook S/C Chair
John Cermak
Chuck Coward
Jay Eldridge
Michael Feuser
Jay Fizer
Tim Kuski
Eric Tingloff

Non-Voting S/C Chair:

Walter Mecozzi – Program S/C chair

3. Adoption of Agenda

4. Approval of the Minutes

The last meeting of this committee was held on 22 Jan 2018 in Chicago, IL.

5. Items of business

5.1 ASHRAE Code of Ethics

In this and all other ASHRAE meetings, the ASHRAE Code of Conduct requires us to act with honesty, fairness, courtesy, competence, integrity and respect for others, and that we avoid all real or perceived conflicts of interests. (See full Code of Ethics: https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics.)

5.2 TC 5.0 Section Head/Liaison Reports

Any TC liaisons or section heads present are given an opportunity to report on their activities

5.3 Chairman's report

5.4 Membership

5.5 Old business

6. Subcommittee reports

6.1 Standards subcommittee

6.2 Handbook subcommittee – Zhiping Wang

6.3 Research subcommittee – Brian Reynolds

6.3.1 1769-RFP, Experimental Evaluation of the Efficiency of Belt Drives for Fans
6.3.2 WS-1829 (Inlet and Outlet System Effects on Multiple Plenum Fans in a Parallel Arrangement (Fan Arrays) for Air and Sound Performance)
6.3.3 New RTAR ' Comparison of EC fan & motor vs. traditional fan with induction motor & inverter (Air & sound performance)

6.4. Program subcommittee – Walter Mecozzi

6.5 Efficiency metric subcommittee – Tim Mathson

7. Website Report – Harold Dubensky

8. New Business

8.1 TC-1.4 proposal to create an extension of Guideline 36
TC 1.4 *Control Fundamentals and Applications* has presented to TAC the attached proposal for a scope addition to the Guideline 36 *High Efficiency Sequences of Operations for HVAC Systems*, whose first edition is being published this month.

Does the TC feel that a fan in a subsystem would benefit from the proposed TC 1.4 efforts?

8.2 California regulations
California title 24 fan system power limit for 2019
California title 20 fan regulation proposal.

9. Time and Place of Next Meeting

10. Adjournment ~ 6:30 pm CDT

Attachments: 1) Meetings of Interest
2) TC-1.4 Proposal for New Special Publication

Meetings of interest

Meeting	Day	Time	Place
TC 5.1 Fans	**Mon**	**4:15 - 6:30 pm**	**371 DE (GRBCC, 4th floor)**
TC 5.1 Handbook S/C	**Sun**	**2:00 – 3:00 pm**	**Grand G (Hilton, 4th floor)**
TC 5.1 Research S/C	**Sun**	**3:00 – 4:00 pm**	**Grand G (Hilton, 4th floor)**
TC 5.1 Program S/C	**Sun**	**4:00 - 4:30 pm**	**Grand G (Hilton, 4th floor)**
Seminar # 37, "Selection and Application Considerations of Fans Used in Variable Air Volume Systems"	**Mon**	**11:00 am – noon**	**371 DE (GRBCC)**

GRBCC = George R. Brown Convention Center
Please check the final schedule for subcommittee meeting times and places
Please note that the ASHRAE TC 5.1 Fan Efficiency Subcommittee is not scheduled to meet

PROPOSAL FOR NEW SPECIAL PUBLICATION

Summary
TC-1.4 proposes the creation of an extension of Guideline 36 (or if not possible, a new Guideline), to provide detailed descriptions of the subsystems for which Guideline 36 provides sequences of operations.

TC-1.4 believes this would help

- increase the probability of systems being built, being operated, and perform as designed
- increase the HVAC systems reliability
- reduce design complexity, allowing to produce thorough designs in the same billable hours
- reduce the design cost and risk of complex strategies, such as automatic fault detection and diagnostics for systems, therefore allowing for their widespread use
- accelerate and simplify the adoption of new technologies, by integrating them into these subsystems.

BACKGROUND
TC-1.4 has organized surveys and brainstorming sessions during subcommittee meetings and program sessions to tackle the **poor energy performance and reliability of HVAC systems**, as well as the **slow adoption of new technologies** that would help solve them. In those sessions, members expressed their **concern for the energy waste and environmental impact of the HVAC systems**.

They also expressed their misgivings about most new technologies, as they tend to be complex and misunderstood, so when included in designs, they tend to not be implemented and operated as they should. This was confirmed by building surveys by PNNL and Berkeley Lab: a few years after commissioning, most buildings with new designs don't perform as expected, but similarly to buildings designed 30 years ago.

Also, the fact that current designs use equipment as basic building blocks, and the short design time available, limits the complexity and thoroughness possible in HVAC designs. All this causes the widespread practice of replicating old and less efficient, but simpler and time-tested designs.

More efficient designs being usually more complex, and needing more fine tuning, require more details, and better understanding by all parties involved throughout the system life.

In short, the emerging consensus is that efficient designs and technologies would be gladly adopted if they were

- reliable and pretested
- as plug-and-play as possible
- easy to incorporate in designs
- easily understood by all parties
- auto-detecting performance and operation deviations, and if possible, self-correcting.

Guideline 36, a compilation of High Performance Sequences of Operation for HVAC Systems, is a first step towards a solution.

As Guideline 36 came out for public review in 2017, and before formal publication, some ASHRAE members started using it and soon questions came to GPC-36 and TC-1.4 requesting descriptions and specifications of the systems they applied to.

Specifically, we received enquiries about sensor locations, type, and accuracy; minimum equipment technology and how variations (e.g. the presence of a desiccant wheel) would change the controls; how these subsystems would interact with other subsystems (e.g. chiller plant, boiler plant, and air handlers);

and what subsystems would be compatible with others while maintaining the proposed reliability and efficiency.

PROPOSAL DETAILS
A solution to the problems and limitations listed above is having a set of well defined, tested, and efficient subsystems, or "macroblocks", to be used as the basic building blocks of HVAC designs.

ASHRAE can provide a **compilation of macroblock designs** in a guideline, which would be referenced in HVAC designs. E.g. "The chiller plant shall be ASHRAE Guideline XX, subsystem 26, with options A, D, and E, sized for 850 Tons"

Each subsystem specification should at least include:

- Minimum requirement specifications for all the equipment, including accessories (e.g. valves, water treatment, strainers)
- Equipment connection diagram (P&ID), with all accessories, sensors location, and ducts and piping sizing guidelines (or pointers to those guidelines).
- Controls equipment minimum specifications, detailed sequences of operations (or pointers to sections of Guideline 36)
- Options (e.g. optional geothermal field in parallel with cooling towers)
- All interfaces required for interactions with other subsystems, from piping connection ports, to network points, and related functions (e.g. how the boiler plant will use the load valves position to optimize the supply temperature and distribution pumps speed), to make them as plug-and-play as possible.
- All sensors and routines required for automatic fault detection, diagnostics, and ongoing commissioning.

They may also include:

- EnergyPlus model which can take the models of the specific equipment used.
- Commissioning and maintenance recommendations.
- Sensors and logic to verify the equipment performance. This should be accompanied with a requirement for equipment suppliers to provide an efficiency map at the time of submittal, which will be part of what's covered by their warranty, as well as the "as-built" efficiency map measured before shipping.

Before inclusion in the guideline, samples of these subsystems should be built, tested, and improved via ASHRAE research projects, potentially with co-sponsors, satisfying the "pretested" need.

The incorporation of new technologies into these thoroughly designed, pretested, and almost plug-and-play macroblocks would make their adoption significantly easier and faster.

As the development of these specifications should involve expertise from most ASHRAE technical groups, we request this proposal is forwarded to all ASHRAE groups chairs for discussion. We'll be looking forward to their feedback.

On behalf of TC-1.4,

Marcelo Acosta
TC-1.4 Chair

Notes – In the preliminary discussions by TC-1.4 the following comments and concerns came up:

1. Would this eliminate the need for HVAC designers?
   A: We had in our meetings representatives from UK and Denmark, which use similar approaches and who reported no HVAC designer jobs were lost. Instead, the designers in these countries

have become able to provide much more detailed and reliable designs in the same budgeted hours.

2. Each building is different, so trying to come up with a one-size-fits-all is impractical and utopia.
   A: The idea is not to have one design that covers everything, but many reliable subsystems that can be combined in different ways to cover the needs of most buildings. This is already common practice for rooftops and chillers: we don't design them, we just select the standard design that best fits our project needs.
3. But every building offers unique opportunities that standard designs can seize.
   The gist of the idea is having solid, standard, pretested, well know, and robust designs which benefit from an economy of scale. While custom designs may promise lower cost and additional efficiency due to a building unique opportunities, the same uniqueness brings the "one-of-a-kind", "untested", and "not well understood" factors that make most buildings perform worse than their design intent.

4. What about compliance with different local codes and different climate zone needs?
   A: As explained above, the idea is defining many standard subsystems, but not a huge amount. There would be variations based on climate zone and ideally the standard would comply with the most stringent codes. Eventually the codes would adjust to what's possible and become more uniform.
5. So, what would ASHRAE be responsible for? What would be in this standard?
   ASHRAE would define these subsystems and how they interact with others, then create minimal performance specifications for them. Each subsystem will be prototyped and tested via research projects.