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# RECOMMENDATIONS AND CHALLENGES FOR CEN AND ISO STANDARDS

Ventilative cooling in buildings: now & in the future



## AGENDA

- Background
- New Work Items in CEN & ISO
- Parallel work
- Challenges in CEN & ISO standards
- Recommendations to CEN & ISO standards
- Outlook

# BACKGROUND

- **Focus and timing of ventilative cooling in standards & regulations**
  - EPBD directive, 2010/31/EU: Passive cooling techniques mentioned (e.g. NV + shading)
  - The revision of many EN standards started from 2012 until 2017 (EPB standards)
- **Natural ventilative cooling (NVC) and natural ventilation (NV) reduce summer indoor temperatures**
  - Open windows to reduce temperature
  - NVC is free and does not consume energy like active cooling
- European Committee for Standardization (CEN) and International Organization for Standardization (ISO)
  - A lot of guidance on "ventilative cooling" is missing in existing CEN & ISO standards on e.g. design of ventilative cooling systems
- Standards, regulations and compliance tools need to support more simple to use evaluation methods, so more specifiers will use natural ventilative cooling and NV in future

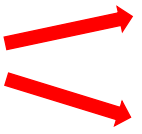


# NEW WORK ITEMS IN CEN/TC 156 (VENTILATION)

- New Work Items in CEN/TC 156 have been proposed and submitted by Danish National Standards body, dealing with ventilative cooling and, natural and hybrid ventilation-systems
- Overall purpose:
  - Make technical documents focusing on the **design aspects (not requirements)** of ventilative cooling and natural and hybrid ventilation-systems in buildings
- Overall scope (e.g. ventilative cooling):
  - "Specify how indoor environmental aspects (prEN 16798-1) have to be used for the building design, system design and dimensioning, energy performance calculations when using ventilative cooling systems to prevent overheating, which serve both residential and non-residential buildings"

# NEW WORK ITEMS IN CEN/TC 156 (VENTILATION)

- Danish National Standards body initially proposed 2 new work items for CEN/TC 156
  - **Ventilative cooling systems (N 1509), now N 1587**
    - All buildings
    - Focus: Thermal comfort (prevent overheating)
    - Type: Technical specification [*]
    - Work proposed to: WG/21
  - **Natural and hybrid ventilation systems (N 1508)**
    - All buildings
    - Focus: Indoor air quality
    - Type: Technical specification [*]
    - Work not proposed yet to any WG



**Residential buildings**
- **Content into Revision of EN 15665 and CEN/TR 14788**

**Non-residential buildings**
- **Natural and hybrid ventilation systems in non-residential buildings**

5 [*] Technical specifications are right below EN standards in status. Technical Reports are lower status than TS's



# NEW WORK ITEMS IN CEN/TC 156 (VENTILATION)

- Natural and Hybrid ventilation systems:
  - **Natural and hybrid ventilation systems in non-residential buildings**
  - Main focus: Indoor air quality
  - Type: Technical specification
  - Work proposed to: WG/20 in CEN/TC 156
  - **Expansion of Natural and Hybrid ventilation in residential buildings in upcoming "Revision of EN 15665:2009 and CEN/TR 14788:2006"**
    - Main focus: Indoor air quality
    - Type: E.g. European standard (Content to be part of revision of EN 15665:2009 + CEN/TR 14788:2006)
    - Work proposed to: WG/2 in CEN/TC 156
- Ventilative cooling systems:
  - **Ventilative cooling systems**
    - Main focus: Thermal comfort (prevent overheating)
    - Type: Technical specification
    - Work proposed to: WG/21 in CEN/TC 156

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# OVERVIEW OF RELEVANT WORK ITEMS AND REVISIONS

| Main focus | Thermal Comfort for overheating prevention (TC) | Indoor Air Quality (IAQ) | TC & IAQ |
|---|---|---|---|
| Residential (R) | | 3. **CEN**; NV/Hybrid ventilation to be included in "Revision of 15665 + CEN/TR 14 | |
| Non-residential (NR) | 1. **ISO**; Design process of Natural Ventilation (S) | 4. **CEN**; Nat ver (TS)<br>, 62.1 (S), R | 6. **CIBSE**; AM 10 (S), R |
| R & NR | 2. **CEN**; Ventilative coo systems (TS) | | 7. **National**; Natural ventilation standard for design in China (S) |

4 technical documents incl. Ventilative cooling initiated!

1. "Design process of Nat educing cooling demand in energy-efficient non-residential buildings" (ISO standard)
2. "Ventilative coo 97), WG21 in CEN/TC 156 (Technical specification)
3. Expansio d ventilation in residential buildings in upcoming "Revision of EN 15665:2009 and CEN/TR 14788:2006", WG2 in CEN/ ard)
4. "Natur brid ventilation systems in non-residential buildings" (N 1586), WG20 in CEN/TC 156 (Technical specification)
5. "ASHRA 62.1" – Revision of the natural ventilation procedure (ASHRAE standard, USA)
6. "CIBSE AM10:2005" – Revision of standard (Application manual, UK)
7. "Natural ventilation standard for design" (National standard, China)

# EXISTING & NEW WORK ON STANDARDS

## European EN standards (finished)

- EN 16798-7:2017 on "calculation methods for the determination of air flow rates in buildings" (EPB standard)
  - New (simple) calculation methods for single-sided natural ventilation + cross-ventilation included
  - Increases relevance of ventilative cooling:
    - Cross-ventilation now included in EN standard!
    - Increased stack effect by enhanced height difference (1 window → more windows)

## International standardisation documents (ongoing)

- "Design process of Natural Ventilation for reducing cooling demand in energy-efficient non-residential buildings"
  - CEN/TC 156 to request a liaison with ISO/TC 205, WG2 to coordinate (2 separate documents)
- "Natural ventilation standard for design from China"
- Revision of ASHRAE 62.1 and CIBSE AM10 documents on ventilation

## New Work Items in CEN (Initiated)

- Technical documents on **design aspects** of ventilative cooling and natural/hybrid ventilation-systems in buildings
- 2 New Work Items + 1 revision underway, work to start up Q4:2017

# CHALLENGES IN CEN & ISO STANDARDS

- **Ventilative cooling is a new standardisation area**
  - Aim to formalize experience and knowledge on VC → New knowledge in IEA EBC Annex 62
- **Many technical documents ongoing or starting up simultaniously on VC**
  - Big task to sufficiently coordinate among the "VC" documents, to limit overlaps and repetitions
  - May be difficult for some to find out which documents to focus on. Some cover both IAQ + TC
  - Difference in climates, building customs and typology in CEN and between CEN & ISO regions
- **Agreeing on terminology**
  - Definitions not defined in EN 12792, must be discussed and aligned on consensus basis
  - Agreeing on terminology across different CEN national standardisation bodies
- **Agreeing on what topics are most important to cover in the new documents**
  - Many stakeholders interested in influencing the new documents, giving specific interests



# INSPIRATION

- **Guidelines:**
  - Japanese design guideline for ventilative cooling:
    - "Design guideline of window for outdoor air cooling, Northern regional building research institute, Japan, 2010"
  - IEA EBC Annex 62 deliverable:
    - "Design Guideline for Ventilative cooling"
- **Standards/norms:**
  - CIBSE AM10:2005
    - First section (design) or in "control of summer overheating"))
  - Danish standard - DS 447:2013:
    - "Requirements for mechanical, natural and hybrid ventilation systems"
    - Includes ventilative cooling expressed as Free cooling, night cooling, passive cooling & cooling by means of natural ventilation)

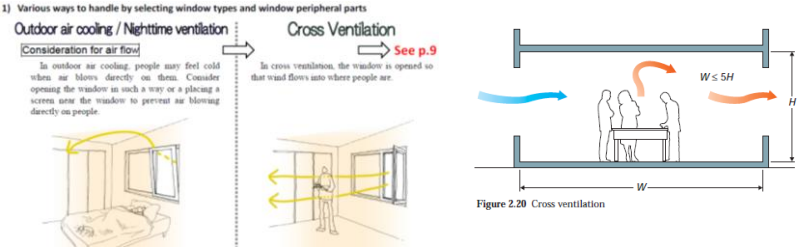
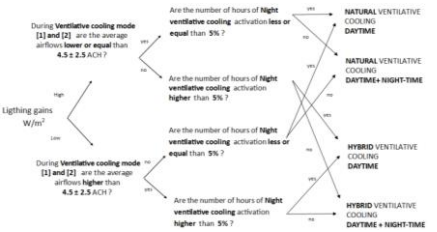


Figure 2.20 Cross ventilation



# RECOMMENDATIONS TO CEN & ISO STANDARDS

- **General alignment among new documents**
  - Try to align methods, to eliminate overlaps or too big variation in results
    - E.g. for calculation of air flow rates through windows for natural ventilative cooling; use EN 16798-7:2017
  - Work together and learn from each other in CEN & ISO; Liasions or workshops

- **Opportunities:**
  - New work give opportunities to increase the knowledge and explain how to utilize the ventilative cooling effects in buildings in upcoming standards
  - Enables e.g. architects & consulting engineers to better design and implement ventilation systems
  - Increased focus on ventilative cooling, will also increase the relevance of hybrid ventilation, encompassing the best of both worlds; NV + MV
  - Content of new documents & guidelines on VC to be "legislation-ready" (open to legislation)



# CONCLUSION

- **Interest & activities on ventilative cooling in standardisation world!**
  - New work items (all items accepted through voting, work to start up Q4:2017)
  - Alignment and start-up of task groups initiated

- **Evaluation of ventilative cooling in EN 16798-7:2017 standard:**
  - New (simple) calculation methods of air flow rates (EN 16798-7) to hopefully be used in new documents
  - Relevance of ventilative cooling highly increased (e.g. by including cross ventilation)
    - Previously only single-sided ventilation was included

- **Less is more:**
  - Simple to use evaluation methods, to further increase the awareness and knowledge of NVC
  - The more difficult methods to use, the less general exposure of how to use ventilative cooling

# ANNEX 62 - DELIVERABLE

- **Name:** Recommendations for legislations, standards and compliance tools
- **Purpose:** Map detailed differences between national calculation methods for (natural) ventilative cooling on:
  - Legislation level (national, regional or guideline)
  - Compliance tool level (national)
  - Standards level (**ISO, EN** and national)
- **Main focus:** Natural ventilative cooling
- **Countries contributing (9):** Italy, Denmark, UK, Austria, Switzerland, Portugal, Australia, Japan, Ireland
- **Finish:** Q4:2017

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