Webinar

Myths vs Facts in Ventilation: Making the Right Choice for you and your Customers

Thursday, November 22, 2018 from 1:30-2:30 ET

Mechanical ventilation equipment is a key component of your building and has a great influence on the comfort and health of the occupants. Gord Cooke from Building Knowledge Canada will share his thoughts and advice based on his extensive experience. Loïc Arès from Venmar will provide useful information to guide the builders and energy advisors through the different options available. Doug Tarry from Doug Tarry Homes will provide input about the use of energy recovery ventilators from a builders' perspective, based on his experience and the feedback from home owners.

This webinar will provide answers to some common questions about ventilation and also provide you with a better understanding of heat and energy recovery ventilators:

- The science and history on why ventilation is important
- Why "leaky" houses have worse air quality than "tight" houses
- How to choose the right unit (HRV vs ERV, airflow, efficiency)
- The different installation options and their advantages
- Canadian testing requirements that ensure performance in our climate
- What home owners need to know about ventilation

Speakers

Gord Cooke
President
Building Knowledge Canada

Gord is a sought-after presenter for his areas of expertise in applied building science, energy efficient housing initiatives, innovative HVAC systems, ventilation, and Indoor Air Quality (IAQ). A professional engineer with more than 30 years of experience in the low and high-rise residential building industry, Gord shares his insights and passion as he advocates for better building practices and methods for improving IAQ and energy efficiency in new and existing homes. Combining solid building science with his training and technical background, his presentations and workshops have been requested by builders, contractors and building conferences throughout North America. Gord is Chair of CSA F280 Standard for Determining the Size of Residential Heating and Cooling Systems; Member of CSA F326 Standard for Mechanical Ventilation; recipient of the EEBA Excellence in Building Legacy Award; and Ontario Home Builders Hall of Fame Inductee.

Loïc Arès
Technical Advisor – IAQ
Venmar Ventilation ULC

Loïc Arès is responsible for conducting and implementing Venmar Ventilation ULC initiatives supporting Indoor Air Quality project development. His role is to provide technical expertise on heat and energy recovery technologies, building code requirements and extensive applications. As a mechanical engineer with more than 12 years of experience in the ventilation industry, he was involved with product testing with Underwriters Laboratory (UL) for safety compliance and HVI for performance compliance. A member of the R&D team, he collaborated on the development of several heat recovery ventilator platforms and developed an in-depth understanding of their advantages and behaviors in all climates. Proud supporter of Indoor Air Quality, his first priority is to share his knowledge and help stakeholders to provide cost-effective solutions for the building community.

Doug Tarry Jr.
Vice President / Director of Operations
Doug Tarry Limited

Doug is a second-generation builder trained in ENERGYSTAR®, R-2000 and Net Zero building methods. He's a National Award Winning BCIN Qualified Home Designer, working with a number of manufacturers on development of products for more sustainable housing. His career highlights include:

- Past President, OHBA
- Inaugural winner of the Net Zero Home of the Year Award, CHBA
- Two Time National Grand SAM Award Winner, CHBA
- Project HOPE, a 3-Day Net Zero Ready Home fundraising build ("HOPE: A Story that builds more than a new Home" documentary film will be released in 2018)
- Founding HOPE AGUA VITA, a fundraising effort taking volunteers to the village of San Lorenzo, Puerto Rico to help rebuilding after Hurricane Maria

Indoor Air Quality

Myths & Facts in Ventilation

Gord Cooke
Building Knowledge Canada
November, 2018

Three Topics for Discussion

A background of Indoor Air Quality in Houses

The strategies for providing the healthiest possible air for your clients

A little history of ventilation in houses

Canadian Research on Molds and IAQ

1988 Health Canada survey of 18,000 children in 20 communities

1993 Wallaceburg studies

1995 CMHC Basement study

1996 Asthma Pilot Study

1997 PEI Infant Health and Housing

2000 Larger Asthma Study

CMHC SCHL

Canadian Research on Molds and IAQ

- Indoor air is 2-5 times worse than outside air
- Dominant factor in mold growth is bulk moisture, not RH;
- Immune system of children living in moldy houses is affected;
- More mold is found in older homes;
- Leaky houses have more mold than tight homes
- Dampness and molds increase respiratory problems and affect the immune system
- The young, the old and the sick are at greatest risk

Understanding IAQ

Indoor Air Quality is Important to our Clients

30% of households have someone with asthma, allergies or respiratory problems

…poor IAQ may cost 10's of billions annually in lost productivity

EPA

Air cleaners are a $1.2 Billion industry

IAQ…Why is it a bigger issue than ever?

Change in the **<u>way we build</u>**
-Tighter
-More chemicals
-Air conditioning

Change in the **<u>way we live</u>**
-90% of time indoors
-Don’t open windows
-More moisture

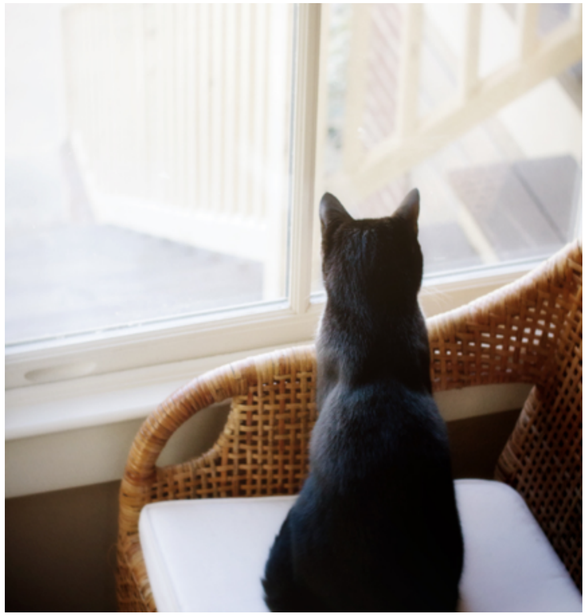
Change in **<u>products we use</u>**
-Carpets &furnishings
-Cleaners & hygiene
-More “stuff” inside

More appliances

More hot water

More pets

More stuff



Common Pollutants

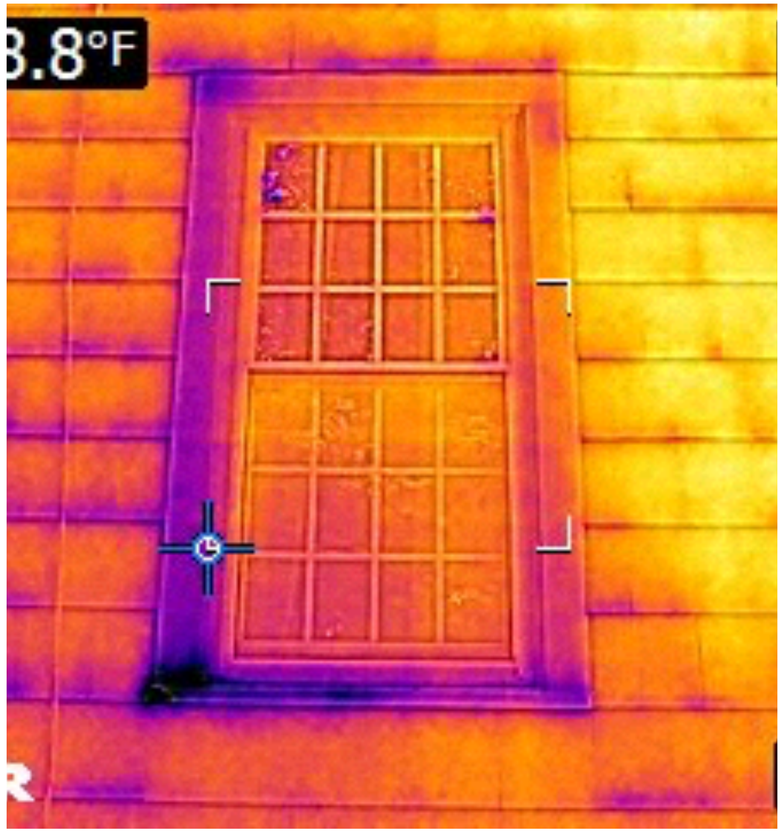
Building related

Occupant related

More Windows

But….
Opened Less

Their expectations



How many holes?

How much waste?

When do they want fresh air?

What is good indoor air ?

Is as fresh and clean as outdoor air

Has no odours (use your nose)

Has fewer pollutants

Healthier to breathe

(The right temperature and humidity)

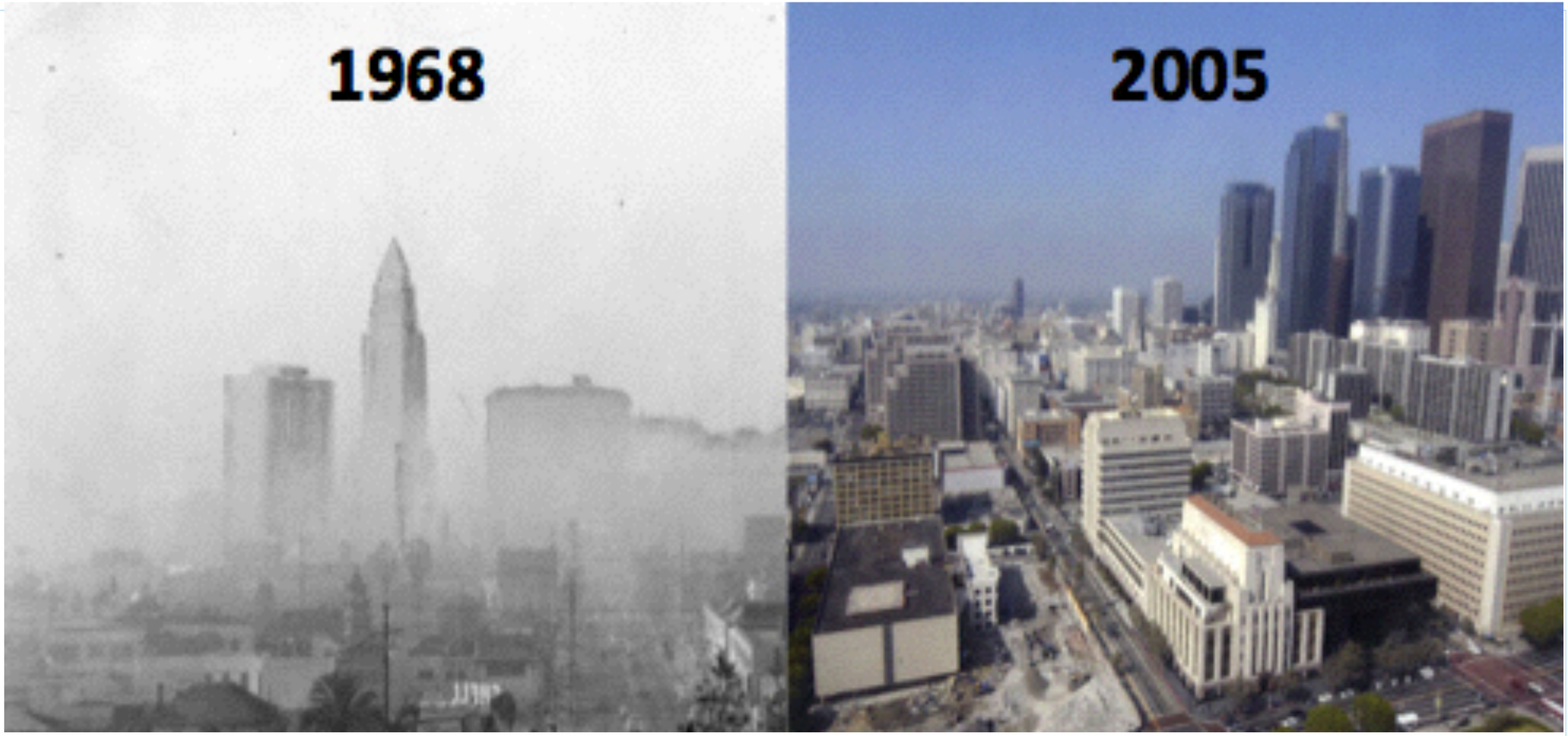
Outside has Improved

SMOG

Ozone

+

Fine dust



IAQ Control Strategies

1. **Remove Pollutants**
2. **Source control**

    “Seal” or Isolate

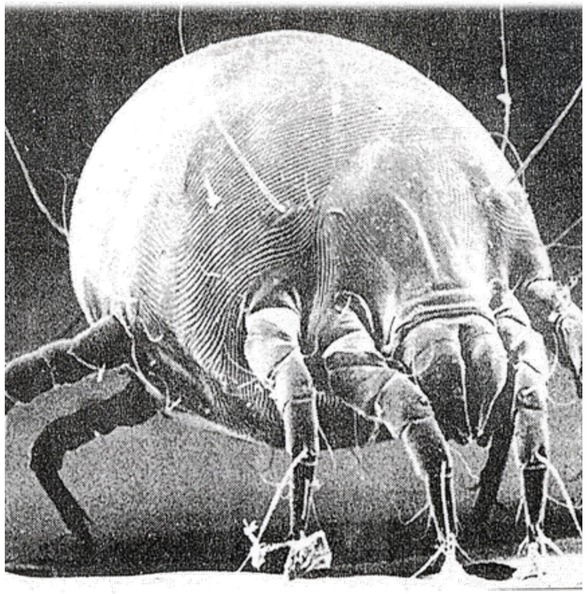
    If you can’t remove it find a way to isolate or seal it

3. **Ventilate**

    Dilute pollutants with “fresh” outdoor air

    Point source removal

4. **Filter**



Strategies to ensure good indoor air quality:

- Control indoor relative humidity levels during both summer and winter.
- Design building envelopes that stop leaks of humid air and water.
- Use the approach of eliminate, reduce, contain and dilution
- Use the MSDS information sheets to guide product selection.
- Specify the most benign materials that suit the building's performance requirements and employ compatible methods of attachment.

AIR QUALITY IN INTERIOR ENVIRONMENTS

by Barry Craig, André Bourassa, Ken Ruest, Duncan Hill, Sandra Marshall

ABSTRACT

Excessive moisture represents the major cause of poor air quality in buildings because it encourages mold growth. Awareness of mold contamination in homes has also focused the attention of building professionals on the legal consequences of interior air quality problems, especially with respect to liability insurance. Many North American and European studies indicate a link between dampness and respiratory health problems. This article describes the sources of air contamination and offers ways to eliminate, reduce or separate these sources from indoor air. Preventive strategies in design and renovation are also suggested, as well as different aspects of architects' responsibilities related to air quality problems.

Figure 1-That woodsy smell

OBJECTIVES

After reading the article, an architect should understand the following:

- Major air quality issues in residential buildings
- Sources and consequences of problems related to biological contaminants
- Design strategies to prevent air contamination
- Roles of architects with respect to indoor air quality
- Sources of information concerning indoor air quality

Ontario Association of Architects
Manitoba Association of Architects
CMHC SCHL
Continuing Education
HOME TO CANADIANS Canada

Benjamin Franklin

“I am certain that no air is so unwholesome as air in a closed room that has been often breathed and not changed.”

Short History of Ventilation

"Light and air as means of preserving the health of the occupants of tenements are just as necessary as running water. Dr. H. M. Biggs, an eminent authority on tuberculosis, testified before the Tenement House Commission

The New York Times
Published: October 13, 1901

The History

Natural ventilation

Corridor ventilation

Exhausts from kitchen and baths

Ventilation

Ventilation - a system or means of providing fresh air.

Webster New Collegiate Dictionary

We used to ventilate with windows, now we don’t

All homes need Capacity for Mechanical Ventilation

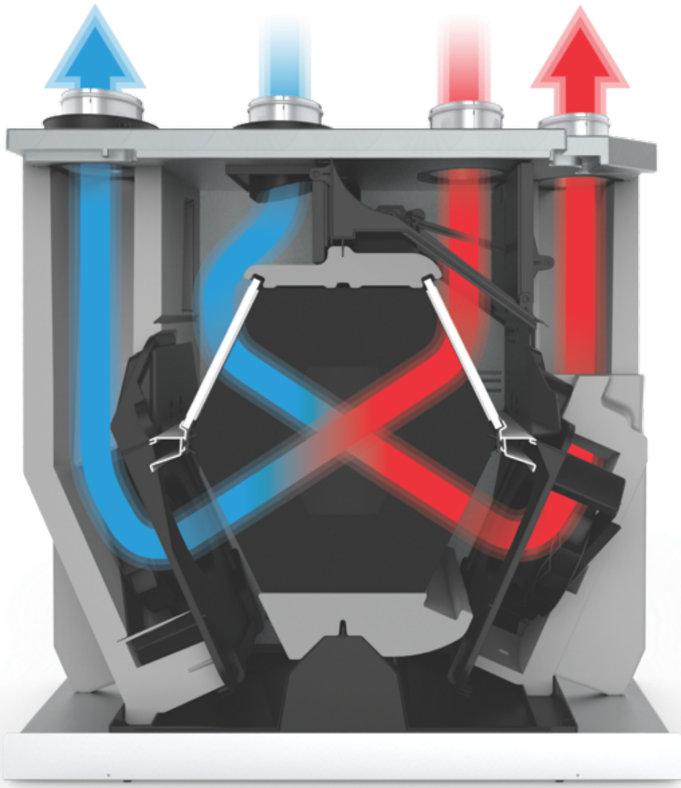
- To control moisture
- To remove common pollutants
- To ensure good indoor air quality for occupants

In Summary

Build Tight…

Ventilate Right:

- Windows
- Capacity for Continuous mechanical ventilation



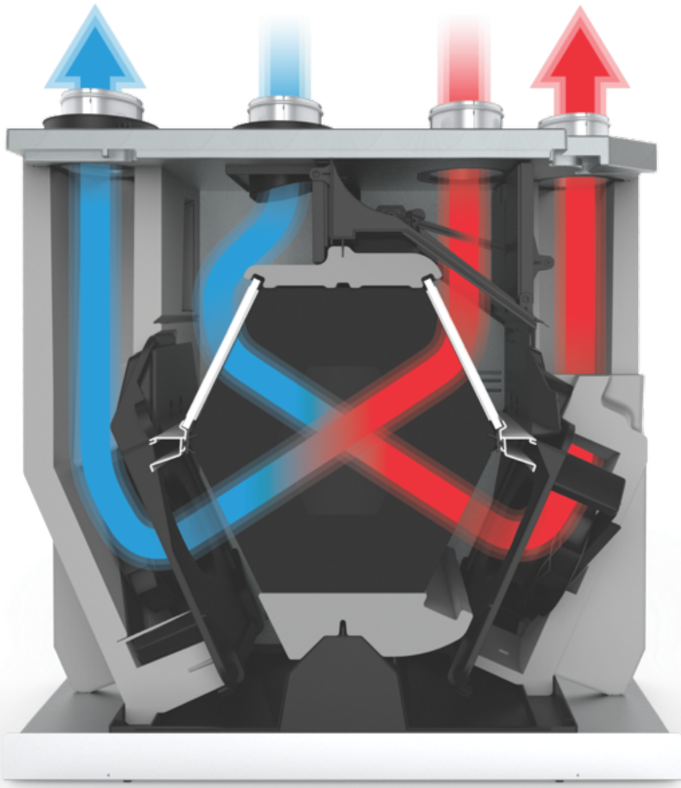
In Summary

Build Tight…

Ventilate Right:

- Windows
- Capacity for Continuous mechanical ventilation

Its been a code requirement since 1995



Thank You
Questions??

Gord Cooke
Building Knowledge Canada
November, 2018

CHBA Webinar

Myths vs Facts in ventilation

Make the **right choice for you and your c**ustomers

BROAN NuTone best VENMAR innergytech VIM EE

VENMAR HRV / ERV HISTORY

More than 30 years of experience with H/ERV

1st HRV introduce in 1985

1st ERV in 1997

Manufacture our own H/ERV core for more than 20 yrs

innergy tech

All cores and H/ERV are designed, manufactured and tested in Drummondville, QC

Sold under two renowned brand as well as some OEM

vanEE®

VENMAR AVS
THE PROFESSIONALS' CHOICE

Installed in the toughest Canadian climatic conditions for years and proved their robustness and reliability

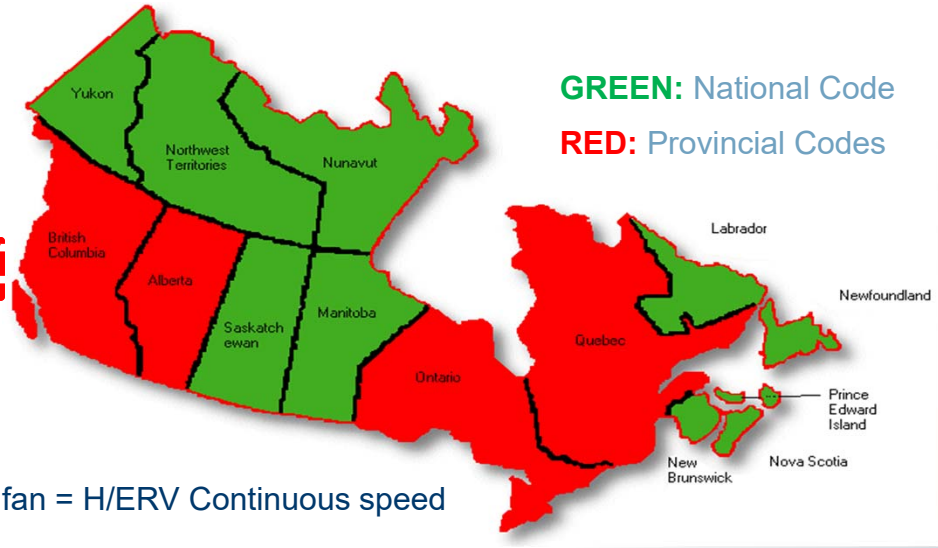
BROAN NuTone best VENMAR innergy tech vanEE

H/ERV How to choose the right ''size'' - AIRFLOW

- **New Construction : always refer to minimum code requirements in your jurisdiction**

NBC 2010 /2015 - Table 9.32.3.3

# of Bedrooms in Dwelling Unit	Normal Operating Exhaust Capacity, L/s (cfm)	
	Minimum	Maximum
1	16 (34)	24 (51)
2	18 (38)	28 (59)
3	22 (47)	32 (68)
4	26 (55)	38 (81)
5	30 (64)	45 (95)
> 5	System must comply with CSA-F326	



GREEN: National Code

RED: Provincial Codes

- Normal operating exhaust capacity of principal exhaust fan = H/ERV Continuous speed
- Airflow should be balanced on site to within ± 10%
- Manual switch that control H/ERV shall be located within the living area of the dwelling unit

- **NBC** also allow to use CSA F326 (Residential Mechanical Ventilation System) to size ventilation requirement with 0.3 air change / hour criteria.
  - *1400 sq. ft townhome with 3 bedrooms 8ft. ceiling* — *56 cfm*
  - *2200 sq. ft single detached home with 3 bedrooms 8ft. ceiling* — *88 cfm*

Source : National Building Code of Canada 2010 Volume 2

H/ERV How to choose the right ''size'' – AIRFLOW

ONTARIO

# of Bedrooms in Dwelling Unit	Normal Operating Exhaust Capacity, L/s (cfm) Minimum
1	15 (32)
2	22.5 (48)
3	30 (64)
4	37.5 (80)
5	45 (95)
> 5	System must comply with CSA-F326

ALBERTA use NBC table

BRITISH COLUMBIA

Floor Area, m² (ft²)	Number of Bedrooms L/s (cfm)				
	0-1	2-3	4-5	6-7	>7
< 140 (1,507)	14 (30)	21 (44)	28 (59)	35 (74)	42 (89)
140-280 (1,507 – 3,025)	21 (44)	28 (59)	35 (74)	42 (89)	49 (104)
281-420 (3,025 – 4,521)	28 (59)	35 (74)	42 (89)	49 (104)	56 (119)
421-560 (4,521 – 6,028)	35 (74)	42 (89)	49 (104)	56 (119)	64 (136)
561-700 (6,028 – 7,535)	42 (89)	49 (104)	56 (119)	64 (136)	71 (150)
> 700 (7,535)	49 (104)	56 (119)	63 (133)	71 (150)	78 (165)

- Capacity rating shall be determined in accordance with HVI-916 or CSA-260-M

- **BATHROOM VENTILATION:**
  - ***Minimum 25 L/s (53 cfm)***

OR

+

Located in the bathroom

Source : Ontario Building Code 2012 table 9.32.3.4.A

H/ERV How to choose the right ''size'' – Efficiency metrics

ASE : Apparent Sensible Effectiveness

- highest reported value in specheet
- ''gross'' efficiency value without any loss / penalty accounted
- **Used to determine supply airflow temperature**

0°C outdoor / 20°C indoor
85% ASE HRV
Supply air temperature?
(0.85*20°C) = **17°C**

SRE : Sensible Recovery Efficiency

- NET heat (sensible) recovery efficiency including all loss and motor consumption
- Value referenced by building codes and ''above code'' programs for PRESCRIPTIVE PATH

ASRE : Adjusted Sensible Recovery Efficiency

- ''Adjusted'' means without motor consumption
- Use for energy modeling where software account for fan energy as a separate input

ENERGY MODELING

TRE : Total Recovery Efficiency (ERV)

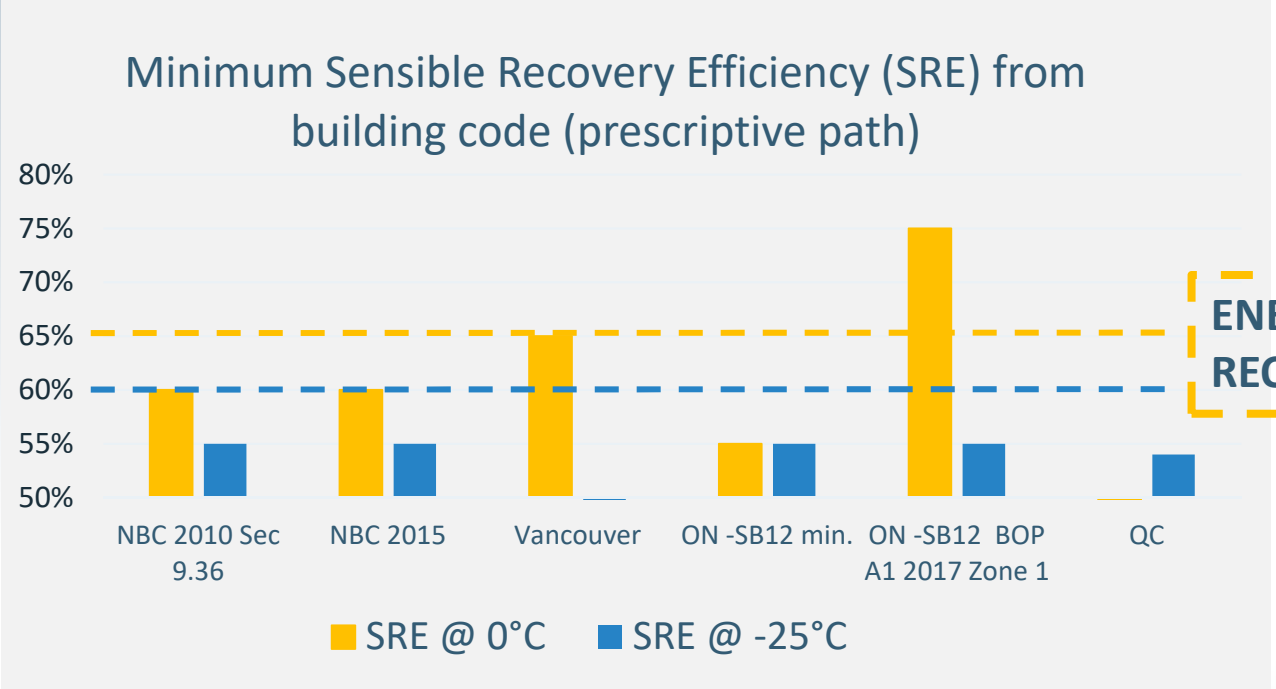
- NET energy recovery (sensible + latent) efficiency including all loss and motor consumption

ATRE : Adjusted Total Recovery Efficiency (ERV)

- Same as ''TRE'' without motor consumption

ENERGY MODELING

H/ERV How to choose the right ''size'' – Efficiency



Fan Efficacy (cfm/Watt): how much power does the unit need to deliver a defined air volume

Energy Star requirement: 0.8 cfm/W & ≥ 75% SRE or 1.2 cfm/W

ECM MOTORS

Assumptions:
- 60 cfm continuous
- 0.12$/ kWh

	Fan efficacy (CFM/W)			
	0.8	1.2	2	3
Electricity Cost	79 $	53 $	32 $	21 $
savings / year	- $	26 $	47 $	58 $

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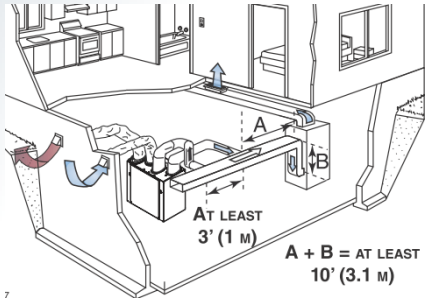
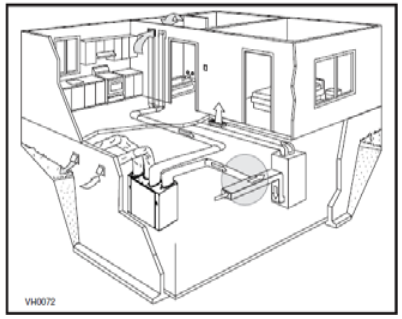
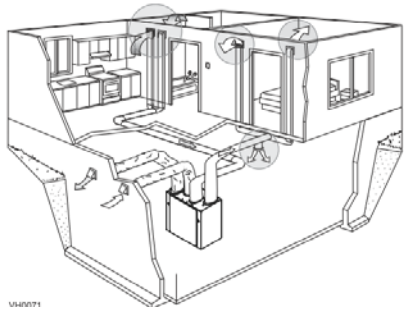
H/ERV – installation options







Installation type / characteristics	SIMPLIFIED (return/return)	DEDICATED - EXHAUST ONLY	DEDICATED (fully ducted)
Exhaust side	From AHU return duct	From bathroom(s), kitchen optionnal	From bathroom(s), one per story, kitchen optionnal
Supply side	Through AHU return (with interlock) or supply duct	Through AHU return or supply duct	Bedroom(s), one per story, living room optionnal
Installation cost & complexity	Low	Medium	High
Indoor air quality	**GOOD** Depend on AHU ducting design	**BETTER** Pollutants exhausted from the source continuously	**BEST** Fresh air delivered to living space and bedrooms
Installation static pressure	Low (~0.2'' w.g.)	Exhaust medium-high (~0.4'' to 0.6'' w.g.)	Med-High (0.4 to 0.8'' w.g.)

Always refer to your local building code requirements about installation restrictions as some installation option could be found non compliant

H/ERV installation – space limitation

Townhomes and multifamily could be a challenge for both installation space and outdoor hoods location

Smallest Energy Star H/ERV (K8 / K10 models) 16 x 16 x 16 inch.

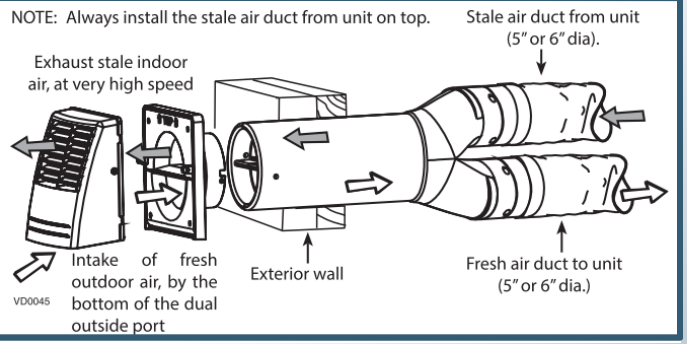
Evaluate ceiling mounted units option (S10 with 9” total height) or slim units (Constructo 1.0)

Tandem Hood provide many benefits:

1 - Only one hood to locate away from dryer, rangehood or furnace vents

2- Less penetration within building enveloppe

3- Simplified insulated duct runs



H/ERV How to choose the right ''unit'' – HRV vs ERV

SUMMER

ERV

Outside air to building
35°C
45% RH

31°C

Stale air to outside

Stale air from building
24°C
50% RH

27°C
55% RH
(60% at 24 °C)

Fresh air to building

HRV

Outside air to building
35°C
45% RH

31°C

Stale air to outside

Stale air from building
24°C
50% RH

27°C
70% RH
(80% at 24 °C)

Fresh air to building

H/ERV How to choose the right ''unit'' – HRV vs ERV

WINTER

ERV

Outside air to building
-20C
40% RH

-8°C

Stale air to outside

Stale air from building
22°C
30% RH

12°C
35% RH
(18% at 22 °C)
Fresh air to building

Outside air to building
-20C

-8°C

Stale air to outside

Stale air from building
22°C
30% RH

12°C
10% RH
(5% at 22 °C)
Fresh air to building

HRV

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HVI (Home Ventilating Institute)

- **Why should I choose an ‘’HVI Certified’’ H/ERV?**
  - ***Assurance that the product has been tested by a third party lab to meet specific standards***
  - ***Assurance that the product will perform as reported***
    - ***Airflow VS static pressure (duct restriction)***
    - ***Heat/ Energy Recovery***
  - ***HVI verification program:***
    - ***Randomly picked H/ERV are tested to ensure performance reporting compliance***

- **Make sure the unit has a -25°C test results (except Southwest B.C. region)**
  - ***72 consecutive hours test***
  - ***Ensure a reliable operation in winter condition***

- **Performance listing are available to public from HVI Certified Product Directory**
  - ***https://www.hvi.org/proddirectory/index.cfm***

VENMAR PRODUCT LINE-UP

- Complete range from as low as 35 cfm continuous ventilation up to 250 cfm for residential usage
- All types with an Energy Star certified version, many with top ports or side ports configuration
- Light commercial units range from 400 to 1200 cfm

SPECIFICATIONS	Target area	Benefits	Model
K7 / K8 / K10	CONDOS, APARTMENTS AND SMALL HOMES	- The most affordable - The lowest electrical consumption (34w) - The ideal choice for small spaces (2.27 c.f.)	K7 HRV 44150 K7 ERV 44162*, 44163** K8 HRV 44152*, 44153** K10 HRV 44500*, 44503**
Constructo 1.0 / C12	CONDOS, APARTMENTS AND SMALL HOMES	- The smartest in its category - Bottom access facilitating maintenance - Compact design for small spaces	Constructo 1.0 HRV 41502*, 41500** Constructo 1.0 ERV 41506*, 41504** C12 HRV 41552*, 41550** C12 ERV 41556*, 41554**
S10	CONDOS, APARTMENTS AND SMALL HOMES	- Ultra thin design, only 9 inches thick - Easy installation into the ceiling or in a bulkhead - The solution for high-rise residential towers	S10 ERV 41700 S10 ERV Plus 41702
1.5 ES / 2.0 ES (*AVAILABLE IN QUEBEC ONLY)	CONDOS, APARTMENTS AND SMALL HOMES	- Meets the NOVOCLIMAT* standards - Fits the new residential construction requirements for small-sized homes (refer to local building code) - Pressure taps, balancing dampers and straps for insulated ducts for quick effective installation	1.5 ES HRV 46121 2.0 ES HRV 47121
Constructo 1.5 ES / 2.0 ES	MEDIUM TO LARGE-SIZED HOMES	- Increased ventilation flow for large-sized homes - Very quiet operation - Tried and tested technology over time	Constructo 1.5 ES HRV 46110 Constructo 2.0 ES HRV 47110
Solo	MEDIUM TO LARGE-SIZED HOMES	- Reversible for a better installation flexibility - High range model offering more features	Solo 1.5 ES HRV 46720 Solo 2.0 ES HRV 47720
E10 / E15	MEDIUM TO LARGE-SIZED HOMES	- Exceptional sensible recovery efficiency - ECM motor providing significant electrical consumption savings - Meet the standards of eco-efficient home programs	E10 HRV 43120 E15 HRV 43125 E15 ECM HRV 43801 E15 ECM ERV 43811
X24 / X30	MEDIUM TO LARGE-SIZED HOMES	- Combines the best performance with the best energy efficiency at a lower overall operating cost - German made ECM motors - Electronic balancing and no balancing dampers	X24ERV ECM X24ERVE X24HRV ECM X24HRVE X30ERV ECM X30ERVE X30HRV ECM X30HRVE
6LC / 12LC	LIGHT COMMERCIAL	- Ideal choice for small businesses, doctor's offices, etc. - Versatile unit with multiple installation options - Designed to resist corrosion in areas such as laboratories, car washes (12LC)	6LC (Polypropylene core / Aluminum core) 12LC (with powder coated option) (Polypropylene core / Aluminum core)

H/ERV selection table

Criteria	Recommendation	Benefits
Airflow rate	Close to maximum NBC table	- Lower CO_2 level: make you sleep better - Maintain lower VOC concentration (concerns in new houses) - Air in your house feels fresh all the time
SRE / TRE	The higher the better	- Construction cost savings (builder doing energy modeling) - Recurring operation energy savings (homeowner) - More comfortable & tempered air delivered
CFM/W	The higher the better	- Recurring energy savings (homeowner) - Electricity rates increase at a faster rate than inflation
HRV or ERV?	ERV	- More comfortable indoor air (more stable humidity level) - Energy savings on cooling load (reduced ventilation latent load)
Certification	HVI & Energy Star	- Peace of mind - Credibility (brand perception and recognition)

Life moves pretty fast. If you don't stop and look around once in a while, you could miss it.

Ferris Bueller

Myth's Vs. Facts in Ventilation

HVAC Wildcard / The Homeowner.

Today's Customer:

- Has extremely high performance expectations.
- Have varying needs based on Family Make-up.
- Have been "Educated" on HGTV.
- Expect the home will run itself.
- Can't find their furnace filter.

The Builder:

- Relies on HVAC Contractor.
- Has Limited Knowledge of HVAC / Ventilation.
- Wants a system that works without callbacks.

Myth's Vs. Facts in Ventilation

Our Homeowner Solution?

Keep It Simple:

- Easy to Use Controls in Easy to Access Locations.
- Homeowner Training.
- Ventilation. We Give You Two Types.
  - Windows that Operate.
  - Fresh Air Machine.
- Spot Ventilation Intakes, Return through Return Air Ducting.

Myth's Vs. Facts in Ventilation

Controlling Humidity Can be Complicated:

- Windows used to have condensation, and sometimes ice, on the inside.
- Tighter Homes, Better Windows and More Insulation allow us to have higher humidity levels with fewer problems at the exterior.
- However, this can cause higher humidity issues during the summer.
- If the Homeowner is not diligent about controlling humidity levels.

Myth's Vs. Facts in Ventilation

ERV's don't work in Canada:

- For many years that was our understanding as well.
- From windows that open, to having a fresh air kit, to our first HRV, we've now progressed to where every home we build has an ERV unit.
- This VanEE 60H is our current Standard.

VanEE 60H ERV

Myth's Vs. Facts in Ventilation

Controlling Humidity Can be Complicated:

- Trim used to dry out so badly that it would pull away from the wall.
- Using ERV maintains more balanced humidity levels in the home.
- Less over-drying in the winter.
- Less humidity dumping in the summer.
- Overall Greater comfort.

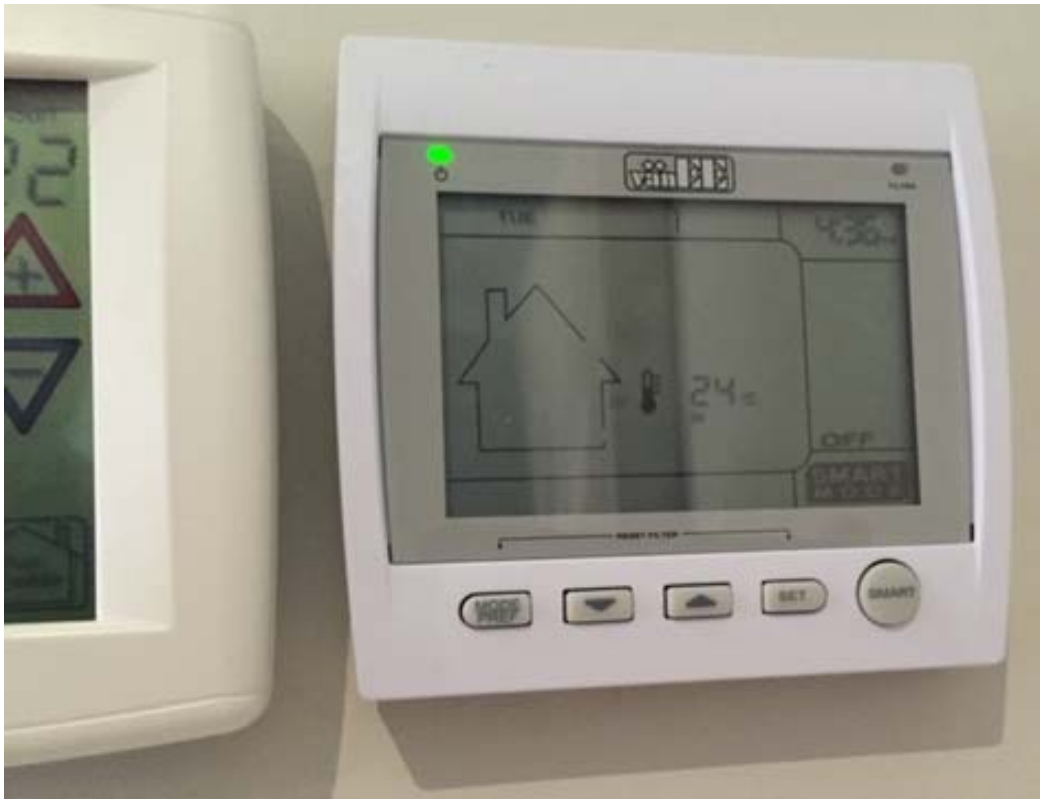
Myth's Vs. Facts in Ventilation

Make it Easy to Use:

When it is simple to understand, we have a higher level of customer satisfaction.

For the Primary control:

- Located directly beside thermostat.
- Currently use the Platinum control.
- Smart Mode is our default.
- High indoor humidity event with cool outdoor air, run on max vent.
- Extreme Heat or Cold, can go to recirculation mode.
- Easy to move between modes using "MODE PREF" and "SMART" buttons.



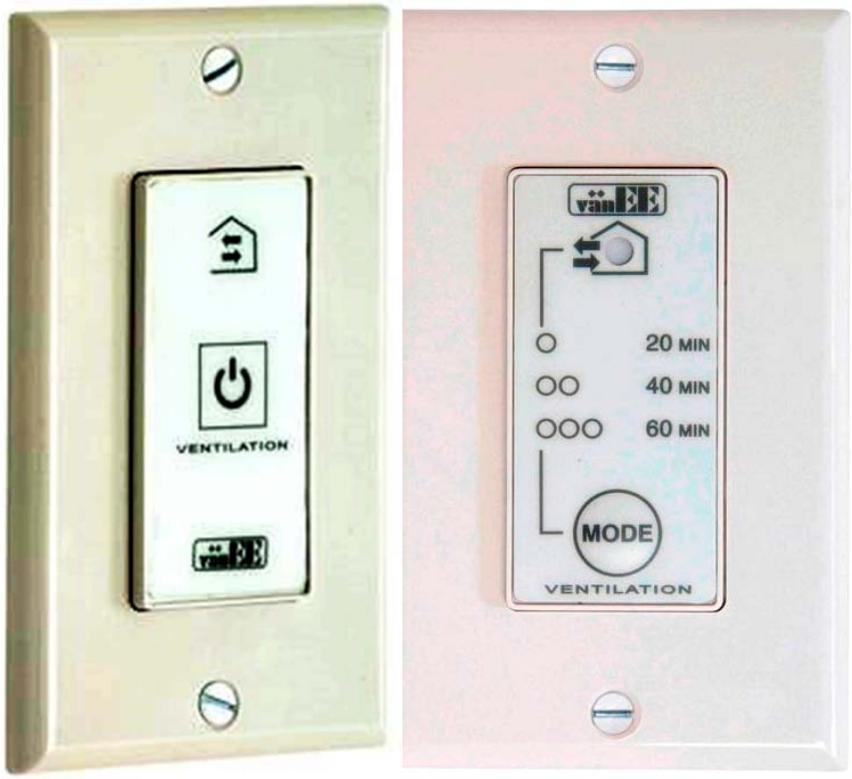
VanEE Platinum Control

Myth's Vs. Facts in Ventilation

Make it Easy to Use:

For the "on demand" control:

- We have tried different types of controls.
- The one on the right shows the time selected. This is much easier for the customer to understand.
- Worth the extra few dollars per switch. (Reduced Warranty Call Backs).



Myth's Vs. Facts in Ventilation

HVAC Ducting.

Put the air where you want it:

- Traditional Ducting is like holding water in a Sieve.
- Up to 30% Leakage.
- Traditional Thinking:
  - If it leaks within the Building Envelope, that's OK.
  - It is not!
- Smart Ducting. Around 4% leakage.
- Much easier to control where the air goes.
- Smaller Trunk (6" Round)and Duct Sizes (2.5" Flex) on Supply Side.
- Interior wall high throw, provides superior distribution for Heating, Cooling and Ventilation Purposes.

Myth's Vs. Facts in Ventilation

There are no Ventilation Police.

Train Your Customer // Repeatedly:

- Visiting our Model Home Sales Team.
- Pre-Permit Home Review Meeting.
- Client Reference Guide for every homeowner.
- In Home Training Session.
- 30 Day Warranty Follow Up.
- Blogs, Emails, and Courtesy Calls.
- Not just for ERV, for controlling HVAC System and Humidity.

Myth's Vs. Facts in Ventilation

Where is Doug Tarry Homes going from here?

- Net Zero Ready will be standard, January 2019.

netzero home

The ultimate standard for comfort and efficiency

- Average Air Change is <0.75 ACH.
  - Very Tight.
  - Efficient, usable ventilation strategy even more critical.
- Moving from 60H ERV to 90H-V ERV with ECM motor, for lower electrical usage and higher ventilation capacity.
- Moving Ensuite ERV intake to Main Hallway.
- Adding a bath fan into Ensuite, to limit excess humidity dump into the main system.

VanEE 90H-V ERV with ECM Motor

More Info

www.chba.ca/nzc

subscription link for Net Zero News

www.chba.ca/nze

see submenu for more info

www.NetZeroHome.com

list of Net Zero builders

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