Residential SIP Ventilation Modification Design Guide

For Single- and Multi-Family Homes

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SECTION 1

BACKGROUND

1.1 VENTILATION INTRODUCTION

Outdoor air ventilation is necessary for occupant comfort, occupant health, and to help assure the durability of the building structure. In older homes and small buildings, ventilation has traditionally been provided by air infiltration through building leaks such as windows, doors, vents, gaps, and cracks. Occupants have also relied on additional ventilation through open windows when they feel that their indoor air is stuffy or uncomfortable.

Natural ventilation is inexpensive to implement and gives occupants direct control over the ventilation in their space. However, reliance on windows and infiltration has been proven by multiple studies to be unreliable, and it generally causes excessive energy consumption.

The drawbacks to the use of infiltration and natural ventilation include:

- Building inhabitants do not always open windows in response to elevated contaminant levels because they cannot detect many harmful contaminants such as carbon monoxide (CO).
- In the cold weather climate zones, some building habitants use humidifiers to intentionally add extra moisture, which can result in elevated humidity levels, mold, and structural damage.
- In the warm weather climate zones, the natural infiltration of humid air can also result in unhealthy humidity levels, mold, and structural damage.
- The natural air infiltration rate is greatly affected by weather conditions and the level of weather-induced variation. Often the actual infiltration rate does not correspond with the ventilation requirement.
- Open windows allow an increase in interior noise levels within a building.
- Elevated levels of infiltration increase the amount of energy needed to heat or cool incoming air.

The American National Standard Institute (ANSI) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) have developed ventilation standards that address ventilation requirements and methods.

- **ANSI/ASHRAE 62.1** – Ventilation for Acceptable Indoor Air Quality (for high-rise construction >3 stories)
- **ANSI/ASHRAE 62.2** – Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings. (≤3 stories)

The ANSI/ASHRAE standards recognize that infiltration plays a role in building ventilation, but that it should not be the primary source. The primary source should be controlled mechanical ventilation. For building-science experts, engineers, designers, code authorities, and contractors throughout the United States, the ANSI/ASHRAE standards are the de facto reference. Building codes continue to evolve to require compliance with the ANSI/ASHRAE ventilation standards.

In the early 1980s, the FAA Part 150 Sound Insulation Program (SIP) added acoustical modifications to the typical building renovation process. Multiple studies later found that these acoustical modifications greatly impacted indoor air quality ventilation.

Research conducted from 1996-2002 by the Minneapolis-St. Paul International Airport – Metropolitan Airports Commission (MAC), Minneapolis Center for Energy and Environment (CEE), and THC, Inc.,

showed that acoustical modifications to a home/building reduced natural, uncontrolled air infiltration by 25% to 45%. This sharp decrease in air infiltration (resulting from the addition of SIP acoustic modifications) provided excellent aircraft-noise reduction for interior living spaces. However, the modifications had numerous negative impacts on indoor air quality: increased moisture levels, spillage of carbon monoxide (CO) in the gas appliance combustion process, reduced exhaust ventilation flow, and worsening of existing ventilation deficiencies.

1.2 SIP VENTILATION RESEARCH FINDINGS 1996-2002 (MSP, MKE)

After the introduction of the FAA Part 150 Sound Insulation Program (SIP) in the early 1980s, the Minneapolis-St. Paul International Airport – Metropolitan Airports Commission (MAC) began planning in 1990 for what is today one of the largest residential and institutional sound insulation programs in the United States. After the initiation of a "pilot" program in 1993, the MAC successfully treated 2,800 single-family homes by 1996. As the completion rates increased, MAC began to receive ventilation-related complaints from FAA Part 150 property owners. These concerns related to elevated moisture levels, gas appliance back-drafting, and mold issues. Although many U.S. airports had started to implement sound insulation programs, no program sponsor had considered the negative impacts of SIP treatments on indoor air quality.

In early 1996, based on complaints received, Minneapolis newspaper *Star Tribune* initiated an undercover investigation of homes acoustically treated by MAC in an effort to document the negative impacts of acoustical treatments. In April 1996, *Star Tribune* published an award-winning series of articles that documented the negative impacts of the SIP modifications on indoor air quality. The *Star Tribune* story created a great deal of public concern and panic, introducing a new level of legal liability for both the FAA and all sound insulation program sponsors. In reaction, the MAC formed a Ventilation Research Committee, comprised of the Minneapolis Center for Energy and the Environment (CEE) and several building-science experts from the United States and Canada. The committee decided to conduct "blower door" tests on 944 homes, which represented 40% of the homes treated to date. A "blower door" test measures air tightness in a building by using a fan capable of inducing a range of air flows to create both negative and positive pressure levels.

The "blower door" test revealed that 88% (833) of the 944 tested homes had problems relating to a significant reduction of air infiltration (increased tightness). Building science experts viewed this scenario favorably since it saved energy and reduced noise infiltration. The study also tested the for evidence of the negative impacts that *Star Tribune* had reported: elevated moisture levels, gas appliance back-drafting, and mold issues. As a result of these findings, MAC returned to all 2,800 previously treated homes and provided ventilation modifications designed to correct the documented deficiencies.

From 1997 to 2002, MAC, CEE, and THC, Inc., (program management firm) conducted additional before-and-after "blower door" tests on homes treated by the Minneapolis-St. Paul (MSP) and Milwaukee (MKE) SIP in an effort to identify pre-existing ventilation deficiencies, measure "pre" ventilation levels (before SIP treatment), and measure "post" ventilation levels (after treatment). In February 2003, THC and their legal counsel (McGuire Woods) presented their research findings to the FAA Headquarters in Washington, D.C. THC's presentation was designed to emphasize to the FAA the critical importance of providing ventilation modifications as part of SIP treatment packages and to disclose the potential legal liabilities related to the failure to do so by program sponsors. This presentation outlined several key conclusions of the six-year research:

- The addition of SIP acoustic modifications in a building can reduce the natural infiltration of inside/outside air by 25% to 40%, providing significant sound reduction and energy savings.
- This reduction can inhibit the natural exchange of air, introduce carbon monoxide (CO) spillage in gas appliances during the combustion process, reduce the effectiveness of exhaust venting, and elevate interior moisture levels. If not properly addressed and treated, all these negative impacts can increase safety concerns for building inhabitants.
- Most homes have pre-existing ventilation deficiencies. The addition of SIP acoustic modifications can worsen existing deficiencies, reduce indoor air quality, and increase sponsor legal liability.

- If identified by the SIP design team, it is critical that the property owner corrects all pre-existing ventilation deficiencies prior to the addition of SIP modifications.
- During the SIP design process, a quality ventilation inspection must be performed in each building slated for SIP treatment. The inspection should include the following:
  - » Blower door test
  - » Gas appliance spillage test
  - » Gas appliance carbon monoxide (CO) test
  - » Moisture inspection
  - » Attic/wall insulation inspection
- Based on the inspector's observations, the mechanical/ventilation engineer should prescribe additional ventilation modifications (as part of the standard SIP acoustic treatment package) to ensure that proper ventilation levels will be maintained in a tightened environment.
- Depending on the climate zone, there are several ventilation modifications that may be required:
  - » Gas appliance venting modifications
  - » Ventilation air exchange systems
  - » Addition of ventilation fans
  - » Fan venting modifications
  - » Addition of combustion air
  - » HVAC system replacement
  - » Replacement or addition of ductwork
  - » Conversion of gas water heaters to electric
  - » Dehumidification
  - » Sealing of HVAC rooms/closets

1.3 PROBLEMS WITH TIGHT BUILDINGS

Tight buildings are similar to air in a sealed plastic bag. Unwanted pollutants such as odors, humidity, airborne chemicals, and gases are trapped inside. In fact, a tight building is worse than a sealed plastic bag since the building occupants are adding additional pollutants to the air constantly. Without controlled ventilation, pollutants build up in tight buildings, causing physiological harm to the occupants and structural damage to the building.

Sick Building Syndrome is a term used to describe the effects experienced by occupants of buildings that are too tight and have poor ventilation. Occupants typically experience discomfort and acute health symptoms that are linked to the amount of time spent in a building. Many times, no specific illness can be diagnosed and no specific source can be identified.

Affected occupants experience symptoms such as irritation of the eyes, nose, and throat; neurotoxic or general health problems; skin irritation; non-specific hypersensitivity reactions; infectious diseases; and odor and taste sensations. These symptoms have been shown to negatively affect productivity and quality of life.

Damage caused to a building due to the combination of poor ventilation and a tight building envelope will often manifest as humidity. Excess humidity causes mold and fungus to appear in visible and hidden locations. Excess humidity also causes rot in wood and wall structures, leading to premature structural failure and decreased property value. Mold and fungus can cause acute health effects in building occupants.

Mold and fungus, often seen as dark or black growth, can be visible to the eye in attics, on the underside of roofs, near tubs/showers/toilets, and around windows. Mold and fungus can be found in wall cavities, but wall materials must be removed to find them. Anywhere condensation can accumulate, mold and fungus can grow.

Whole-building ventilation – the exchanging of stale indoor air with fresh outdoor air – is necessary to maintain a healthy living environment. Continuous ventilation removes and dilutes pollutants not captured by local (source) ventilation, as well as pollutants that occur in rooms other than bathrooms or kitchens.

Common Pollutants Found in Buildings:

- Volatile Organic Compounds (VOC) – Perfumes, hairsprays, furniture polish, cleaning solvents, hobby and craft supplies, pesticides, carpet dyes and fibers, glues, adhesives, sealants, paints, stains, varnishes, strippers, wood preservatives, dry-cleaned clothes, moth repellents, air fresheners, stored fuels, automotive products, contaminated standing water, plastics, etc.
- Formaldehyde – Particle board, interior-grade plywood, cabinetry, furniture, urea formaldehyde foam insulation, carpet, fabrics, etc.
- Pesticides – Insecticides, (including termiticides), rodenticides, fungicides, disinfectants, herbicides (from outdoor use), etc.
- Biological Contaminants – Humans, plants, animals, pillows, bedding, house dust, wet or damp materials, mold, etc.
- Environmental Tobacco Smoke (ETS) – Tobacco products
- Other – Visit www.epa.gov and search for “Indoor Air Quality”.

1.4 VENTILATION STANDARDS IN THE UNITED STATES

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) is the technical body that develops and maintains ventilation standards for the United States. Most U.S. ventilation codes and energy-efficiency programs are based on ASHRAE 62 standards. ASHRAE 62 Standard committees develop and maintain ventilation standards for low-rise residential and other residential, commercial, and institutional applications in the United States.

There are two separate ASHRAE ventilation standards that pertain to different types of buildings:

- ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality (for high-rise construction >3 stories)
- ASHRAE 62.2 – Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings (≤3 stories)

The two main requirements of ASHRAE 62 are (1) whole-building/unit mechanical ventilation to maintain acceptable air quality, and (2) local exhaust ventilation in each kitchen and bathroom to reduce the levels of contaminants and moisture in these spaces. Local ventilation in kitchens and bathrooms removes (or reduces the intensity of) many pollutants at their source; whole-building/unit mechanical ventilation maintains the overall indoor air quality of the occupiable spaces.

ANSI/ASHRAE Standard 62.1 – Ventilation for Acceptable Indoor Air Quality (>3 stories)

Whole-Building/Unit Ventilation

The amount of whole-building/unit mechanical ventilation required for high-rise residential ventilation is determined by a formula that considers the size of each dwelling unit and the potential number of occupants:

$$\mathbf{V_{bz} = (R_p * P_z) + (R_a * A_z)}$$

V_{bz} = Breathing zone outside airflow.

A_z = Zone floor area; the net occupiable floor area of the ventilation zone (ft^2).

P_z = Zone Population; the number of people in the ventilation zone during typical usage. (1-bedroom dwelling assumes 2 people, with an additional person for each additional bedroom)

R_p = Outdoor Air for People; rate required per person as indicated in Table 6-1 of ASHRAE 62.1-2010. (See table on page 10)

R_a = Outdoor Air for Dwelling; airflow rate required per unit as indicated in Table 6-1 of ASHRAE 62.1-2010. (See table on page 10)

Table 6-1 MINIMUM VENTILATION RATES IN BREATHING ZONE						
	People Outdoor Air Rate R_p		Area Outdoor Air Rate R_a		Notes	Air Class
	cfm/person	L/s*person	cfm/ft^2	L/s*m^2		
Residential						
Dwelling Unit	5	2.5	0.06	0.3	F, G	1
Common Corridors	-	-	0.06	0.3		1
Note F	Default occupancy for dwelling units shall be two persons for studio and one-bedroom units, with one additional person for each additional bedroom.					
Note G	Air from one residential dwelling shall not be recirculated or transferred to any other space outside of that dwelling.					

Example: 2-bedroom apartment, 1000 ft^2

$V_{bz} = (R_p * P_z) + (R_a * A_z)$

V_{bz} = (3 People)*(5 CFM per person from Table 6-1) + (.06 from Table 6-1)*(1000 ft^2)

V_{bz} = 15 + 60

V_{bz} = 75 CFM Continuous

ANSI/ASHRAE Standard 62.2 – Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings (≤3 stories)

Whole-Building/Unit Ventilation

The amount of whole-building/unit mechanical ventilation required for low-rise residential ventilation is very similar but less complicated than ANSI/ASHRAE Standard 62.1. The total airflow is determined by a simplified formula that considers the size of the building and the potential number of occupants:

$Q_{tot} = 0.03A_{floor} + 7.5(N_{br} + 1)$

Q_{tot} = total required ventilation rate (CFM)

A_{floor} = floor area of residence (ft^2)

N_{br} = number of bedrooms (not to be less than 1)

Example: 3-bedroom home, 2200 ft^2

$Q_{tot} = 0.03A_{floor} + 7.5(N_{br} + 1)$

Q_{tot} = (0.03 * 2200) + 7.5(3 + 1)

Q_{tot} = 66 + 30

Q_{tot} = 96 CFM Continuous

Local Ventilation

It is generally accepted by building-science experts and most code authorities that local ventilation is necessary to remove high concentrations of bathroom and kitchen pollutants such as humidity, odors, and cooking by-products. As a guideline, ANSI/ASHRAE Standards 62.1 and 62.2 recommend that, if local ventilation is operated intermittently, it must be capable of exhausting a minimum of 50 CFM for each bathroom and 100 CFM for the kitchen. If continuous ventilation is used, the rate is 25 CFM for each bathroom and 50 CFM for the kitchen.

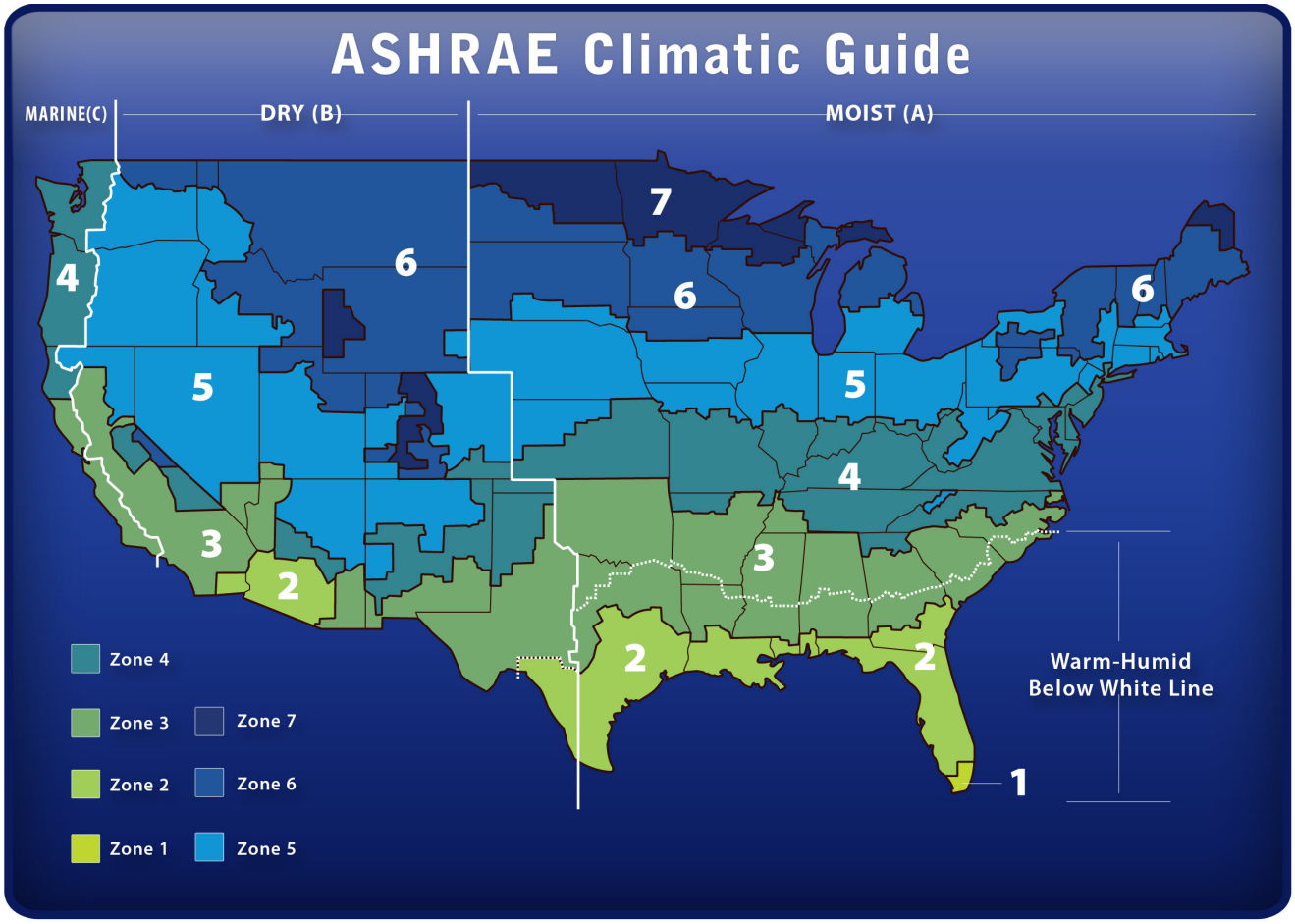
Some jurisdictions allow an operable window to substitute for mechanical ventilation in a bathroom. An open window will allow sound to infiltrate. For the purpose of FAA SIP ventilation programs, an operable window is not an allowable alternative to mechanical ventilation.

While ASHRAE Standard 62.2 is generally accepted by national experts as the minimum standard for ventilation, it is not a best practice. If it was, it would assign ventilation rates based on factors such as the number of occupants in a dwelling and the strength of pollutant sources.

Refer to local code authorities for jurisdiction-specific requirements.

1.5 CLIMATE ZONES

The ventilation recommendations outlined in later chapters are heavily influenced by the ASHRAE climate zone in which the structure is located. The continental United States is divided into seven specific climate zones, ranging from Very Hot in Zone 1 to Very Cold in Zone 7, as shown on the map below and in the table that follows. (Hawaii falls under Zone 1A, and parts of Alaska are Zone 8. See Appendix II.)



Additionally, most zones are divided into Humid (eastern half of the United States), Dry (most of the western states), and Marine (west coast states) sub-zones.

The climate zone and sub-zone dictate which ventilation solution is most appropriate for a dwelling. For example:

- Supply ventilation is suitable for a dwelling in Zone 2, but not for one in Zone 7. In Zone 7, the positive-pressure scenario created by a supply system can push humid air into wall cavities, where it can then condensate when meeting colder exterior walls. This condensation can cause mold and mildew issues.
- Exhaust ventilation is suitable for Zone 7, but not for a dwelling in Zone 1. In Zone 1, the negative-pressure scenario created by an exhaust system can pull humid air into wall cavities, where it can then condensate on colder interior walls, causing mold and mildew issues.

- Balanced ventilation is suitable in all climates since, by definition, it means an equal amount of air is supplied and exhausted from the dwelling and pressure is equalized. However, two fans are required to achieve balanced ventilation.

ASHRAE Climatic Zones	
Climate Zone 1A - Very Hot/Humid	Also known as tropical. Temperature is constantly high and does not vary greatly from day to night. High heat and humidity levels make thunderstorms common.
Climate Zone 2A - Hot/Humid	Also known as tropical. Temperature is constantly high and does not vary greatly from day to night. High heat and humidity levels make thunderstorms common.
Climate Zone 2B, Hot/Dry	Also known as deserts or semi-deserts. Transition areas between humid, tropical climates and warm, moderate climates. Characterized by low humidity levels (less than 50% RH) and high levels of solar radiation. Overall precipitation is typically low and often falls rapidly over a short period of time.
Climate Zone 3A, Warm/Humid	Mixed, humid climates experience all four seasons, but season length and extremity vary by location. These regions receive more than 20 inches of rain annually. The average winter temperature typically drops below 45°F. Summers can be extremely hot and humid. Many of these regions will experience some snowfall and icing during winter months.
Climate Zone 3B, Warm/Dry	Mixed, dry climates experience seasonal temperature variations and typically experience all four seasons. Season length and extremity vary by location. These regions typically receive less than 20 inches of rain annually.
Climate Zone 3C, Warm/Marine	Temperate climates found on the coast. These areas typically do not have extreme seasons. Temperatures remain relatively mild year-round due to the high heat capacity of water. Marine climates only experience two seasons, summer and winter. Summer months are dry, while winter can be very wet. To be considered a marine climate, 65% of annual total rainfall must occur in less than six months of the year. These climates are generally humid, but moisture and precipitation levels can vary greatly by location.
Climate Zone 4A, Mixed/Humid	Mixed, humid climates experience all four seasons, but season length and extremity vary by location. These regions receive more than 20 inches of rain annually. The average winter temperature typically drops below 45°F. Summers can be extremely hot and humid. Many of these regions will experience some snowfall and icing during winter months.
Climate Zone 4B, Mixed/Dry	Mixed, dry climates experience seasonal temperature variations and typically experience all four seasons. Season length and extremity vary by location. These regions typically receive less than 20 inches of rain annually.
Climate Zone 4C, Mixed/Marine	Temperate climates found on the coast. These areas typically do not have extreme seasons. Temperatures remain relatively mild year-round due to the high heat capacity of water. Marine climates only experience two seasons, summer and winter. Summer months are dry, while winter can be very wet. To be considered a marine climate, 65% of annual total rainfall must occur in less than six months of the year. These climates are generally humid, but moisture and precipitation levels can vary greatly by location.
Climate Zone 5A, Cool/Humid	Mixed, humid climates experience all four seasons, but season length and extremity vary by location. These regions receive more than 20 inches of rain annually. The average winter temperature typically drops below 45°F. Summers can be extremely hot and humid. Many of these regions will experience some snowfall and icing during winter months.
Climate Zone 5B, Cool/Dry	Mixed, dry climates experience seasonal temperature variations and typically experience all four seasons. Season length and extremity vary by location. These regions typically receive less than 20 inches of rain annually.

Climate Zone 6A, Cold/Humid	Cold climates include those known as the tundra, taiga, or alpine. These climates are typically found close to the poles and include the majority of Canada, Northern Europe, and Northern Asia. Cold climates can be found at high altitudes in any region of the world. They typically have long, dark winters with short days; however, they can experience large seasonal temperature swings and very warm summers. Snow and ice accumulations are common in most cold climates.
Climate Zone 6B, Cold/Dry	Cold climates include those known as the tundra, taiga, or alpine. These climates are typically found close to the poles and include the majority of Canada, Northern Europe, and Northern Asia. Cold climates can be found at high altitudes in any region of the world. They typically have long, dark winters with short days; however, they can experience large seasonal temperature swings and very warm summers. Snow and ice accumulations are common in most cold climates.
Climate Zone 7, Very Cold	Cold climates include those known as the tundra, taiga, or alpine. These climates are typically found close to the poles and include the majority of Canada, Northern Europe, and Northern Asia. Cold climates can be found at high altitudes in any region of the world. They typically have long, dark winters with short days; however, they can experience large seasonal temperature swings and very warm summers. Snow and ice accumulations are common in most cold climates.

For specific ventilation solutions based on climate zones, refer to Section 3.

For specific climate zones by state and county, refer to Appendix II.

1.6 CENTRAL VENTILATION SYSTEMS

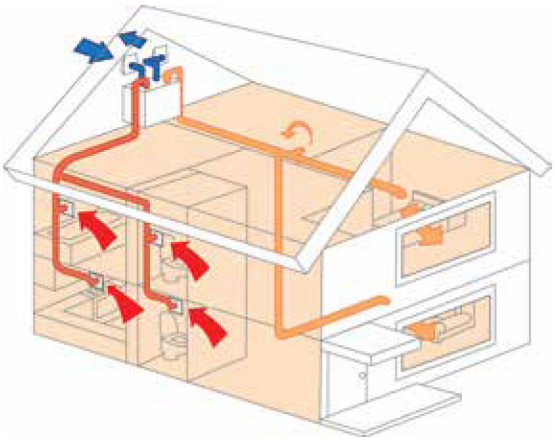
A central ventilation system can be defined as a centrally located ventilator specifically designed to provide controlled movement of air in and out of the building for general ventilation. The purpose of a central ventilation system is to provide a continuous low-level flow of air in and out of the building to ensure a safe environment for the occupants and protect the structural integrity of the building.

A central ventilation system provides low-level continuous flow using one of three methods: supply, exhaust, or balanced. These methods are explained in more detail in Section 2. The continuous low-level flow of air removes and dilutes the pollutants commonly found in buildings. A central ventilation system should not to be confused with a central heating and air conditioning handling unit (AHU). The differences between the two are explained in Section 1.7.

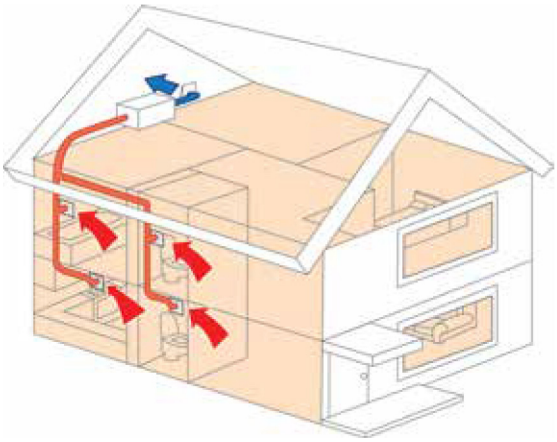
Advantages of Central Ventilation Systems

- Lower installed cost
- Better performance
- Significant energy savings from precise ventilation rate control and ENERGY STAR rated ventilators
- Precisely controlled ventilation rates with very effective air distribution
- Minimal penetrations in the building envelope (no more than two for balanced operation)

Local ventilation, such as bathroom and kitchen fans, is designed to remove the high levels of humidity, odors, and other pollutants that are typically created by an event such as taking a shower or cooking. This type of ventilation eliminates most of these pollutants at the source, but it does not capture it all. Moreover, local ventilation methods do not have the distribution efficiency to provide the whole-house continuous ventilation that tight buildings need. Hybrid central ventilation systems provide continuous low-level ventilation for the entire home, as well as local ventilation for kitchens and bathrooms, if necessary.



Balanced Ventilation System



Local (Exhaust) Ventilation System

1.7 DIFFERENCES BETWEEN VENTILATION AND HVAC/AC UNIT

It is a common misconception that the home's central heating and air conditioning handling unit (AHU) provides ventilation. In fact, the AHU is designed to recirculate existing indoor air through the air-conditioning and/or heating units. This is a closed system that neither exhausts pollutants nor supplies fresh air to the home.

Ventilation is the process by which "clean" air (usually outdoor air) is intentionally provided to a space, and stale air is removed. This process is usually accomplished mechanically, but it can occur naturally in rare cases and under specific circumstances.

Most confusion can be attributed to the typical installation of the AHU by Heating, Ventilation, and Air-Conditioning (HVAC) contractors, as well as the assumption that air movement equals ventilation.

Proper ventilation strategies are dependent upon the climate zone in which a home or building resides. To select the best ventilation strategy for a particular building, consider the regional climate zone and the project budget.

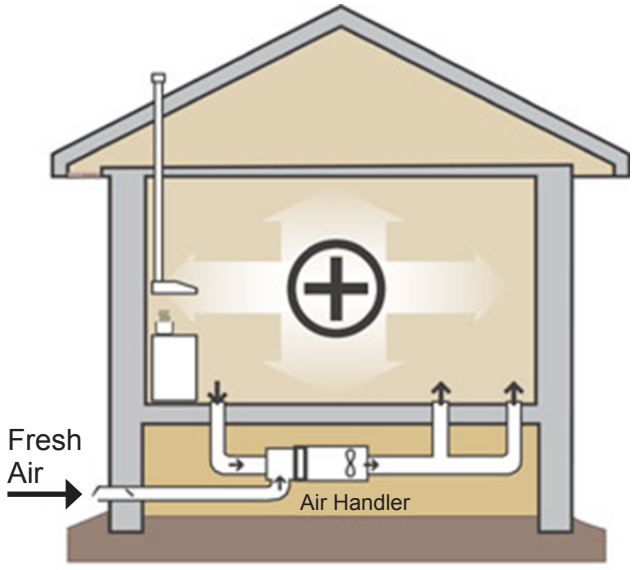
Air Handling Unit

1.8 VENTILATING WITH AN AHU

Using a fresh air duct to provide supply ventilation via the central heating and air conditioning handling unit (AHU) is not recommended, except in very limited circumstances (Refer to Section 2.2 for recommended supply air solutions). AHU are designed to respond to thermostat requests. They will not respond to ventilation requirements without special equipment.

Disadvantages of Ventilating with an AHU:

- Unregulated amount of air being pulled into the building envelope
- Potential damage to gas heat exchangers
- Creates drafts and thermal discomfort in the winter
- Excess condensation in A/C ducting during warm-moist seasons can cause water to blow off coils, potentially causing mold to form in duct systems
- No filtration of incoming air
- Continuous operation of AHU to provide proper ventilation (even in non-cooling/heating seasons) can result in excess energy expense
- Difficult to calibrate and deliver recommended ventilation rates
- Unsuitable for cold climates (due to the positive-pressure scenario, as explained on page 21)



Ventilating with an AHU

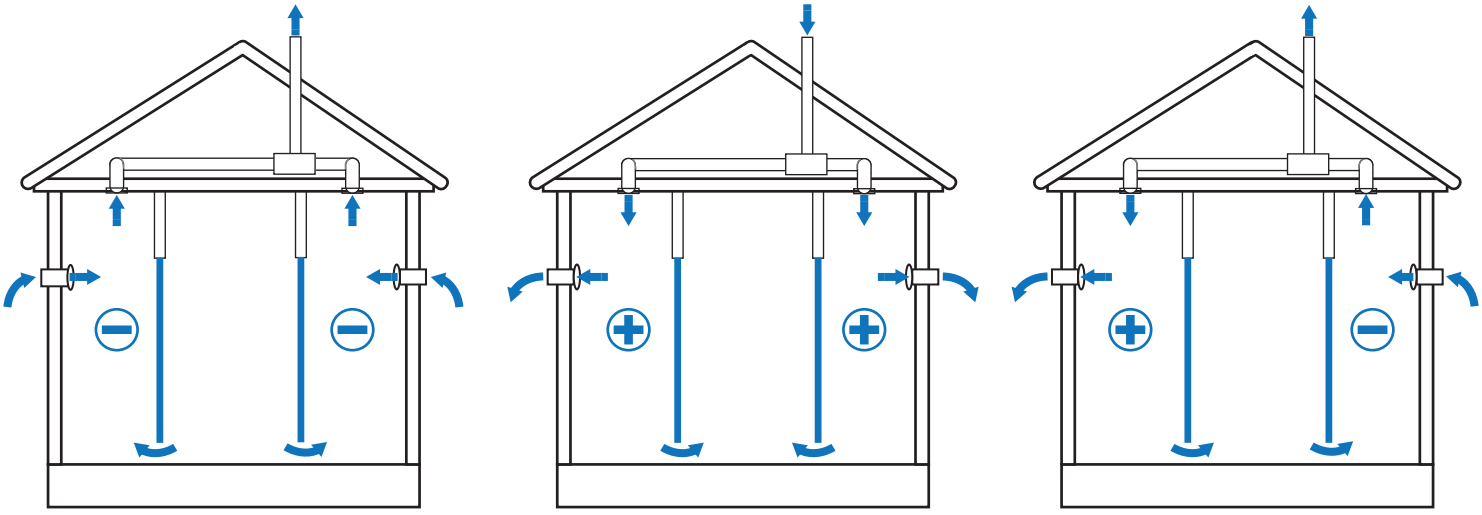
1.9 OTHER INSTALLATION CONSIDERATIONS FOR RETROFIT PROJECTS

When introducing a continuously operating appliance to a home that did not have one previously, consider the following:

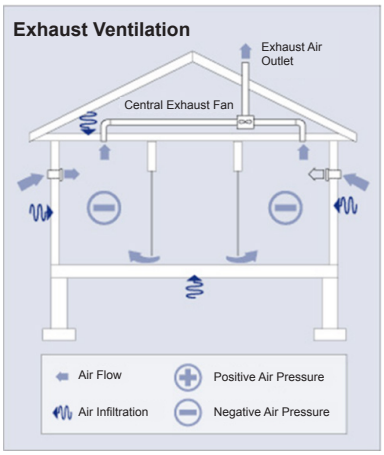
- The appliance should be silent
- The appliance should be ENERGY STAR rated
- The appliance should be low maintenance

SECTION 2

COMMON MECHANICAL VENTILATION METHODS

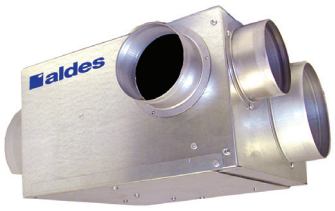


2.1 CONTINUOUS EXHAUST



- A fan brings in outside air by creating negative pressure inside the building
- Good for source contaminant removal
- Requires dedicated air-intake points to direct outside air to habitable spaces
- ENERGY STAR rated fan recommended

Types of Equipment*

		
In-Line Fan (VS)	***Multi-Port Fan (MPVS)***	***Air Inlets***

*Remote-mounted fans are preferred for noise-free operation

Pros

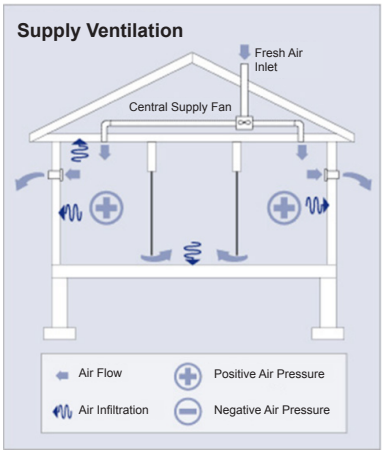
- Central systems can combine spot (bathroom) exhaust and whole-building ventilation
- Low power consumption
- Relatively low cost
- Good for Climate Zones 2B, 3B, 3C, 4B, 4C, 5A, 5B, 6A, 6B, 7A & 7C (see pages 12-14)

Cons

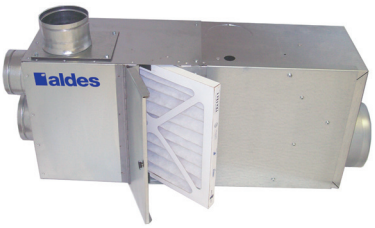
- Potential to backdraft appliances and fireplaces
- Cannot effectively filter incoming air
- Cannot use in Climate Zones 1, 2A, 3A, and 4A (see pages 12-14)
- Not suitable for use in warm-humid climates.
- Warm, moist air will condense on cold surfaces in walls and leakage areas in building envelope

2.2 CONTINUOUS SUPPLY

- A fan brings in outside air directly
- Creates positive pressure in the building
- Can direct where the fresh air is introduced into habitable zones



Types of Equipment*

		
In-Line Filtering Fan (FSVS)	***In-Line Filtering/Distributing Fan (DSVS)***	***Multi-Port Blending/Filtering Fan (BVS)***

*Remote-mounted fans are preferred for noise-free operation

Pros

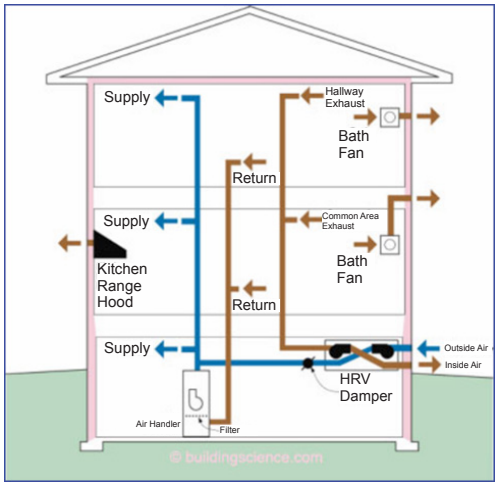
- Directly filters outside air
- Quiet-to-silent operation
- Moderate cost
- Positive pressure can prevent unwanted infiltration and subsequent contaminant introduction into the building, especially from attached garages
- Can offset negative pressure from appliances and stack effect
- Good for Climate Zones 1, 2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A & 5B (see pages 12-14)

Cons

- Separate exhaust fans are still required for bathrooms and kitchens
- Not suitable for use in very cold climates
- Cannot use in Climate Zones 6A, 6B, 7A, and 7B (see pages 12-14)
- Warm, moist air will condense on cold surfaces in walls and leakage areas in building envelope

2.3 BALANCED VENTILATION

- Brings in outside air directly and exhausts stale air simultaneously
- Creates neutral pressure in the building (depending on ducting)
- Good for source-contaminant removal and directing the distribution of fresh air introduction
- A Heat or Energy Recovery balanced ventilator recovers from the exhaust air a portion of the energy used to heat and cool the building and transfers that energy to the fresh outside air



Types of Equipment

	
HRV – Heat Recovery Ventilator	***ERV – Energy Recovery Ventilator***

Differences Between Heat Recovery Ventilators (HRV) and Energy Recovery Ventilators (ERV)

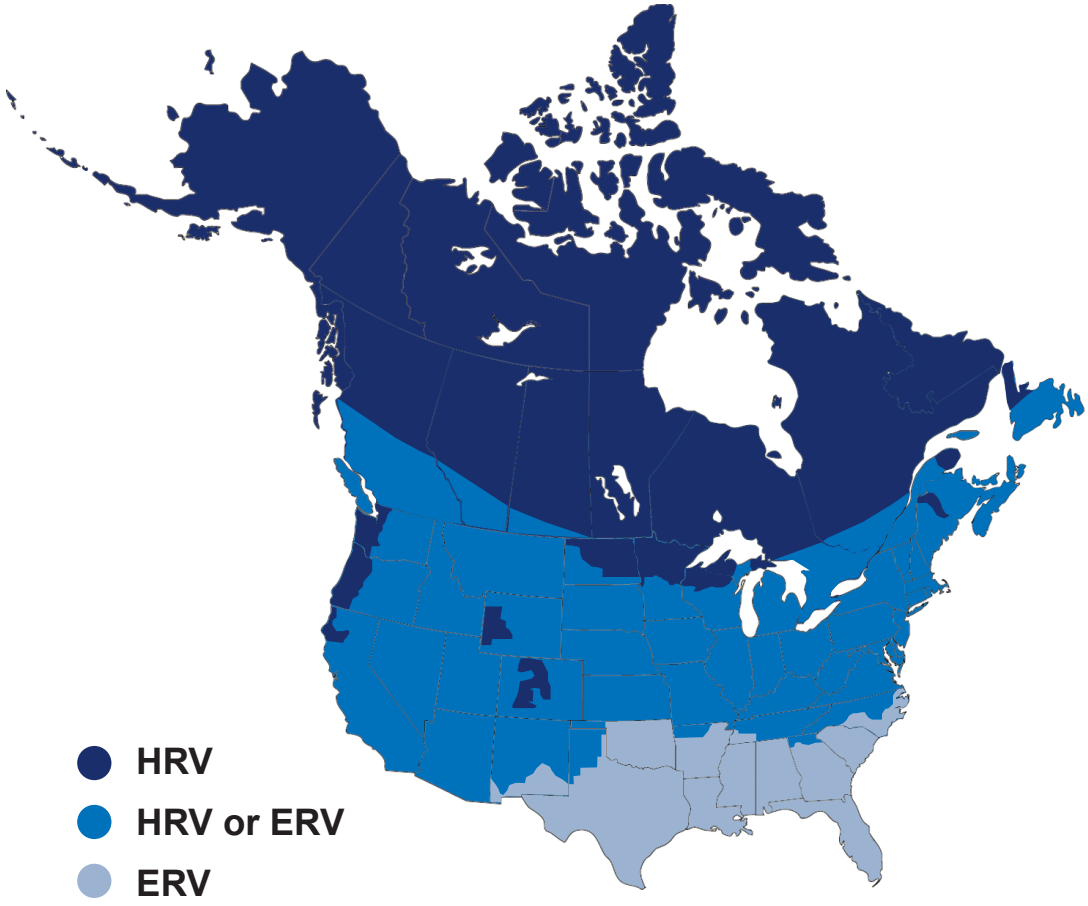
Choosing between an HRV and an ERV is not always straightforward. It depends on many factors – house square footage, number of occupants, tightness of the building envelope, and climate, among others – but the presence of outdoor humidity is often the deciding factor.

The map at right shows that an ERV is the best choice for the hot and humid conditions of the southern United States. An ERV is more cost effective when paired with an air conditioner. In very cold climates, there is not enough difference in moisture levels between indoor and outdoor air for homes to benefit from the moisture-transfer capabilities an ERV.

Areas that experience cold winters and warm summers are candidates for an HRV or ERV. Specific instances, such as indoor relative humidity problems, can make one more suitable than the other.

HRV/ERV Climate Zone Recommendations (See climate zone descriptions on pages 12-14 and map on page 23)	
HRV	2B, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 6A, 6B, 7A & 7B
ERV	1, 2A, 2B, 3A, 3B, 4A, 4B, 5A, 5B, 6A & 6B

HRV/ERV Climate Zone Recommendations



Pros of Balanced Ventilation

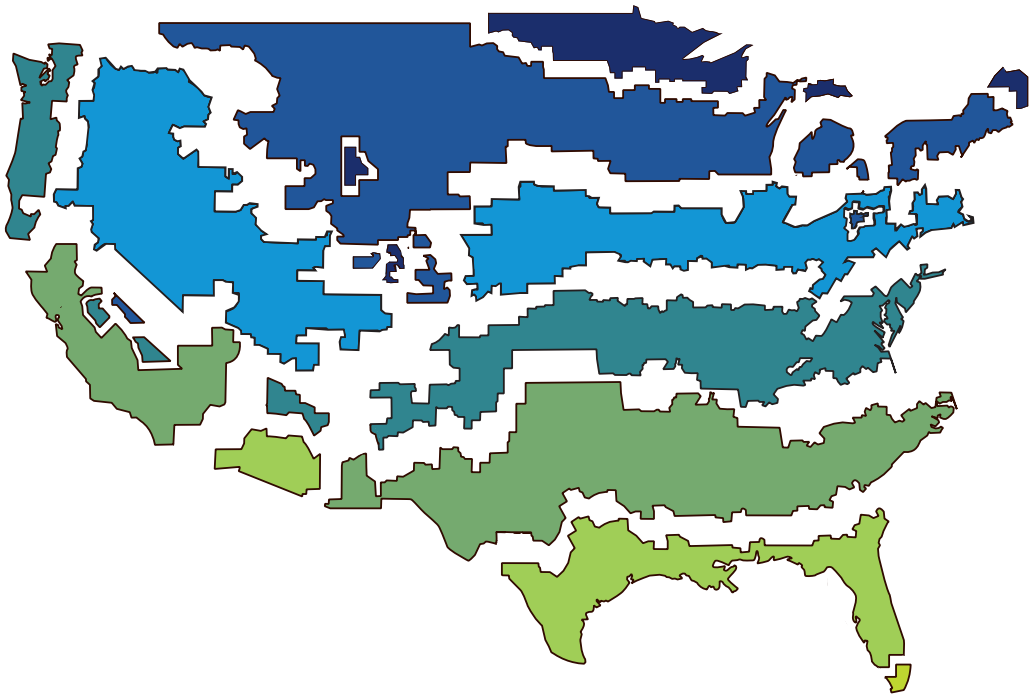
- HRV/ERV pays for itself in the long run through energy savings
- Filters outside air directly
- Quiet-to-silent operation
- Neutral-to-slight pressure offset (if desired)
- Addresses the requirement for bathroom exhaust (with limitations)
- Can offset negative pressure from appliances and stack effect

Cons of Balanced Ventilation

- Plumbing required for condensation drains (in HRV)
- More maintenance requirements
- Higher installed cost

SECTION 3

CLIMATE DESIGN RECOMMENDATIONS

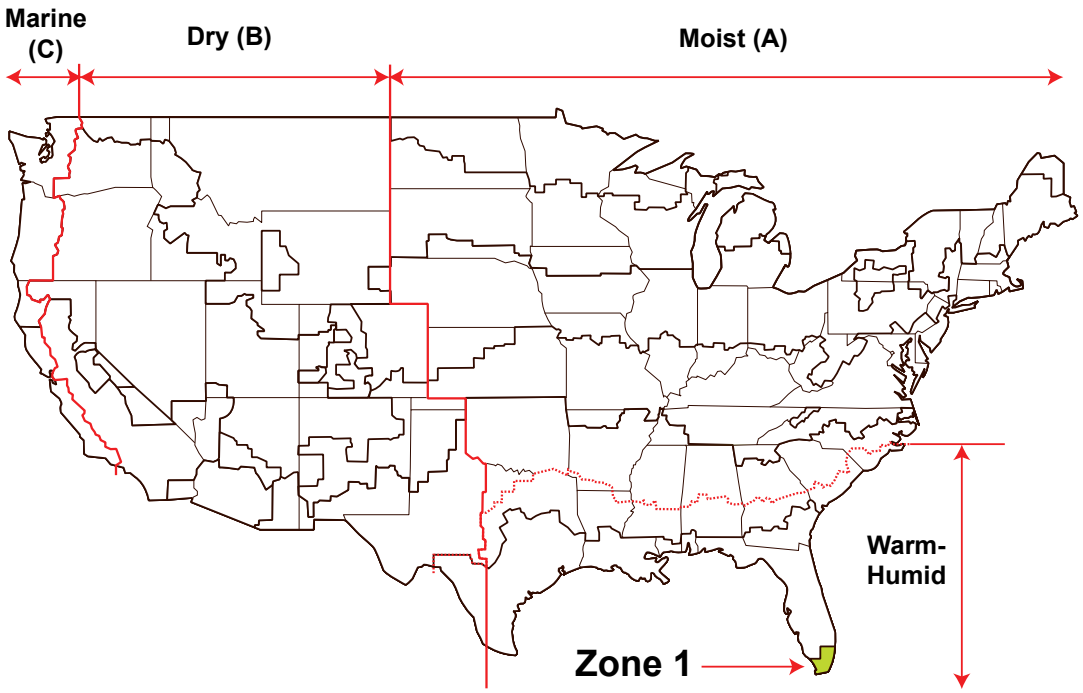


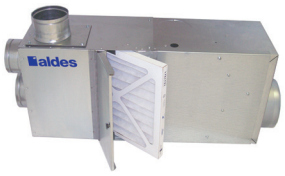
3.1 DESIGN RECOMMENDATIONS: CLIMATE ZONE 1

Climate Zone 1A, Very Hot/Humid – Also known as tropical. Temperature is constantly high and does not vary greatly from day to night. High heat and humidity levels make thunderstorms common.

Thermal Criteria: 9000 < CDD 50°F*

*CDD = Cooling Degree Days



Recommended Ventilation Solutions for Climate Zone 1			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6

TYPICAL VENTILATION SCENARIOS IN SINGLE- AND MULTI-FAMILY HOMES: ZONE 1

- **SCENARIO #1 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: No

  Recommended Ventilation Modifications

  OPTION A
  Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  OPTION B
  Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #2 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: No

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  OPTION B
  Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #3 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Alternately, duct the supply air from the ERV to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  OPTION B
  Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*
  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #4 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Alternately, duct the supply air from the ERV to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

OPTION B
Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

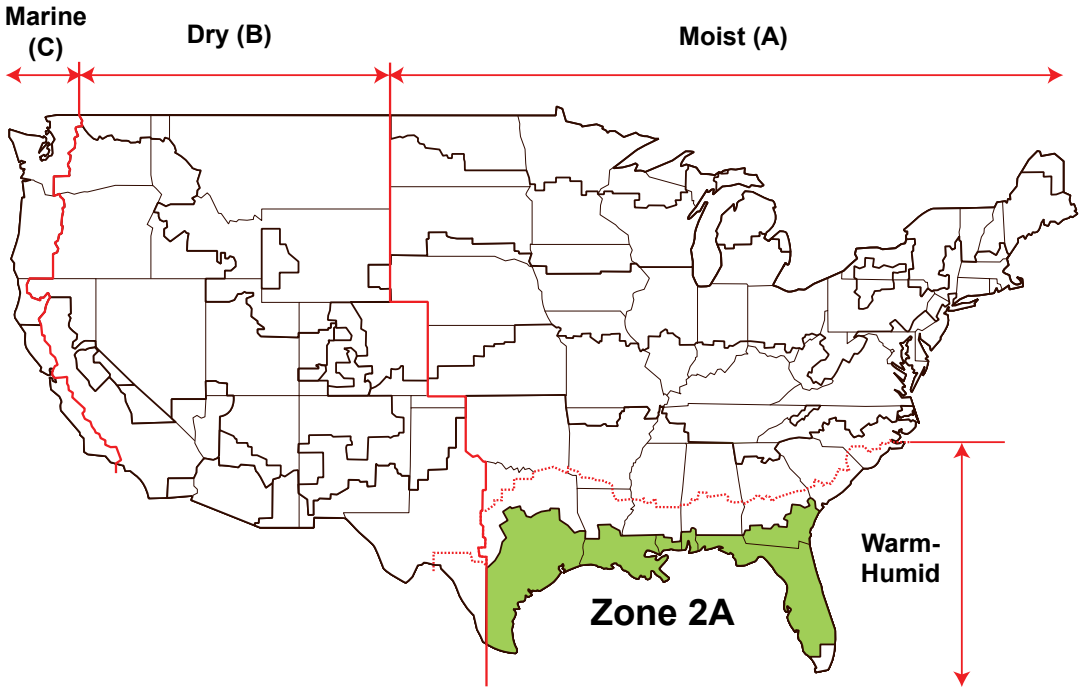
Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

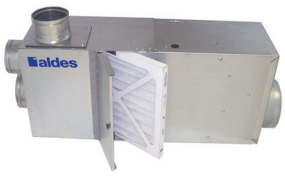
3.2 DESIGN RECOMMENDATIONS: CLIMATE ZONE 2

Climate Zone 2A, Hot/Humid – Also known as tropical. Temperature is constantly high and does not vary greatly from day to night. High heat and humidity levels make thunderstorms common.

Thermal Criteria: 6300 < CDD 50°F ≤ 9000*

*CDD = Cooling Degree Days

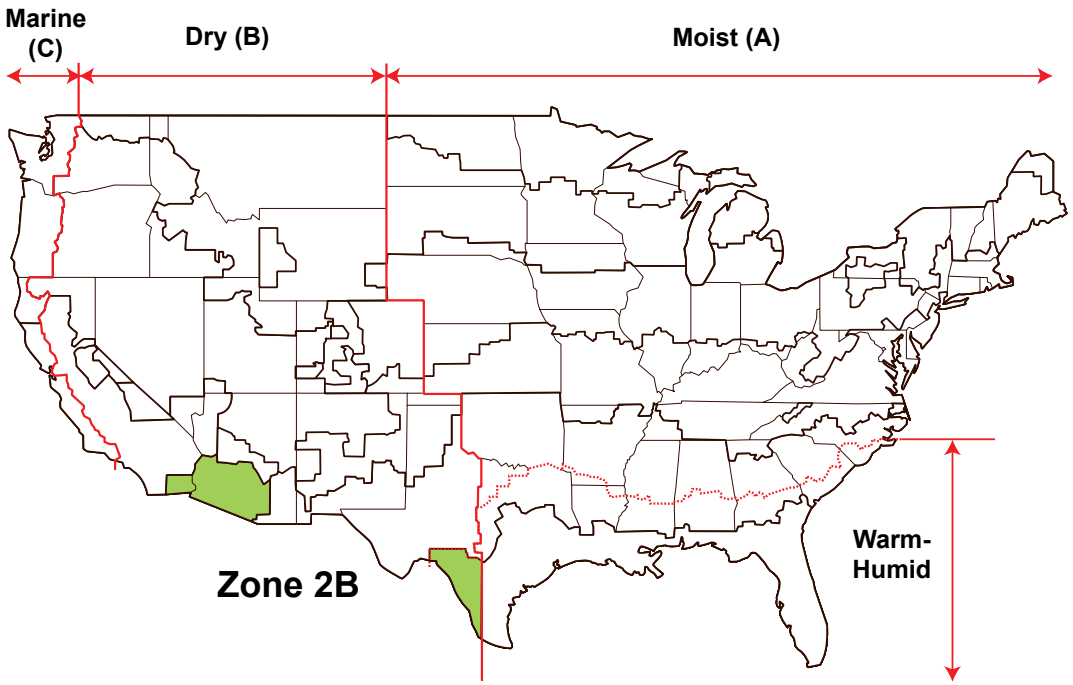


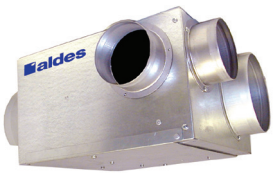
Recommended Ventilation Solutions for Climate Zone 2A			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6

Climate Zone 2B, Hot/Dry – Also known as deserts or semi-deserts. Transition areas between humid, tropical climates and warm, moderate climates. Characterized by low humidity levels (less than 50% RH) and high levels of solar radiation. Overall precipitation is typically low and often falls rapidly over a short period of time.

Thermal Criteria: 6300 < CDD 50°F ≤ 9000*

*CDD = Cooling Degree Days



Recommended Ventilation Solutions for Climate Zone 2B			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6
			
VZ-IAQ-HRV See Appendix I, Table A-3	***VZ-IAQ*** See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5	

TYPICAL VENTILATION SCENARIOS IN SINGLE- AND MULTI-FAMILY HOMES: ZONE 2

- **SCENARIO #1 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: No

  Recommended Ventilation Modifications

  OPTION A
  Zone 2A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 2B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators, (CAR) or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  OPTION B
  Zone 2A or 2B – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Zone 2B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide general continuous exhaust ventilation. If bath and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #2 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: No

Recommended Ventilation Modifications

Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

OPTION A

Zone 2A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

Zone 2B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

OPTION B

Zone 2A or 2B – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Zone 2B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide general continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Continuous Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust – See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.

- **SCENARIO #3 EXISTING CONDITIONS**

  Central Ventilation System: No

  Central AC/Heat: Yes

  Recommended Ventilation Modifications

  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

OPTION A
Zone 2A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Alternately, duct the supply air from the ERV to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

Duct to bathrooms and kitchen if no local ventilation is in place. Ensure the system is balanced, and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

Zone 2B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Alternately, duct the supply air from the air exchanger to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 & A-4.

OPTION B
Zone 2A or 2B – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Zone 2B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #4 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: Yes

Recommended Ventilation Modifications

Ensure the existing ventilation system provides whole-house continuous ventilation, and the local exhaust ventilation meets recommended airflow rates. If not:

OPTION A

Zone 2A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Alternately, duct the supply air from the ERV to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

Zone 2B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Alternately, duct the supply air from the air exchanger to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

OPTION B

Zone 2A or 2B – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-SVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Zone 2B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

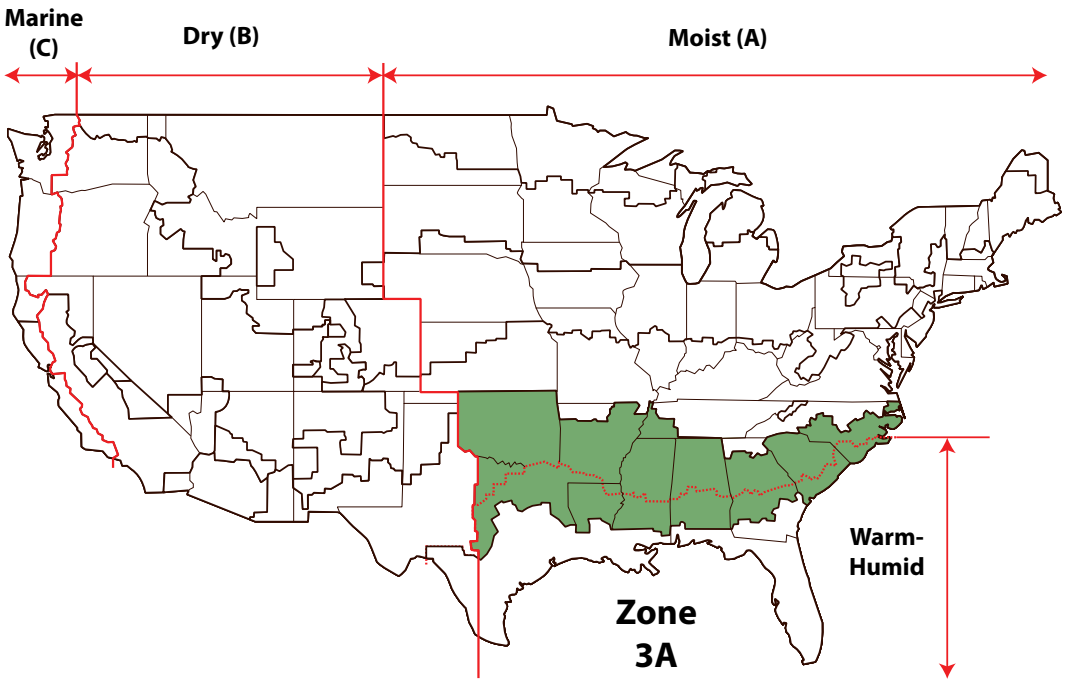
Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

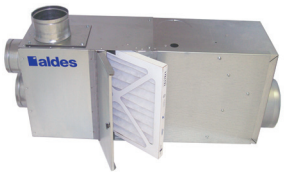
3.3 DESIGN RECOMMENDATIONS: CLIMATE ZONE 3

Climate Zone 3A, Warm/Humid – Mixed, humid climates experience all four seasons, but season length and extremity vary by location. These regions receive more than 20 inches of rain annually. The average winter temperature typically drops below 45°F. Summers can be extremely hot and humid. Many of these regions will experience some snowfall and icing during winter months.

Thermal Criteria: 4500 < CDD50°F ≤ 6300*

*CDD = Cooling Degree Days

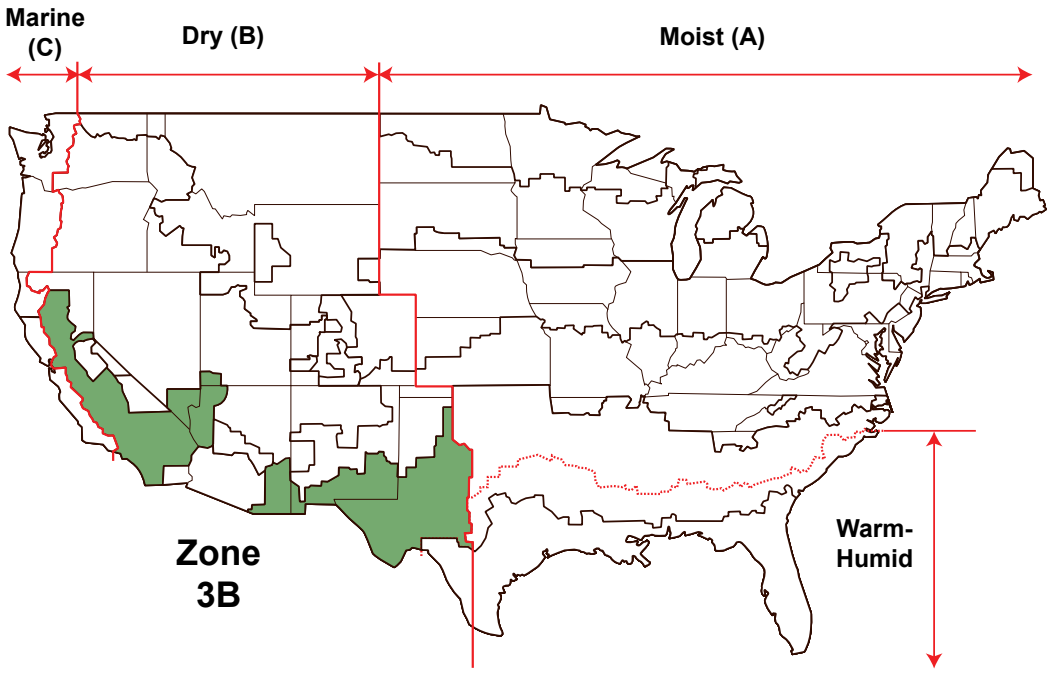


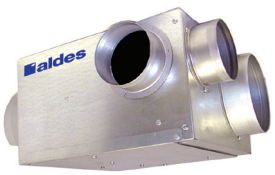
Recommended Ventilation Solutions for Climate Zone 3A			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6

Climate Zone 3B, Warm/Dry – Mixed, dry climates experience seasonal temperature variations and typically experience all four seasons. Season length and extremity vary by location. These regions typically receive less than 20 inches of rain annually.

Thermal Criteria: 4500 < CDD50°F ≤ 6300*

*CDD = Cooling Degree Days

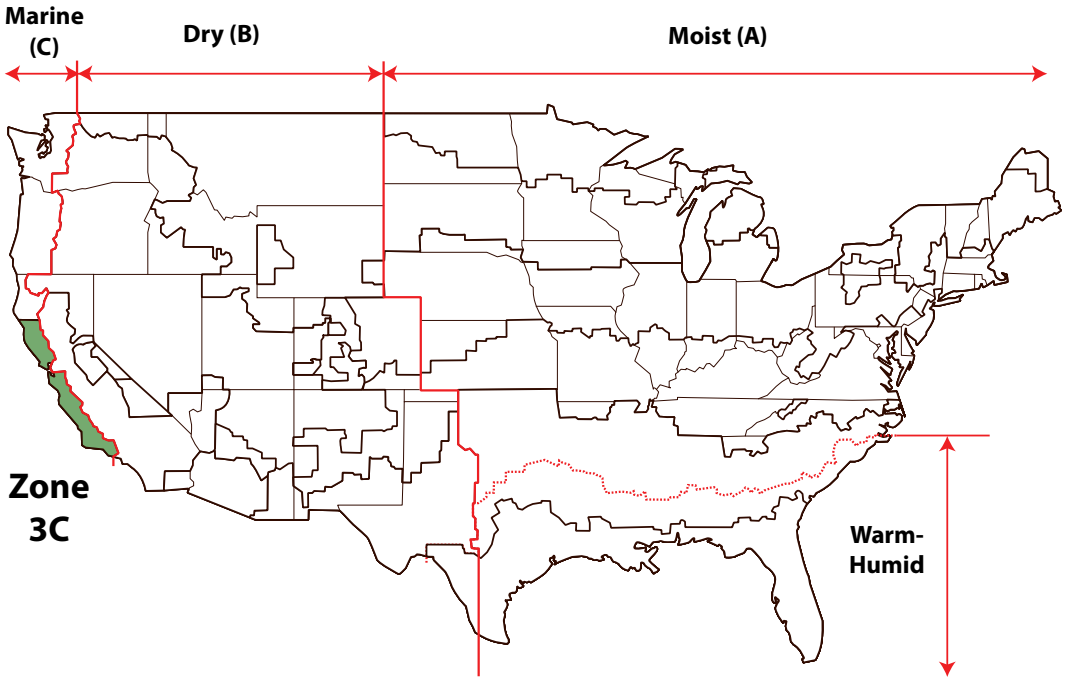


Recommended Ventilation Solutions for Climate Zone 3B			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6
			
VZ-IAQ-HRV See Appendix I, Table A-1	***VZ-IAQ*** See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5	

Climate Zone 3C, Warm/Marine – Temperate climates found on the coast. These areas typically do not have extreme seasons. Temperatures remain relatively mild year-round due to the high heat capacity of water. Marine climates only experience two seasons, summer and winter. Summer months are dry, while winter can be very wet. To be considered a marine climate, 65% of annual total rainfall must occur in less than six months of the year. These climates are generally humid, but moisture and precipitation levels can vary greatly by location.

Thermal Criteria: CDD50°F ≤ 4500 and HDD65°F ≤ 3600*

*CDD = Cooling Degree Days, HDD = Heating Degree Days



Recommended Ventilation Solutions for Climate Zone 3C			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6
			
VZ-IAQ See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5		

TYPICAL VENTILATION SCENARIOS IN SINGLE- AND MULTI-FAMILY HOMES: ZONE 3

- **SCENARIO #1 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: No

  Recommended Ventilation Modifications
  OPTION A
  Zone 3A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 3B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 3C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 3A, 3B & 3C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bath and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Zone 3B & 3C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #2 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: No

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 3A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 3B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 3C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 3A, 3B & 3C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bath and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Zone 3B & 3C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bath and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*
  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #3 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 3A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 3B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 3C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 3A, 3B & 3C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Zone 3B & 3C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*
  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #4 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 3A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 3B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 3C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 3A, 3B & 3C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Zone 3B & 3C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

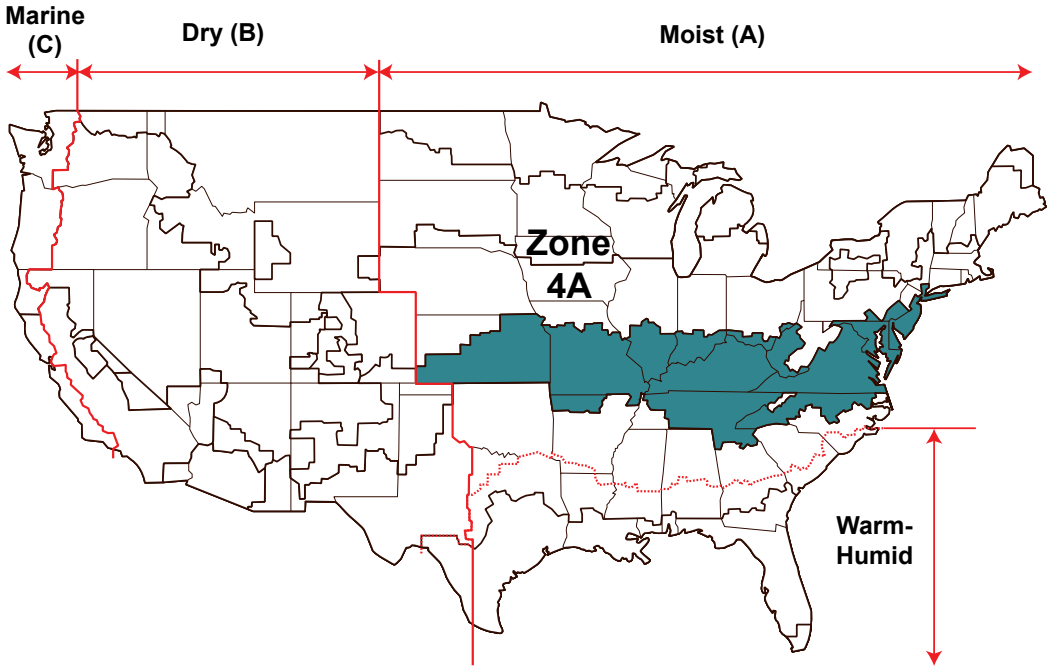
  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*
  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

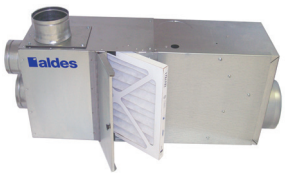
3.4 DESIGN RECOMMENDATIONS: CLIMATE ZONE 4

Climate Zone 4A, Mixed/Humid – Mixed, humid climates experience all four seasons, but season length and extremity vary by location. These regions receive more than 20 inches of rain annually. The average winter temperature typically drops below 45°F. Summers can be extremely hot and humid. Many of these regions will experience some snowfall and icing during winter months.

Thermal Criteria: CDD50°F ≤ 4500 and 3600 < HDD65°F ≤ 5400*

*CDD = Cooling Degree Days, HDD = Heating Degree Days

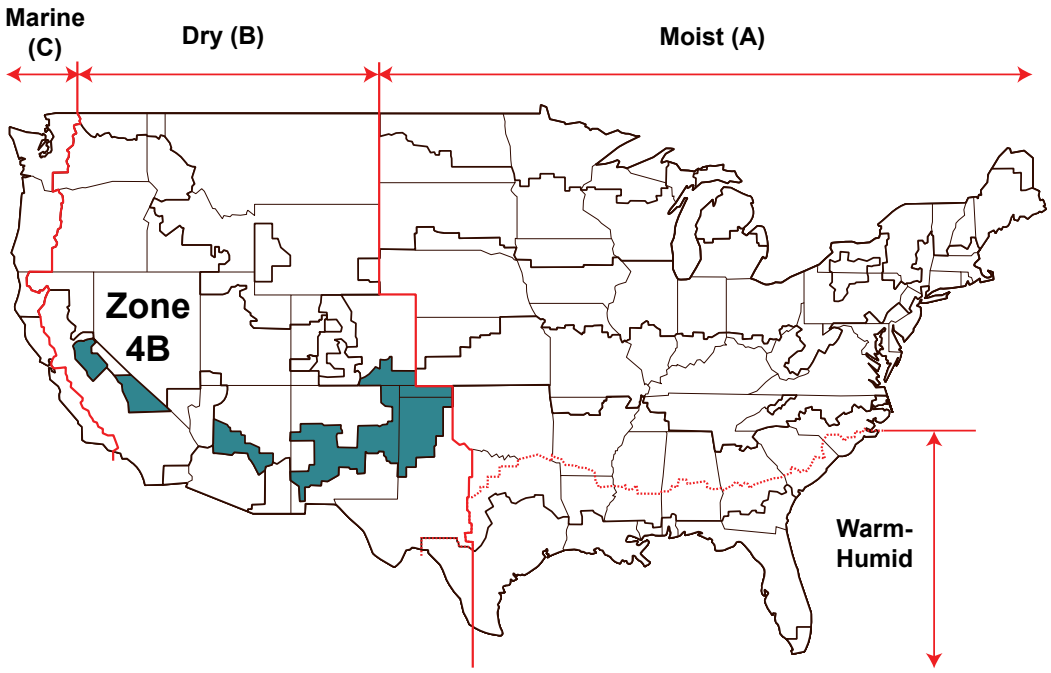


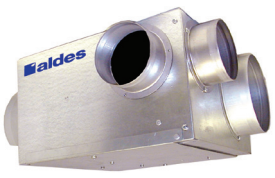
Recommended Ventilation Solutions for Climate Zone 4A			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6
			
VZ-IAQ-HRV See Appendix I, Table A-3			

Climate Zone 4B, Mixed/Dry – Mixed, dry climates experience seasonal temperature variations and typically experience all four seasons. Season length and extremity vary by location. These regions typically receive less than 20 inches of rain annually.

Thermal Criteria: CDD50°F ≤ 4500 and 3600 < HDD65°F ≤ 5400*

*CDD = Cooling Degree Days, HDD = Heating Degree Days

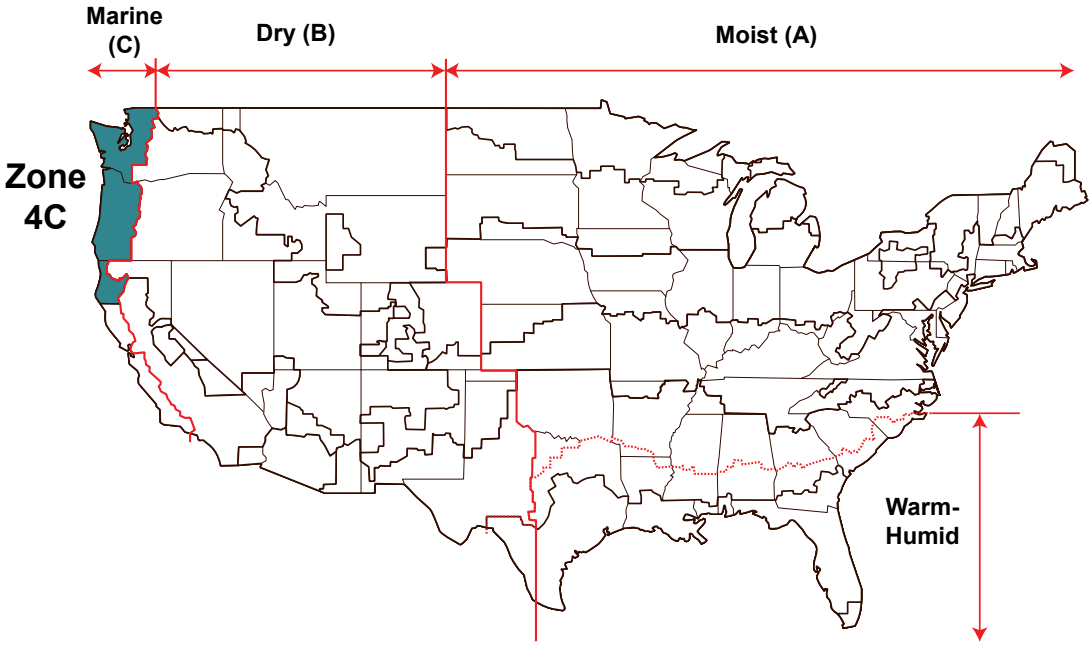


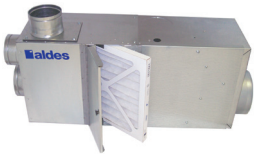
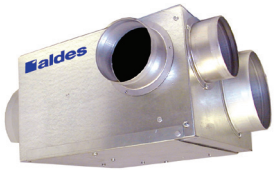
Recommended Ventilation Solutions for Climate Zone 4B			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6
			
VZ-IAQ-HRV See Appendix I, Table A-3	***VZ-IAQ*** See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5	

Climate Zone 4C, Mixed/Marine – Temperate climates found on the coast. These areas typically do not have extreme seasons. Temperatures remain relatively mild year-round due to the high heat capacity of water. Marine climates only experience two seasons, summer and winter. Summer months are dry, while winter can be very wet. To be considered a marine climate, 65% of annual total rainfall must occur in less than six months of the year. These climates are generally humid, but moisture and precipitation levels can vary greatly by location.

Thermal Criteria: 3600 < HDD65°F ≤ 5400*

*HDD = Heating Degree Days



Recommended Ventilation Solutions for Climate Zone 4C			
			
VZ-IAQ-HRV See Appendix I, Table A-3	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6
			
VZ-IAQ See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5		

TYPICAL VENTILATION SCENARIOS IN SINGLE- AND MULTI-FAMILY HOMES: ZONE 4

- **SCENARIO #1 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: No

  Recommended Ventilation Modifications

  OPTION A
  Zone 4A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 4B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 4C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 4A, 4B & 4C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Zone 4B & 4C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*
  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #2 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: No

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 4A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 4B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 4C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 4A, 4B & 4C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  ***Whole-House Continuous Supply Ventilation** – See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Zone 4B & 4C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide general continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  ***Whole-House Continuous Exhaust Ventilation** – See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*
  ***Local Exhaust** – See VZ, SBFK, and MBFK in Appendix I, Table A-9, A-10, and A-11.*

- **SCENARIO #3 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 4A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Alternately, duct the supply air from the ERV to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 4B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Alternately, duct the supply air from the air exchanger to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 4C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 4A, 4B & 4C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Zone 4B & 4C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #4 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 4A – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) to provide general ventilation. Alternately, duct the supply air from the ERV to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Energy Recovery Kits in Appendix I, Table A-4.

  Zone 4B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Alternately, duct the supply air from the air exchanger to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  Zone 4C – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

OPTION B

Zone 4A, 4B & 4C – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Zone 4B & 4C – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

3.5 DESIGN RECOMMENDATIONS: CLIMATE ZONE 5

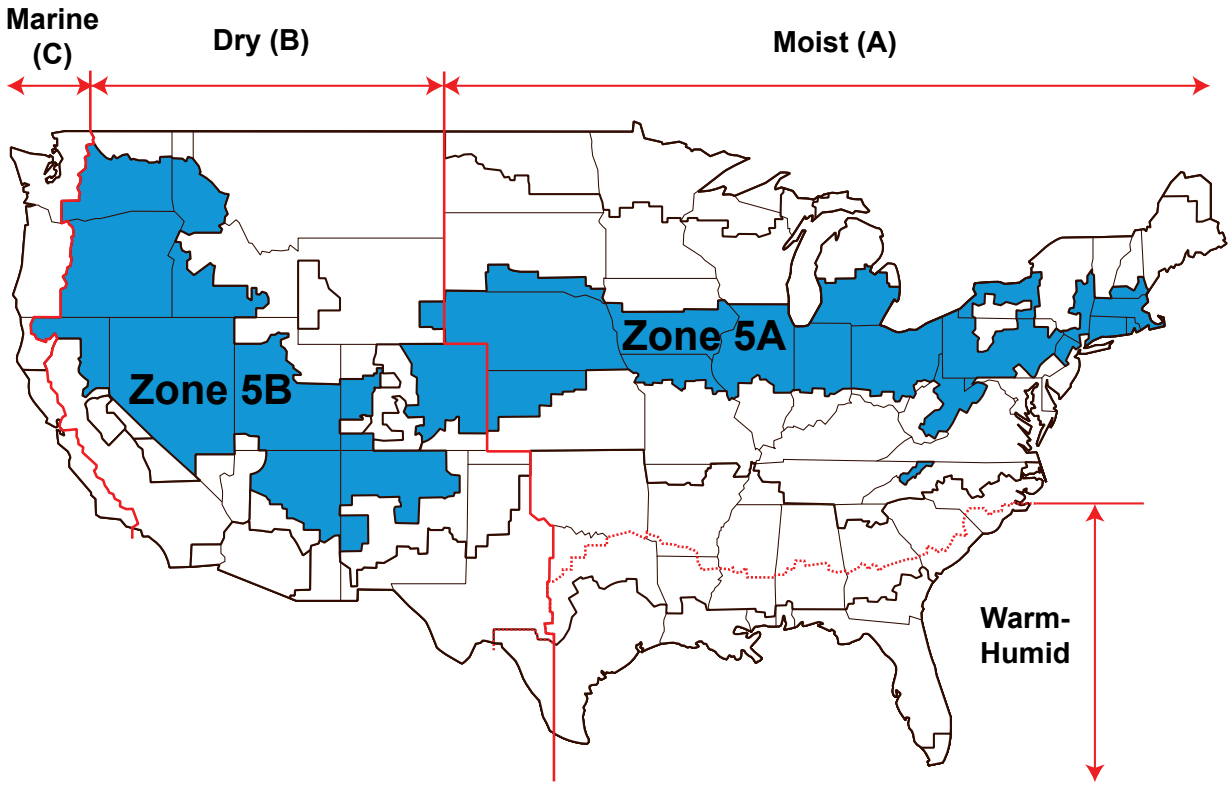
Climate Zone 5A, Cool/Humid – Mixed, humid climates experience all four seasons, but season length and extremity vary by location. These regions receive more than 20 inches of rain annually. The average winter temperature typically drops below 45°F. Summers can be extremely hot and humid. Many of these regions will experience some snowfall and icing during winter months.

Thermal Criteria: 5400 < HDD65°F ≤ 7200*

Climate Zone 5B, Cool/Dry – Mixed, dry climates experience seasonal temperature variations and typically experience all four seasons. Season length and extremity vary by location. These regions typically receive less than 20 inches of rain annually.

Thermal Criteria: 5400 < HDD65°F ≤ 7200*

* HDD = Heating Degree Days



Recommended Ventilation Solutions for Climate Zones 5A & 5B			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***IAQ-BVS*** See Appendix I, Table A-8	***IAQ-DSVS*** See Appendix I, Table A-7	***IAQ-FSVS*** See Appendix I, Table A-6
			
VZ-IAQ-HRV See Appendix I, Table A-3	***VZ-IAQ*** See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5	

TYPICAL VENTILATION SCENARIOS IN SINGLE- AND MULTI-FAMILY HOMES: ZONE 5

- **SCENARIO #1 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: No

  <u>Recommended Ventilation Modifications</u>

  OPTION A
  Zone 5A & 5B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  OPTION B
  Zone 5A & 5B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Zone 5A & 5B – Install a fully ducted supply ventilation system (BVS, DSVS, FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #2 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: No

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 5A & 5B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  OPTION B
  Zone 5A & 5B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bath and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Zone 5A & 5B – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #3 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 5A & 5B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  OPTION B
  Zone 5A & 5B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Zone 5A & 5B – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

  If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-8, A-9, and A-10.*

- **SCENARIO #4 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

Option A

Zone 5A & 5B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

OPTION B:

Zone 5A & 5B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2.*

Zone 5A & 5B – Install a fully ducted supply ventilation system (IAQ-BVS, IAQ-DSVS, IAQ-FSVS) to provide continuous supply ventilation. Alternately, duct the supply air from the ventilator to the return of the AHU. This will result in higher operating costs due to the AHU needing to run continuously.

If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Supply Ventilation *– See Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix I, Tables A-6, A-7, and A-8.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

3.6 DESIGN RECOMMENDATIONS: CLIMATE ZONE 6

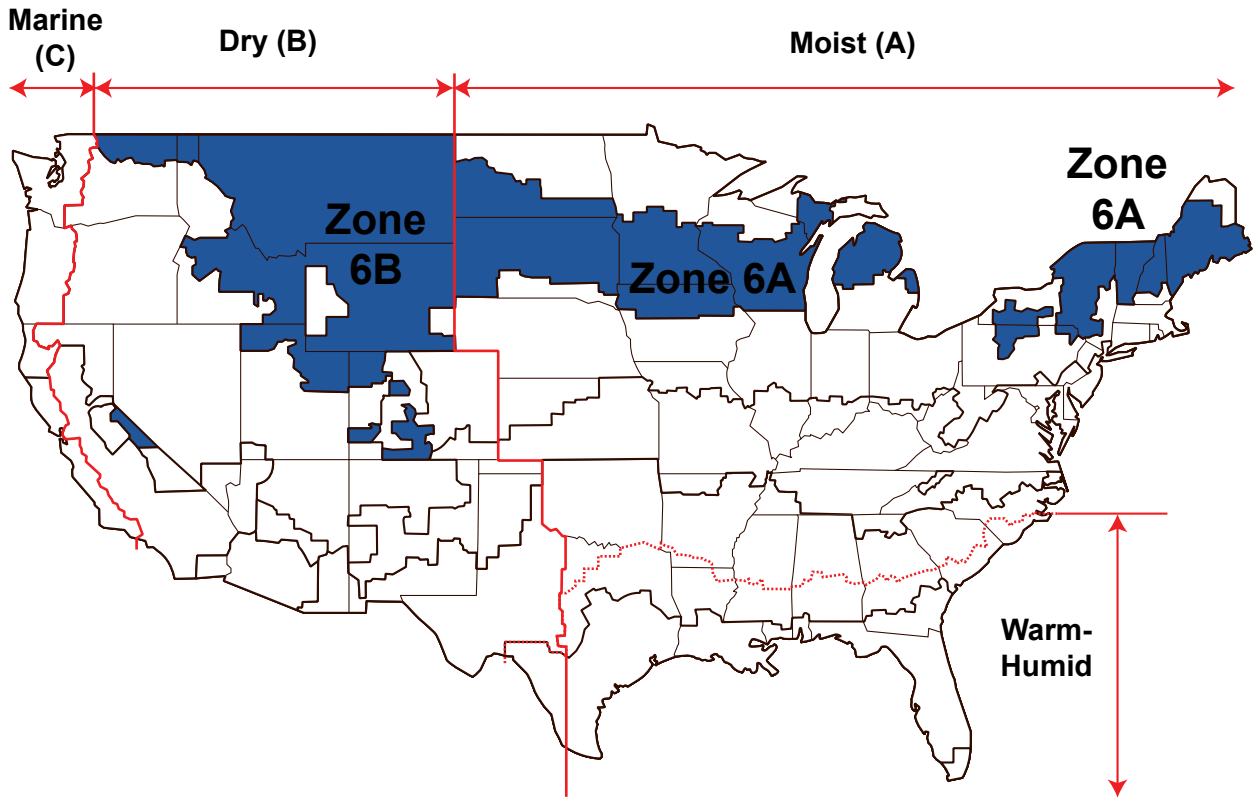
Climate Zone 6A, Cold/Humid – Cold climates include those known as the tundra, taiga, or alpine. These climates are typically found close to the poles and include the majority of Canada, Northern Europe, and Northern Asia. In addition, cold climates can be found at high altitudes in any region of the world. They typically have long, dark winter seasons with short days; however, they can experience large seasonal temperature swings and very warm summers. Snow and ice accumulations are a concern in most cold climates.

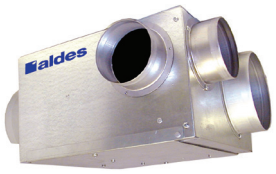
Thermal Criteria: 7200 < HDD65°F ≤ 9000*

Climate Zone 6B, Cold/Dry – Cold climates include those known as the tundra, taiga, or alpine. These climates are typically found close to the poles and include the majority of Canada, Northern Europe, and Northern Asia. In addition, cold climates can be found at high altitudes in any region of the world. They typically have long, dark winter seasons with short days; however, they can experience large seasonal temperature swings and very warm summers. Snow and ice accumulations are a concern in most cold climates.

Thermal Criteria: 7200 < HDD65°F ≤ 9000*

* HDD = Heating Degree Days



Recommended Ventilation Solutions for Climate Zones 6A & 6B			
			
VZ-IAQ-ERV See Appendix I, Table A-4	***VZ-IAQ-HRV*** See Appendix I, Table A-3	***VZ-IAQ*** See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5

TYPICAL VENTILATION SCENARIOS IN SINGLE- AND MULTI-FAMILY HOMES

- **SCENARIO #1 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: No

  Recommended Ventilation Modifications

  OPTION A
  Zone 6A & 6B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Table A-3 and A-4.

  OPTION B
  Zone 6A & 6B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #2 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: No

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation that meets recommended airflow rates. If not:

OPTION A
Zone 6A & 6B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

OPTION B
Zone 6A & 6B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bath and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #3 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: Yes

Recommended Ventilation Modifications
Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

OPTION A
Zone 6A & 6B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

OPTION B
Zone 6A & 6B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #4 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: Yes
  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 6A & 6B – Install a fully ducted Energy Recovery Ventilator (VZ-IAQ-ERV) or Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat & Energy Recovery Kits in Appendix I, Tables A-3 and A-4.

  OPTION B
  Zone 6A & 6B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

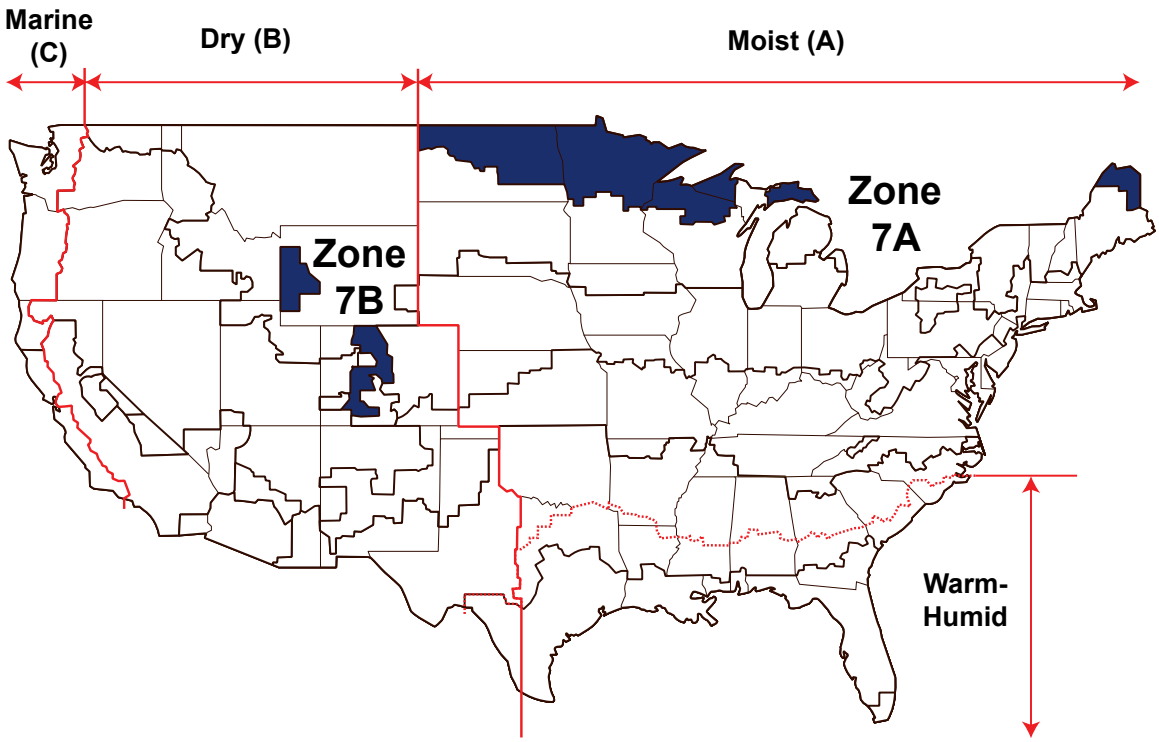
  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

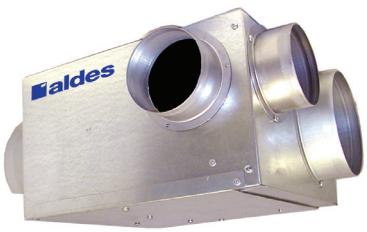
3.7 DESIGN RECOMMENDATIONS: CLIMATE ZONE 7

Climate Zone 7, Very Cold – Cold climates include those known as the tundra, taiga, or alpine. These climates are typically found close to the poles and include the majority of Canada, Northern Europe, and Northern Asia. Cold climates can be found at high altitudes in any region of the world. They typically have long, dark winter seasons with short days; however, they can experience large seasonal temperature swings and very warm summers. Snow and ice accumulations are a concern in most cold climates.

Thermal Criteria: 9000 < HDD65°F ≤ 12600*

* HDD = Heating Degree Days



Recommended Ventilation Solutions for Climate Zones 7A & 7B		
		
VZ-IAQ-HRV See Appendix I, Table A-3	***VZ-IAQ*** See Appendix I, Table A-2	***IAQ-MPVS*** See Appendix I, Table A-5

TYPICAL VENTILATION SCENARIOS IN SINGLE- AND MULTI-FAMILY HOMES: ZONE 7

- **SCENARIO #1 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: No

  Recommended Ventilation Modifications

  OPTION A
  Zone 7A & 7B – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix 1, Table A-3.

  OPTION B
  Zone 7A & 7B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #2 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: No

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 7A & 7B – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 7A & 7B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide general continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #3 EXISTING CONDITIONS**
  Central Ventilation System: No
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 7A & 7B – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

  OPTION B
  Zone 7A & 7B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bathroom and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

  Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

  Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

- **SCENARIO #4 EXISTING CONDITIONS**
  Central Ventilation System: Yes
  Central AC/Heat: Yes

  Recommended Ventilation Modifications
  Ensure the existing ventilation system provides whole-house continuous ventilation, and that local exhaust ventilation meets recommended airflow rates. If not:

  OPTION A
  Zone 7A & 7B – Install a fully ducted Heat Recovery Ventilator (VZ-IAQ-HRV) to provide general ventilation. Duct to bathrooms and kitchen if there is no local ventilation already in place. Ensure the system is balanced and the airflow is regulated by using Zone Register Terminals (ZRT), Constant Airflow Regulators (CAR), or balancing dampers.

  See VentZone® IAQ with Heat Recovery Kits in Appendix I, Table A-3.

OPTION B

Zone 7A & 7B – Install a fully ducted exhaust ventilation system (VZ-IAQ or IAQ-MPVS) to provide continuous exhaust ventilation. If bath and kitchen fans are not already in place, install an intermittent exhaust system (VZ, SBFK, MBFK) to meet local ventilation requirements. Regulate airflow with Constant Airflow Regulators (CAR) or balancing dampers.

Whole-House Continuous Exhaust Ventilation *– See VentZone® IAQ Continuous Exhaust Ventilation Kits in Appendix I, Table A-2 and Ventergy® Series Continuous Duty IAQ Ventilation Kits in Appendix 1, Table A-5.*

Local Exhaust *– See VZ, SBFK, and MBFK in Appendix I, Tables A-9, A-10, and A-11.*

APPENDIX I

PRODUCT SELECTION GUIDE

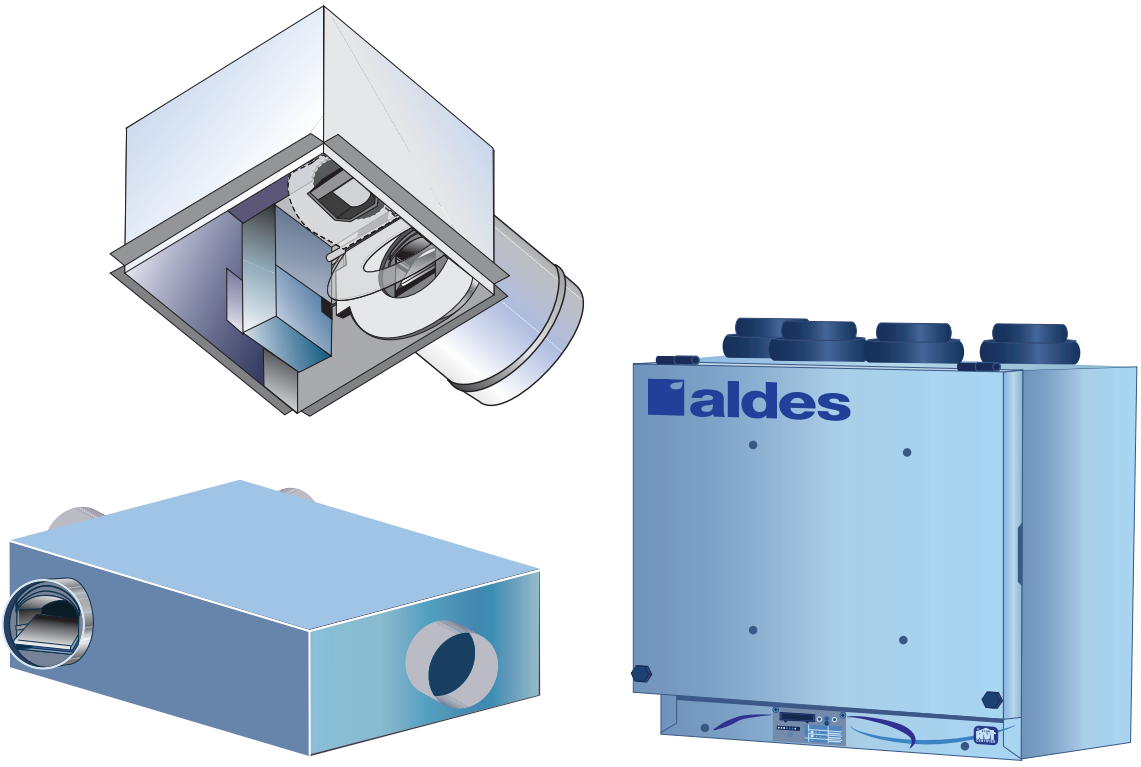
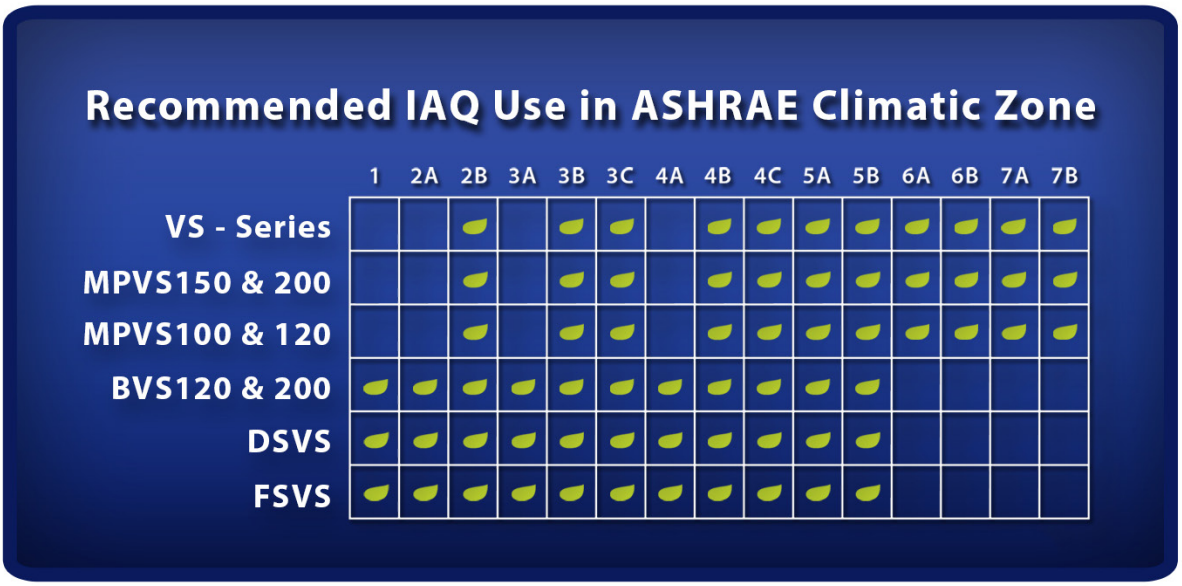


Table A-1: Recommended American Aldes Fans by ASHRAE Climate Zone



See pages 12-14 for explanation of the individual ASHRAE Climate Zones.

See pages 65-75 for descriptions of individual American Aldes products. Contact American Aldes to order.

Table A-2: VentZone® IAQ Continuous Exhaust Ventilation Kits – VZ-IAQ

Whole-house Indoor Air Quality and centralized bathroom fans in a single, highly effective and efficient ventilation kit. Each kit has the capability to provide low continuous IAQ ventilation and zone-based on-demand "boost" ventilation. American Aldes fans are designed to meet ASHRAE 62.2, ENERGY STAR with IAP, LEED for Homes, and California Title 24 (CAL GREEN) Standards.

VentZone® IAQ Continuous Exhaust Ventilation Kits						
Part Number	Kit	Home Size (ft^2) (ASHRAE 62.2)	Number of Bathrooms	Ventilator	6" ZRT-2	4" ZRT-2
						
39 200	VZ-IAQ-P2	< 3500	2	MPVS150/614	1	1
39 201	VZ-IAQ-P3	< 3500	3	MPVS150/624	1	2
39 202	VZ-IAQ-P4	< 3500	4	MPVS150/634	1	3

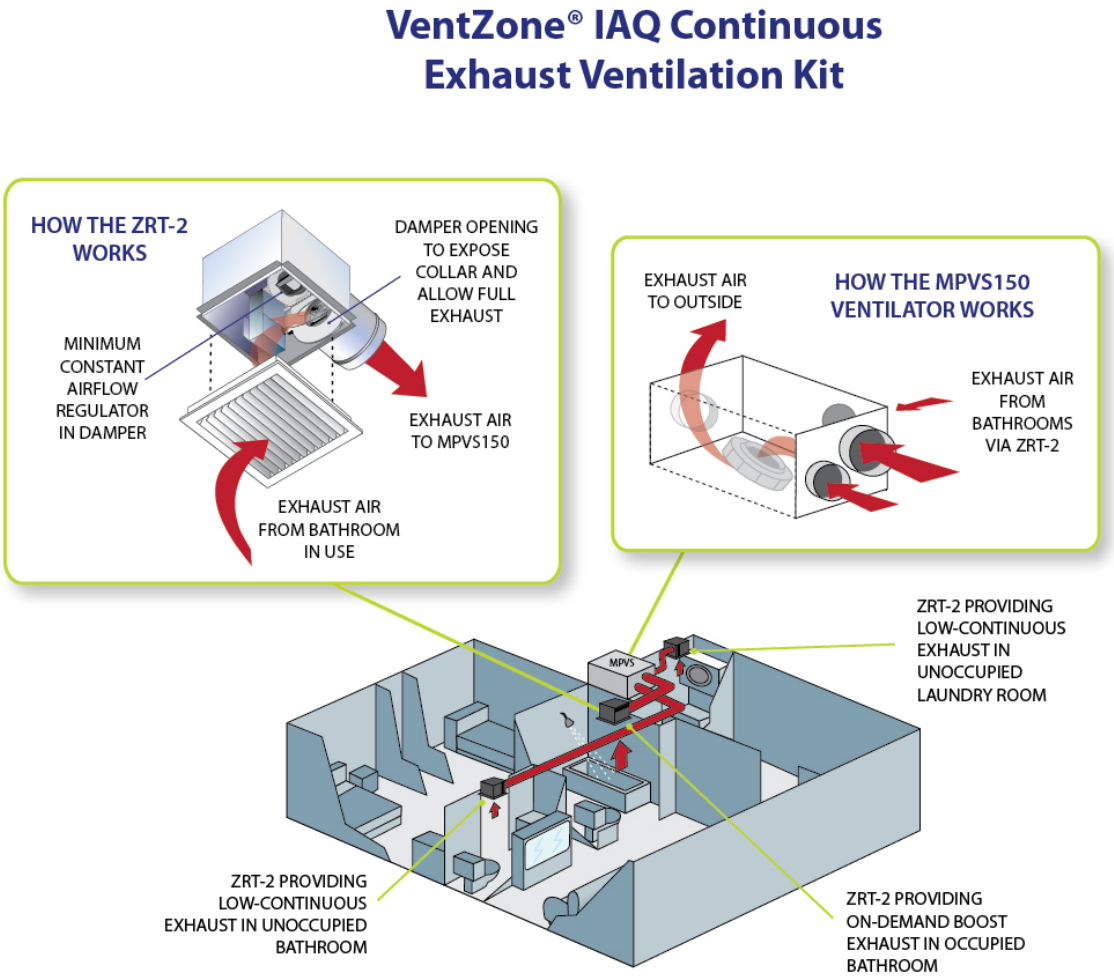


Table A-3: VentZone® Zoned IAQ with Heat Recovery Kits – VZ-IAQ-HRV

VentZone® IAQ Performance Kits with Heat Recovery combine an **Inspir**AIR™ Home Heat Recovery Ventilator (HRV) with Zone Register Terminals (ZRT) for continuous IAQ exhaust and on-demand boost exhaust. Each ZRT corresponds to one bathroom in the house. These kits transfer sensible energy from stale exhaust air to fresh supply air.

VentZone® Zoned IAQ with Heat Recovery Kits							
Part Number	System	Home Size (ft²) (ASHRAE 62.2)	Number of Bathrooms	Ventilator	6" ZRT-2	4" ZRT-2	4" ZRT-1
							
39 321	VZ-IAQ-H150-P2	< 3500	2	H150-TRG	--	2	--
39 322	VZ-IAQ-H150-P2.5	< 3500	2.5	H150-TRG	--	2	1
39 323	VZ-IAQ-H190-P2.5	<4000	2.5	H190-TRG	1	1	1
39 324	VZ-IAQ-H190-P3	<4000	3	H190-TRG	1	2	--
39 325	VZ-IAQ-H190-P3.5	<4000	3.5	H190-TRG	1	2	1
39 328	VZ-IAQ-H215-P4.5	<5000	4.5	H190-TRG	1	3	1
39 329	VZ-IAQ-H215-P5	<5000	5	H190-TRG	1	4	--

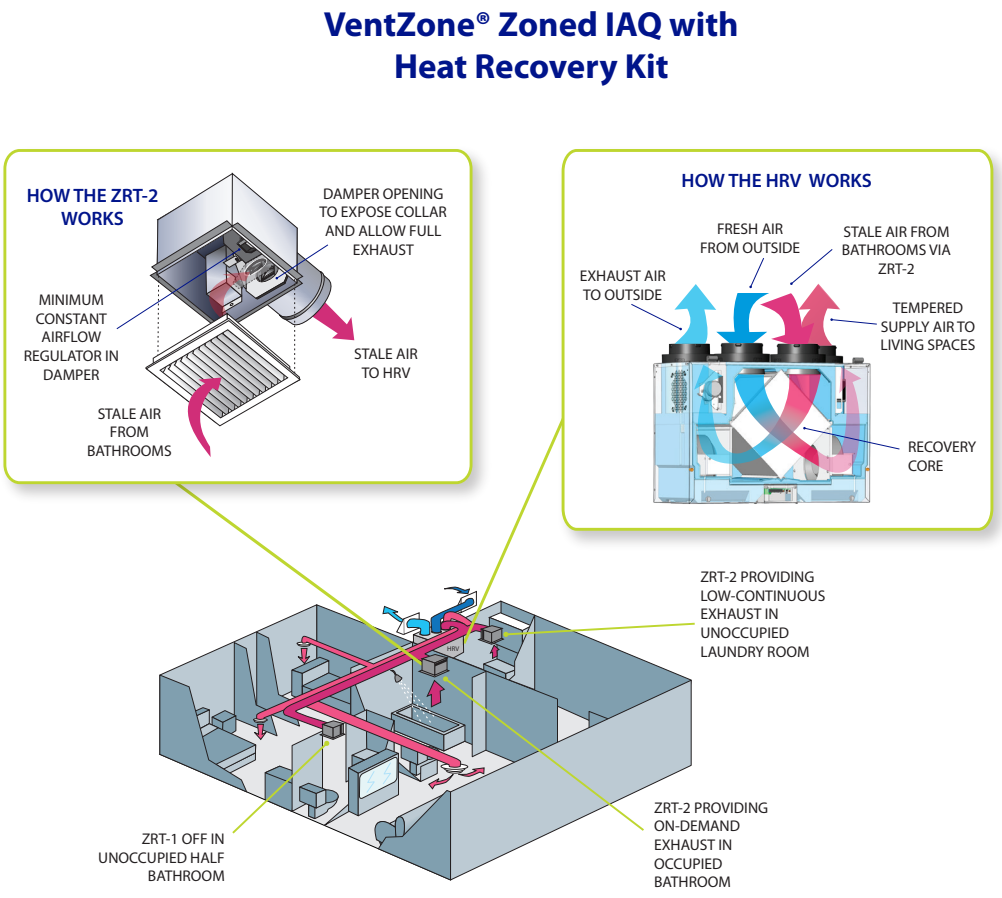


Table A-4: VentZone® Zoned IAQ with Energy Recovery Kits – VZ-IAQ-HRV

VentZone® IAQ Performance Kits with Energy Recovery combine an **Inspir**AIR™ Home Energy Recovery Ventilator (ERV) with Zone Register Terminals (ZRT) for continuous IAQ exhaust and on-demand boost exhaust. Each ZRT corresponds to one bathroom in the house. These kits transfer sensible and latent energy from stale exhaust air to fresh supply air.

VentZone® Zoned IAQ with Energy Recovery Kits							
Part Number	System	Home Size (ft²) (ASHRAE 62.2)	Number of Bathrooms	Ventilator	6" ZRT-2	4" ZRT-2	4" ZRT-1
							
39 421	VZ-IAQ-E150-P2	< 3500	2	E150-TRG	--	2	--
39 422	VZ-IAQ-E150-P2.5	< 3500	2.5	E150-TRG	--	2	1
39 423	VZ-IAQ-E190-P2.5	<4000	2.5	E190-TRG	1	1	1
39 424	VZ-IAQ-E190-P3	<4000	3	E190-TRG	1	2	--
39 425	VZ-IAQ-E190-P3.5	<4000	3.5	E190-TRG	1	2	1
39 428	VZ-IAQ-E215-P4.5	<5000	4.5	E190-TRG	1	3	1
39 429	VZ-IAQ-E215-P5	<5000	5	E190-TRG	1	4	--

VentZone® Zoned IAQ with Energy Recovery Kit

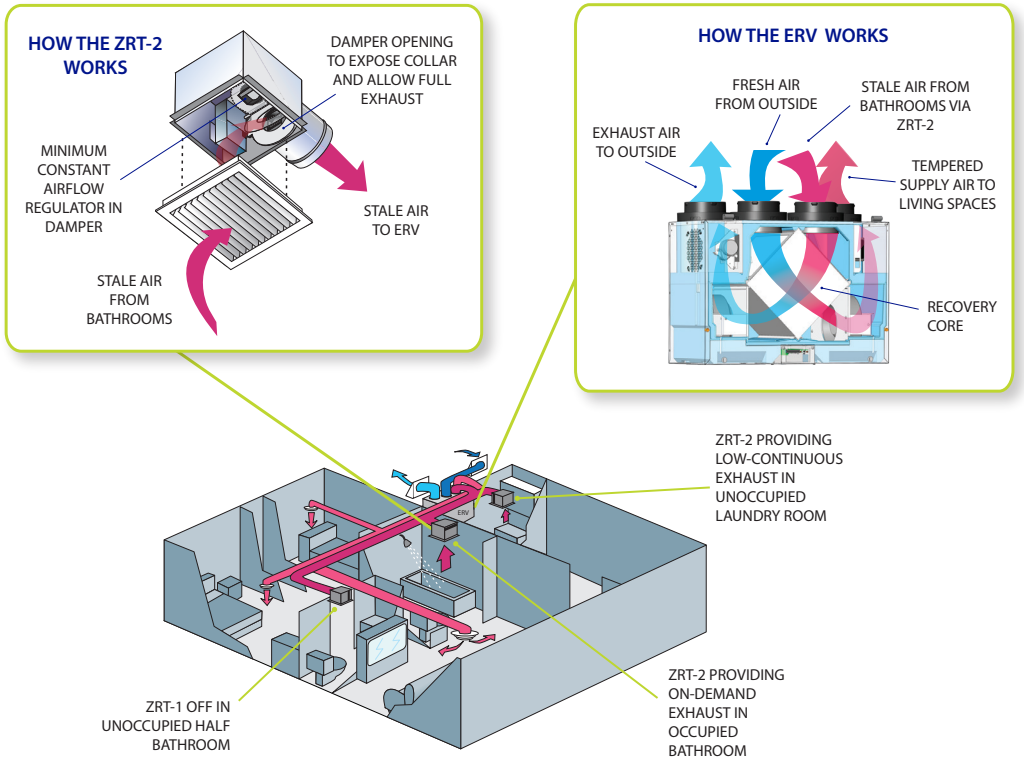


Table A-5: Ventergy® Series Continuous Duty IAQ Ventilation Kits – IAQ-MPVS

American Aldes Ventergy® Series IAQ-MPVS Multi-Port Ventilator Kits use a Ventergy® Series fan to provide optimal, continuous exhaust ventilation. The components are engineered to work seamlessly together for installation ease and guaranteed performance. Kits are suitable for 2-4 bathrooms, and expansion kits are available.

Ventergy® IAQ-MPVS – Multi-Port Ventilator Kits (Continuous Exhaust)							
Part Number	Kit	Number of Bathrooms	Number of Collars	Ventilator	3" CAR Classic (25 CFM)	3" Deco Grille	Universal Sleeve with "L" Bracket
							
26 100	IAQ-S2	2	2	MPVS120/313	2	2	2
26 101	IAQ-S3	3	3	MPVS120/323	3	3	3
26 102	IAQ-S4	4	4	MPVS120/333	4	4	4

IAQ-MPVS Expansion Kit*					
Part Number	Kit	Collar Components	3" CAR Classic (25 CFM)	3" Deco Grille	Universal Sleeve with "L" Bracket
					
26 106	IAQ-SB	1	1	1	1

* Up to 2 expansion kits can be added to each IAQ-MPVS kit

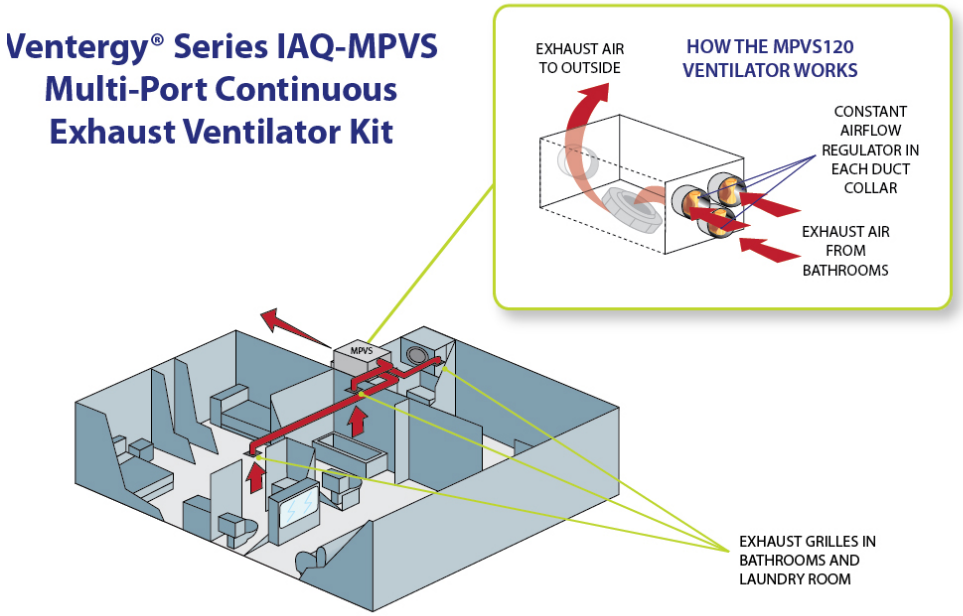
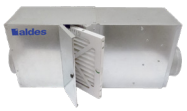
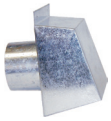


Table A-6: Ventergy® Series Continuous Duty IAQ Ventilation Kits – IAQ-FSVS

American Aldes Ventergy® Series IAQ-FSVS Filtering Supply Ventilator Kits are the best way to supply constant, precisely regulated amounts of fresh air to central force-air (heat/cooling) systems in homes. Compared to using a motorized damper, the IAQ-FSVS constantly and efficiently provides fresh air to the home at a precisely regulated low volume. The FSVS140 is ENERGY STAR rated, consuming far less energy than a large fan in a forced-air system. The IAQ-FSVS Kit is a superior solution for better indoor air quality, comfort, and energy efficiency.

Ventergy® IAQ-FSVS – Filtering Supply Ventilator Kits (Continuous Supply)					
Part Number	Kit	Ventilator	Variable Speed Controller	6" Wall Hood**	Constant Airflow Regulator
					
25 261	IAQ-FSVS140-V	FSVS140 Manual Flow Control	1	1	--
25 267	IAQ-FSVS140-4	FSVS140 Automatic Flow Control	1	1	1
25 268	IAQ-FSVS140-5	FSVS140 Automatic Flow Control	--	1	1
25 269	IAQ-FSVS140-6	FSVS140 Automatic Flow Control	--	1	1

** Galvanized steel standard. Contact American Aldes to request copper or stainless steel.

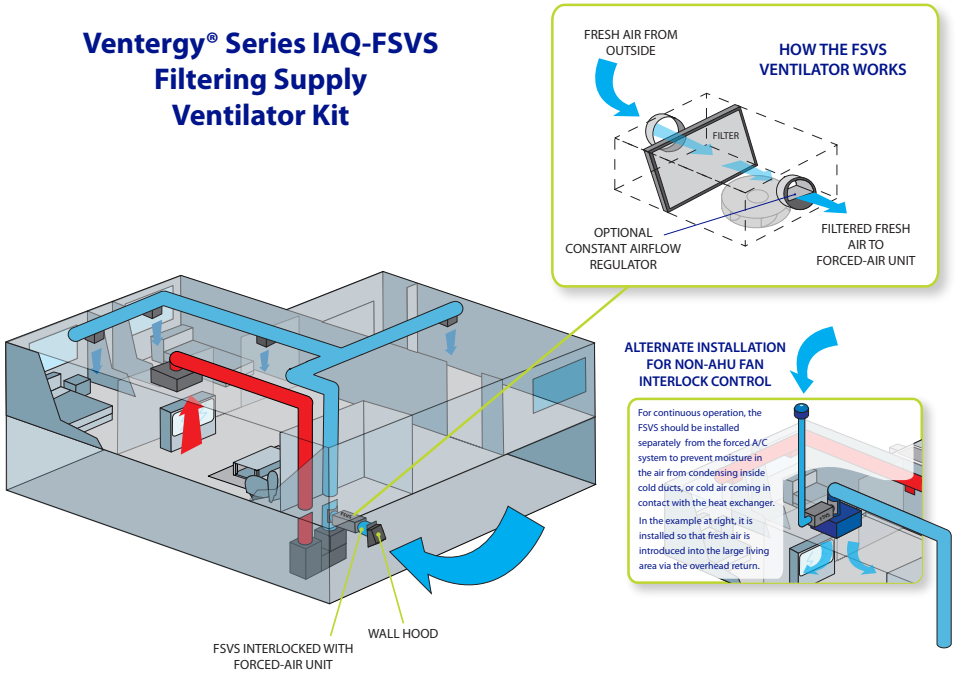


Table A-7: Ventergy® Series Continuous Duty IAQ Ventilation Kits – IAQ-DSVS

American Aldes Ventergy® Series IAQ-DSVS Distributing Supply Ventilator Kits are the best choice to distribute constant, precisely regulated amounts of fresh air to a home when no central forced-air (heating/cooling) system is present. The IAQ-DSVS constantly and efficiently provides fresh air to the home at a precisely regulated low volume.

Ventergy® IAQ-DSVS – Distributing Supply Ventilators Kits (Continuous Supply)								
Part Number	Kit	Number of Ports	Ventilator	3" CAR Classic (10 CFM)	3" Universal Sleeve w/ "L" Bracket	3" Algrille	4" Wall Hood**	Airflow CFM @ 0.2 in. w.g.
								
25 250	IAQ-DSVS100/313	2	DSVS100	2	2	2	1	110
25 251	IAQ-DSVS100/323	3	DSVS100	3	3	3	1	110
25 252	IAQ-DSVS100/333	4	DSVS100	3	4	4	1	110

** Galvanized steel standard. Contact American Aldes to request copper or stainless steel.

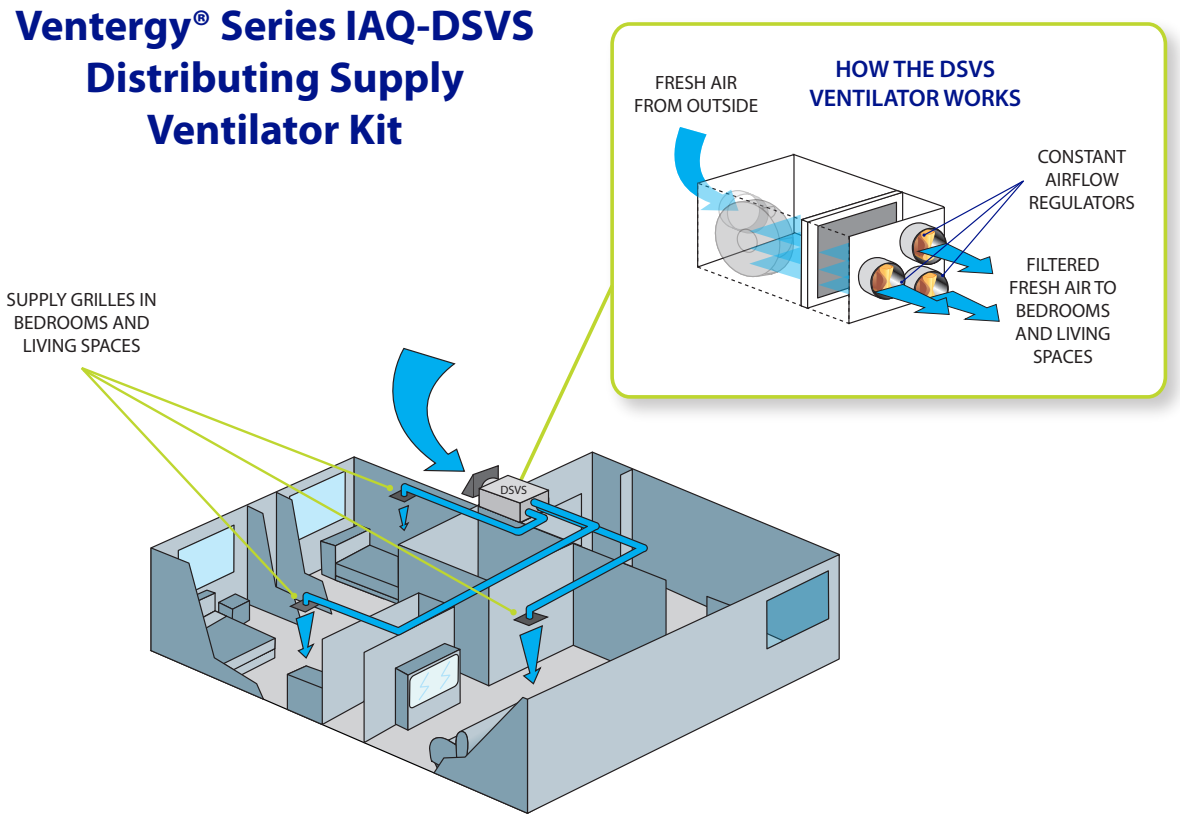


Table A-8: Ventergy® Series Continuous Duty IAQ Ventilation Kits – IAQ-BVS

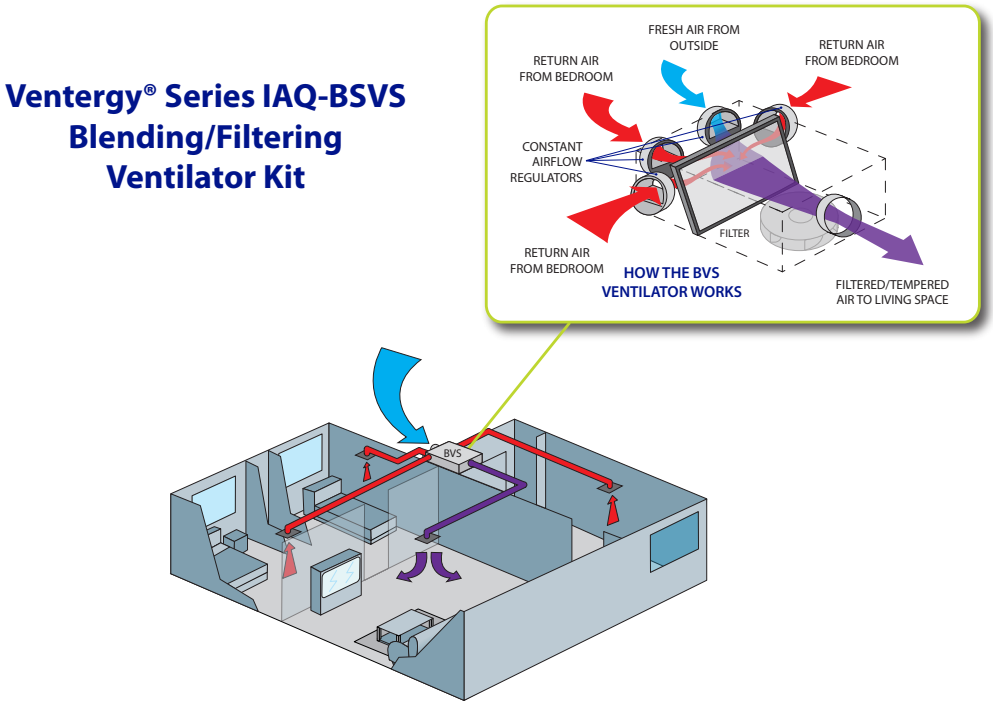
American Aldes Ventergy® Series IAQ-BVS Blending/Filtering Ventilator Kits take stale air from the bedrooms and mix it in the blending chamber with fresh outside air. The air is then filtered and supplied back into the common living area(s) of the home. By blending the outdoor air with indoor air, the IAQ-BVS kit provides clean, tempered air into the home for greater comfort. Blending/Filtering Ventilators are suitable for all climates, but they are ideal for moderate climates where Energy Recovery Ventilators (ERV) are not beneficial.

Ventergy® IAQ-BVS – Blending/Filtering Ventilator Kits				
Part Number	**Number of Bedrooms**	**House/Apt Square Feet**	**CFM Per ASHRAE 62.2**	**Kit (Components listed in table below)**
25 714	1	<1500	30	IAQ-BVS120/514
		1501+	45	
25 724	2	<1500	45	IAQ-BVS120/524
		1501-3000	60	
25 734	3	<1500	45	IAQ-BVS200/534-3
		1501-3001	60	
25 735		3001-4500	75	IAQ-BVS200/534-3MAX
25 744	4	1501-3000	75	IAQ-BVS200/534-4
		3001-4500	90	
		4501-6000	105	
25 754	5	1501-3000	75	IAQ-BVS200/534-5
		3001-4500	90	
		4501-6000	105	

BVS Kit Components														
Kit Part Number	Ventilator	Airflow Regulators (CFM)				Supply Air				Return Air			Intake	
		5”	4”	4”	4”	6” Algrille	6” Universal Sleeve	6” Backdraft Damper	6” Wye	4” Deco Grille	4” Sleeve w/ Backdraft Damper	4” Wye	5” Wall Hood*	
														
25 714	BVS120/514	35/45/50	35/45/50	--	--	1	1	1	--	1	1	--	1	
25 724	BVS120/524	35/45/50	35/45/50	35/45/50	--	1	1	1	--	2	2	--	1	
25 734	BVS200/534-3	40/50/60	35/45/50	35/45/50	35/45/50	2	2	2	1	3	3	--	1	
25 735	BVS200/534-3MAX	75/90/105	35/45/50	35/45/50	35/45/50	2	2	2	1	3	3	--	1	
25 744	BVS200/534-4	75/90/105	10/20/30	10/20/30	40/50/60	2	2	2	1	4	4	1	1	
25 754	BVS200/534-5	75/90/105	10/20/30	40/50/60	40/50/60	2	2	2	1	5	5	2	1	

* Galvanized steel standard. Contact American Aldes to request copper or stainless steel.

Ventergy® Series Continuous Duty IAQ Ventilation Kits – IAQ-BVS (page 71)



VentZone® VZ Zoned Intermittent Bath Exhaust Kit (page 73)

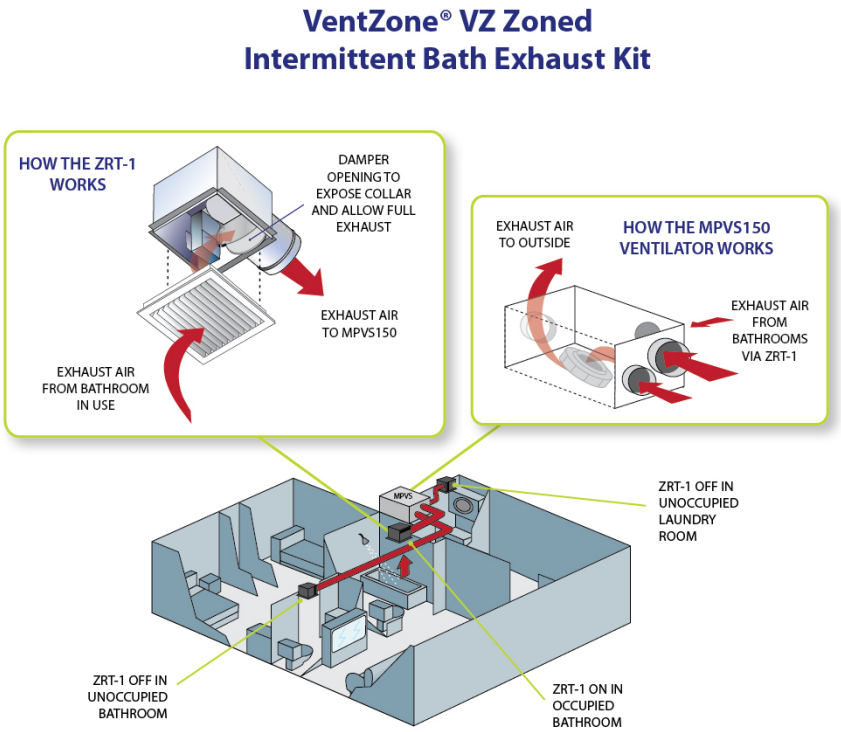


Table A-9: VentZone® VZ Zoned Intermittent Bath Exhaust Kits

American Aldes VentZone® Systems VZ Zoned Bath Exhaust Kits are the most advanced zoned central exhaust ventilation kits on the market. The combination of an ENERGY STAR Rated MPVS 150 ventilator and Zone Register Terminals (ZRT-1) provides powerful-yet-silent zone controlled exhaust from bathrooms that are in use. VZ kits allow for the use of a quiet, high-efficiency fan, and they reduce the load that other central ventilation systems put on heating and cooling systems because they do not ventilate all bathrooms simultaneously – only the one in use.

VentZone® Systems – VZ Zoned Bath Exhaust Kits						
Part Number	Kit	Number of Bathrooms	Ventilator	6” ZRT-1	4” ZRT-1	4” x 4” x 4” Wye
						
39 100	VZ-2	2	MPVS150/614	1	1	--
39 101	VZ-3	3	MPVS150/624	1	2	--
39 102	VZ-4	4	MPVS150/634	1	3	--
39 103	VZ-5	5	MPVS150/634	1	4	1

VZ Expansion Kit**			
Part Number	Kit	4” ZRT-1	4” x 4” x 4” Wye
			
39 150	VZ-SB	1	1

** Up to 3 expansion kits can be added to each VZ kit.

Table A-10: Single-Port Bath Fan Kits – SBFK

American Aldes SBFK Single-Port Bath Fan Kits are a flexible way to install a compact exhaust grille directly over the shower or in tight bathroom spaces. The powerful central system effectively removes moisture, steam, and odors right from the source. The SBFK is designed for homes with 1-2 bathrooms. It includes an efficient, in-line, ENERGY STAR rated ventilator.

SBFK – Single-Port Bath Fan Kits						
Part Number	**Kit**	**Number of Bathrooms**	**Ventilator**	**4" Deco Grille**	**4" Universal Sleeve w/ Backdraft Damper**	**6" x 4" x 4" Wye**
						
25 401	SBFK-DG-1	1	VS4 Max CFM: 101 Max Watts: 22	1	1	--
25 407	SBFK-DG-2	2	VS6 Max CFM: 220 Max Watts: 41	2	2	1

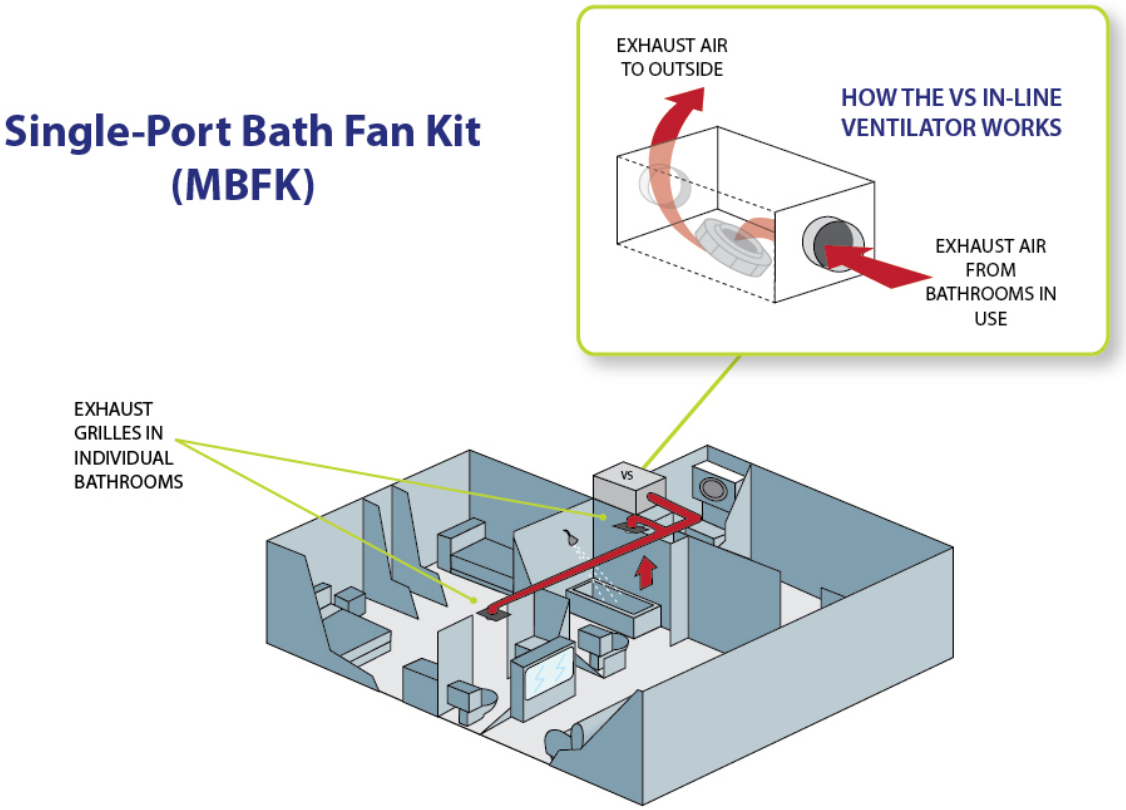
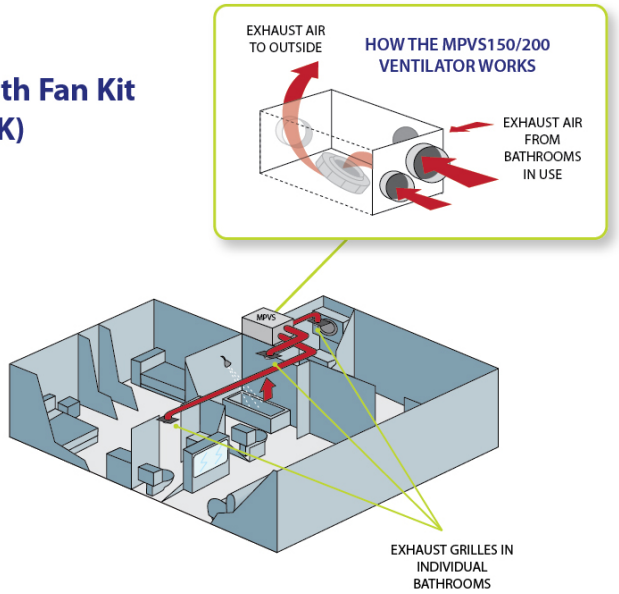


Table A-11: Multi-Port Bath Fan Kits – MBFK

American Aldes MBFK Multi-Port Bath Fan Kits are a flexible way to install a compact exhaust grille directly over a shower or in tight bathroom spaces. The powerful central system effectively removes moisture, steam, and odors right from the sources. The MBFK is designed for homes with 2-4 bathrooms. It includes an efficient, multi-port, ENERGY STAR rated ventilator.

MBFK – Multi-Port Bath Fan Kits							
Part Number	**Kit**	**Number of Bathrooms**	**Ventilator**	**6" Algrille**	**6" Sleeve w/ Backdraft Damper**	**4" Algrille**	**4" Universal Sleeve w/ Backdraft Damper**
							
25 417	MBFK-AG-2/6	2	MPVS150/614 Max CFM: 212 Max Watts: 41	1	1	1	1
25 420	MBFK-AG-3/6	3	MPVS200/624 Max CFM: 287 Max Watts: 59	1	1	2	2
25 423	MBFK-AG-4/6	4	MPVS200/634 Max CFM: 287 Max Watts: 59	1	1	3	3
25 418	MBFK-AG-2/4	2	MPVS150/414 Max CFM: 212 Max Watts: 41	--	--	2	2
25 421	MBFK-AG-3/4L	3	MPVS150/424 Max CFM: 212 Max Watts: 41	--	--	3	3
25 426	MBFK-AG-3/4H	3	MPVS200/424 Max CFM: 287 Max Watts: 59	--	--	3	3
25 423	MBFK-AG-4/4	4	MPVS200/434 Max CFM: 287 Max Watts: 59	--	--	4	4

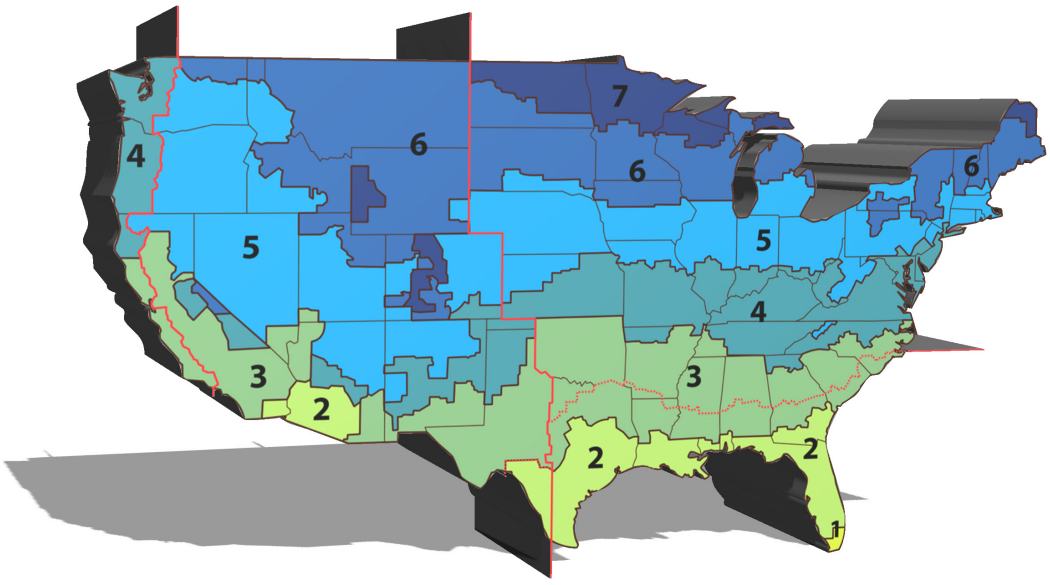
Multi-Port Bath Fan Kit (MBFK)



APPENDIX II

ASHRAE CLIMATE ZONES

BY STATE & COUNTY



State	County/City	ASHRAE Climate Zone	Page #	State	County/City	ASHRAE Climate Zone	Page #
Alabama (AL)	Autauga	3A	35	Alabama (AL)	Marshall	3A	35
Alabama (AL)	Baldwin	2A	29	Alabama (AL)	Mobile	2A	29
Alabama (AL)	Barbour	3A	35	Alabama (AL)	Monroe	3A	35
Alabama (AL)	Bibb	3A	35	Alabama (AL)	Montgomery	3A	35
Alabama (AL)	Blount	3A	35	Alabama (AL)	Morgan	3A	35
Alabama (AL)	Bullock	3A	35	Alabama (AL)	Perry	3A	35
Alabama (AL)	Butler	3A	35	Alabama (AL)	Pickens	3A	35
Alabama (AL)	Calhoun	3A	35	Alabama (AL)	Pike	3A	35
Alabama (AL)	Chambers	3A	35	Alabama (AL)	Randolph	3A	35
Alabama (AL)	Cherokee	3A	35	Alabama (AL)	Russell	3A	35
Alabama (AL)	Chilton	3A	35	Alabama (AL)	Shelby	3A	35
Alabama (AL)	Choctaw	3A	35	Alabama (AL)	St. Clair	3A	35
Alabama (AL)	Clarke	3A	35	Alabama (AL)	Sumter	3A	35
Alabama (AL)	Clay	3A	35	Alabama (AL)	Talladega	3A	35
Alabama (AL)	Cleburne	3A	35	Alabama (AL)	Tallapoosa	3A	35
Alabama (AL)	Coffee	2A	29	Alabama (AL)	Tuscaloosa	3A	35
Alabama (AL)	Colbert	3A	35	Alabama (AL)	Walker	3A	35
Alabama (AL)	Conecuh	3A	35	Alabama (AL)	Washington	3A	35
Alabama (AL)	Coosa	3A	35	Alabama (AL)	Wilcox	3A	35
Alabama (AL)	Covington	2A	29	Alabama (AL)	Winston	3A	35
Alabama (AL)	Crenshaw	3A	35	Alaska (AK)	Aleutians East	7	59
Alabama (AL)	Cullman	3A	35	Alaska (AK)	Aleutians West	7	59
Alabama (AL)	Dale	2A	29	Alaska (AK)	Anchorage	7	59
Alabama (AL)	Dallas	3A	35	Alaska (AK)	Bethel	7	59
Alabama (AL)	DeKalb	3A	35	Alaska (AK)	Bristol Bay	7	59
Alabama (AL)	Elmore	3A	35	Alaska (AK)	Dillingham	7	59
Alabama (AL)	Escambia	2A	29	Alaska (AK)	Fairbanks North Star	8	N/A
Alabama (AL)	Etowah	3A	35	Alaska (AK)	Haines	6A	55
Alabama (AL)	Fayette	3A	35	Alaska (AK)	Juneau	6A	55
Alabama (AL)	Franklin	3A	35	Alaska (AK)	Kenai Peninsula	7	59
Alabama (AL)	Geneva	2A	29	Alaska (AK)	Ketchikan Gateway	5A	50
Alabama (AL)	Greene	3A	35	Alaska (AK)	Kodiak Island	6A	55
Alabama (AL)	Hale	3A	35	Alaska (AK)	Lake and Peninsula	7	59
Alabama (AL)	Henry	2A	29	Alaska (AK)	Matanuska-Susitna	7	59
Alabama (AL)	Houston	2A	29	Alaska (AK)	Nome	8	N/A
Alabama (AL)	Jackson	3A	35	Alaska (AK)	North Slope	8	N/A
Alabama (AL)	Jefferson	3A	35	Alaska (AK)	Northwest Arctic	8	N/A
Alabama (AL)	Lamar	3A	35	Alaska (AK)	Prince of Wales-Outer Ketchikan	5A	50
Alabama (AL)	Lauderdale	3A	35	Alaska (AK)	Sitka	6A	55
Alabama (AL)	Lawrence	3A	35	Alaska (AK)	Skagway-Hoonan-Angoon	6A	55
Alabama (AL)	Lee	3A	35	Alaska (AK)	Southeast Fairbanks	8	N/A
Alabama (AL)	Limestone	3A	35	Alaska (AK)	Valdez-Cordova	7	59
Alabama (AL)	Lowndes	3A	35	Alaska (AK)	Wade Hampton	8	N/A
Alabama (AL)	Macon	3A	35	Alaska (AK)	Wrangell-Petersburg	8	N/A
Alabama (AL)	Madison	3A	35	Alaska (AK)	Yakutat	7	59
Alabama (AL)	Marengo	3A	35	Alaska (AK)	Yukon-Koyukuk	8	N/A
Alabama (AL)	Marion	3A	35	Arizona (AZ)	Apache	5B	50

State	County/City	ASHRAE Climate Zone	Page #	State	County/City	ASHRAE Climate Zone	Page #
Arizona (AZ)	Cochise	3B	36	Arkansas (AR)	Jackson	3A	35
Arizona (AZ)	Coconino	5B	50	Arkansas (AR)	Jefferson	3A	35
Arizona (AZ)	Gila	4B	43	Arkansas (AR)	Johnson	3A	35
Arizona (AZ)	Graham	3B	36	Arkansas (AR)	Lafayette	3A	35
Arizona (AZ)	Greenlee	3B	36	Arkansas (AR)	Lawrence	3A	35
Arizona (AZ)	La Paz	2B	30	Arkansas (AR)	Lee	3A	35
Arizona (AZ)	Maricopa	2B	30	Arkansas (AR)	Lincoln	3A	35
Arizona (AZ)	Mohave	3B	36	Arkansas (AR)	Little River	3A	35
Arizona (AZ)	Navajo	5B	50	Arkansas (AR)	Logan	3A	35
Arizona (AZ)	Pima	2B	30	Arkansas (AR)	Lonoke	3A	35
Arizona (AZ)	Pinal	2B	30	Arkansas (AR)	Madison	4A	42
Arizona (AZ)	Santa Cruz	3B	36	Arkansas (AR)	Marion	4A	42
Arizona (AZ)	Yavapai	4B	43	Arkansas (AR)	Miller	3A	35
Arizona (AZ)	Yuma	2B	30	Arkansas (AR)	Mississippi	3A	35
Arkansas (AR)	Arkansas	3A	35	Arkansas (AR)	Monroe	3A	35
Arkansas (AR)	Ashley	3A	35	Arkansas (AR)	Montgomery	3A	35
Arkansas (AR)	Baxter	4A	42	Arkansas (AR)	Nevada	3A	35
Arkansas (AR)	Benton	4A	42	Arkansas (AR)	Newton	4A	42
Arkansas (AR)	Boone	4A	42	Arkansas (AR)	Ouachita	3A	35
Arkansas (AR)	Bradley	3A	35	Arkansas (AR)	Perry	3A	35
Arkansas (AR)	Calhoun	3A	35	Arkansas (AR)	Phillips	3A	35
Arkansas (AR)	Carroll	4A	42	Arkansas (AR)	Pike	3A	35
Arkansas (AR)	Chicot	3A	35	Arkansas (AR)	Poinsett	3A	35
Arkansas (AR)	Clark	3A	35	Arkansas (AR)	Polk	3A	35
Arkansas (AR)	Clay	3A	35	Arkansas (AR)	Pope	3A	35
Arkansas (AR)	Cleburne	3A	35	Arkansas (AR)	Prairie	3A	35
Arkansas (AR)	Cleveland	3A	35	Arkansas (AR)	Pulaski	3A	35
Arkansas (AR)	Columbia	3A	35	Arkansas (AR)	Randolph	3A	35
Arkansas (AR)	Conway	3A	35	Arkansas (AR)	Saline	3A	35
Arkansas (AR)	Craighead	3A	35	Arkansas (AR)	Scott	3A	35
Arkansas (AR)	Crawford	3A	35	Arkansas (AR)	Searcy	4A	42
Arkansas (AR)	Crittenden	3A	35	Arkansas (AR)	Sebastian	3A	35
Arkansas (AR)	Cross	3A	35	Arkansas (AR)	Sevier	3A	35
Arkansas (AR)	Dallas	3A	35	Arkansas (AR)	Sharp	3A	35
Arkansas (AR)	Desha	3A	35	Arkansas (AR)	St. Francis	3A	35
Arkansas (AR)	Drew	3A	35	Arkansas (AR)	Stone	4A	42
Arkansas (AR)	Faulkner	3A	35	Arkansas (AR)	Union	3A	35
Arkansas (AR)	Franklin	3A	35	Arkansas (AR)	Van Buren	3A	35
Arkansas (AR)	Fulton	4A	42	Arkansas (AR)	Washington	4A	42
Arkansas (AR)	Garland	3A	35	Arkansas (AR)	White	3A	35
Arkansas (AR)	Grant	3A	35	Arkansas (AR)	Woodruff	3A	35
Arkansas (AR)	Greene	3A	35	Arkansas (AR)	Yell	3A	35
Arkansas (AR)	Hempstead	3A	35	California (CA)	Alameda	3C	37
Arkansas (AR)	Hot Spring	3A	35	California (CA)	Alpine	6B	55
Arkansas (AR)	Howard	3A	35	California (CA)	Amador	4B	43
Arkansas (AR)	Independence	3A	35	California (CA)	Anacapa Island	3B	36
Arkansas (AR)	Izard	4A	42	California (CA)	Butte	3B	36

State	County/City	ASHRAE Climate Zone	Page #	State	County/City	ASHRAE Climate Zone	Page #
California (CA)	Calaveras	4B	43	California (CA)	Shasta	3B	36
California (CA)	Colusa	3B	36	California (CA)	Sierra	5B	50
California (CA)	Contra Costa	3B	36	California (CA)	Siskiyou	5B	50
California (CA)	Del Norte	4C	44	California (CA)	Solano	3B	36
California (CA)	El Dorado	4B	43	California (CA)	Sonoma	3C	37
California (CA)	Fresno	3B	36	California (CA)	Stanislaus	3B	36
California (CA)	Glenn	3B	36	California (CA)	Sutter	3B	36
California (CA)	Humboldt	4C	44	California (CA)	Tehama	3B	36
California (CA)	Imperial	2B	30	California (CA)	Trinity	4B	43
California (CA)	Inyo	4B	43	California (CA)	Tulare	3B	36
California (CA)	Kern	3B	36	California (CA)	Tuolumne	4B	43
California (CA)	Kings	3B	36	California (CA)	Ventura	3C	37
California (CA)	Lake	4B	43	California (CA)	Yolo	3B	36
California (CA)	Lassen	5B	50	California (CA)	Yuba	3B	36
California (CA)	Los Angeles	3B	36	Colorado (CO)	Adams	5B	50
California (CA)	Madera	3B	36	Colorado (CO)	Alamosa	6B	55
California (CA)	Marin	3C	37	Colorado (CO)	Arapahoe	5B	50
California (CA)	Mariposa	4B	43	Colorado (CO)	Archuleta	6B	55
California (CA)	Mendocino	3C	37	Colorado (CO)	Baca	4B	43
California (CA)	Merced	3B	36	Colorado (CO)	Bent	4B	43
California (CA)	Modoc	5B	50	Colorado (CO)	Boulder	5B	50
California (CA)	Mono	6B	55	Colorado (CO)	Broomfield	5B	50
California (CA)	Monterey	3C	37	Colorado (CO)	Chaffee	6B	55
California (CA)	Napa	3C	37	Colorado (CO)	Cheyenne	5B	50
California (CA)	Nevada	5B	50	Colorado (CO)	Clear Creek	7	59
California (CA)	Orange	3B	36	Colorado (CO)	Conejos	6B	55
California (CA)	Placer	3B	36	Colorado (CO)	Costilla	6B	55
California (CA)	Plumas	5B	50	Colorado (CO)	Crowley	5B	50
California (CA)	Riverside	3B	36	Colorado (CO)	Custer	5B	50
California (CA)	Sacramento	3B	36	Colorado (CO)	Delta	5B	50
California (CA)	San Benito	3C	37	Colorado (CO)	Denver	5B	50
California (CA)	San Bernardino	3B	36	Colorado (CO)	Dolores	6B	55
California (CA)	San Clemente Island	3B	36	Colorado (CO)	Douglas	5B	50
California (CA)	San Diego	3B	36	Colorado (CO)	Eagle	6B	55
California (CA)	San Francisco	3C	37	Colorado (CO)	El Paso	5B	50
California (CA)	San Joaquin	3B	36	Colorado (CO)	Elbert	5B	50
California (CA)	San Luis Obispo	3C	37	Colorado (CO)	Fremont	5B	50
California (CA)	San Mateo	3C	37	Colorado (CO)	Garfield	5B	50
California (CA)	San Miguel Island	3B	36	Colorado (CO)	Gilpin	5B	50
California (CA)	San Nicholas Island	3B	36	Colorado (CO)	Grand	7	59
California (CA)	Santa Barbara	3C	37	Colorado (CO)	Gunnison	7	59
California (CA)	Santa Barbara Island	3B	36	Colorado (CO)	Hinsdale	7	59
California (CA)	Santa Catalina Island	3B	36	Colorado (CO)	Huerfano	5B	50
California (CA)	Santa Clara	3C	37	Colorado (CO)	Jackson	7	59
California (CA)	Santa Cruz	3C	37	Colorado (CO)	Jefferson	5B	50
California (CA)	Santa Cruz Island	3B	36	Colorado (CO)	Kiowa	5B	50
California (CA)	Santa Rosa Island	3B	36	Colorado (CO)	Kit Carson	5B	50

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Colorado (CO)	La Plata	5B	50	Florida (FL)	Charlotte	2A	29
Colorado (CO)	Lake	7	59	Florida (FL)	Citrus	2A	29
Colorado (CO)	Larimer	5B	50	Florida (FL)	Clay	2A	29
Colorado (CO)	Las Animas	4B	43	Florida (FL)	Collier	2A	29
Colorado (CO)	Lincoln	5B	50	Florida (FL)	Columbia	2A	29
Colorado (CO)	Logan	5B	50	Florida (FL)	DeSoto	2A	29
Colorado (CO)	Mesa	5B	50	Florida (FL)	Dixie	2A	29
Colorado (CO)	Mineral	7	59	Florida (FL)	Duval	2A	29
Colorado (CO)	Moffat	6B	55	Florida (FL)	Escambia	2A	29
Colorado (CO)	Montezuma	5B	50	Florida (FL)	Flagler	2A	29
Colorado (CO)	Montrose	5B	50	Florida (FL)	Franklin	2A	29
Colorado (CO)	Morgan	5B	50	Florida (FL)	Gadsden	2A	29
Colorado (CO)	Otero	4B	43	Florida (FL)	Gilchrist	2A	29
Colorado (CO)	Ouray	6B	55	Florida (FL)	Glades	2A	29
Colorado (CO)	Park	7	59	Florida (FL)	Gulf	2A	29
Colorado (CO)	Phillips	5B	50	Florida (FL)	Hamilton	2A	29
Colorado (CO)	Pitkin	7	59	Florida (FL)	Hardee	2A	29
Colorado (CO)	Prowers	4B	43	Florida (FL)	Hendry	2A	29
Colorado (CO)	Pueblo	5B	50	Florida (FL)	Hernando	2A	29
Colorado (CO)	Rio Blanco	6B	55	Florida (FL)	Highlands	2A	29
Colorado (CO)	Rio Grande	7	59	Florida (FL)	Hillsborough	2A	29
Colorado (CO)	Routt	7	59	Florida (FL)	Holmes	2A	29
Colorado (CO)	Saguache	6B	55	Florida (FL)	Indian River	2A	29
Colorado (CO)	San Juan	7	59	Florida (FL)	Jackson	2A	29
Colorado (CO)	Teller	5B	50	Florida (FL)	Jefferson	2A	29
Colorado (CO)	Washington	5B	50	Florida (FL)	Lafayette	2A	29
Colorado (CO)	Weld	5B	50	Florida (FL)	Lake	2A	29
Colorado (CO)	Yuma	5B	50	Florida (FL)	Lee	2A	29
Connecticut (CT)	Fairfield	5A	50	Florida (FL)	Leon	2A	29
Connecticut (CT)	Hartford	5A	50	Florida (FL)	Levy	2A	29
Connecticut (CT)	Litchfield	5A	50	Florida (FL)	Liberty	2A	29
Connecticut (CT)	Middlesex	5A	50	Florida (FL)	Madison	2A	29
Connecticut (CT)	New Haven	5A	50	Florida (FL)	Manatee	2A	29
Connecticut (CT)	New London	5A	50	Florida (FL)	Marion	2A	29
Connecticut (CT)	Tolland	5A	50	Florida (FL)	Martin	2A	29
Connecticut (CT)	Windham	5A	50	Florida (FL)	Miami-Dade	1A	25
Delaware (DE)	Kent	4A	42	Florida (FL)	Monroe	1A	25
Delaware (DE)	New Castle	4A	42	Florida (FL)	Nassau	2A	29
Delaware (DE)	Sussex	4A	42	Florida (FL)	Okaloosa	2A	29
District of Columbia (DC)	District Of Columbia	4A	42	Florida (FL)	Okeechobee	2A	29
Florida (FL)	Alachua	2A	29	Florida (FL)	Orange	2A	29
Florida (FL)	Baker	2A	29	Florida (FL)	Osceola	2A	29
Florida (FL)	Bay	2A	29	Florida (FL)	Palm Beach	1A	25
Florida (FL)	Bradford	2A	29	Florida (FL)	Pasco	2A	29
Florida (FL)	Brevard	2A	29	Florida (FL)	Pinellas	2A	29
Florida (FL)	Broward	1A	25	Florida (FL)	Polk	2A	29
Florida (FL)	Calhoun	2A	29	Florida (FL)	Putnam	2A	29

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Florida (FL)	Santa Rosa	2A	29	Georgia (GA)	Colquitt	2A	29
Florida (FL)	Sarasota	2A	29	Georgia (GA)	Columbia	3A	35
Florida (FL)	Seminole	2A	29	Georgia (GA)	Cook	2A	29
Florida (FL)	St. Johns	2A	29	Georgia (GA)	Coweta	3A	35
Florida (FL)	St. Lucie	2A	29	Georgia (GA)	Crawford	3A	35
Florida (FL)	Sumter	2A	29	Georgia (GA)	Crisp	3A	35
Florida (FL)	Suwannee	2A	29	Georgia (GA)	Dade	3A	35
Florida (FL)	Taylor	2A	29	Georgia (GA)	Dawson	3A	35
Florida (FL)	Union	2A	29	Georgia (GA)	Decatur	2A	29
Florida (FL)	Volusia	2A	29	Georgia (GA)	DeKalb	3A	35
Florida (FL)	Wakulla	2A	29	Georgia (GA)	Dodge	3A	35
Florida (FL)	Walton	2A	29	Georgia (GA)	Dooly	3A	35
Florida (FL)	Washington	2A	29	Georgia (GA)	Dougherty	2A	29
Georgia (GA)	Appling	2A	29	Georgia (GA)	Douglas	3A	35
Georgia (GA)	Atkinson	2A	29	Georgia (GA)	Early	2A	29
Georgia (GA)	Bacon	2A	29	Georgia (GA)	Echols	2A	29
Georgia (GA)	Baker	2A	29	Georgia (GA)	Effingham	2A	29
Georgia (GA)	Baldwin	3A	35	Georgia (GA)	Elbert	3A	35
Georgia (GA)	Banks	3A	35	Georgia (GA)	Emanuel	3A	35
Georgia (GA)	Barrow	3A	35	Georgia (GA)	Evans	2A	29
Georgia (GA)	Bartow	3A	35	Georgia (GA)	Fannin	3A	35
Georgia (GA)	Ben Hill	3A	35	Georgia (GA)	Fayette	3A	35
Georgia (GA)	Berrien	2A	29	Georgia (GA)	Floyd	3A	35
Georgia (GA)	Bibb	3A	35	Georgia (GA)	Forsyth	3A	35
Georgia (GA)	Bleckley	3A	35	Georgia (GA)	Franklin	3A	35
Georgia (GA)	Brantley	2A	29	Georgia (GA)	Fulton	3A	35
Georgia (GA)	Brooks	2A	29	Georgia (GA)	Gilmer	3A	35
Georgia (GA)	Bryan	2A	29	Georgia (GA)	Glascock	3A	35
Georgia (GA)	Bulloch	3A	35	Georgia (GA)	Glynn	2A	29
Georgia (GA)	Burke	3A	35	Georgia (GA)	Gordon	3A	35
Georgia (GA)	Butts	3A	35	Georgia (GA)	Grady	2A	29
Georgia (GA)	Calhoun	2A	29	Georgia (GA)	Greene	3A	35
Georgia (GA)	Camden	2A	29	Georgia (GA)	Gwinnett	3A	35
Georgia (GA)	Candler	3A	35	Georgia (GA)	Habersham	3A	35
Georgia (GA)	Carroll	3A	35	Georgia (GA)	Hall	3A	35
Georgia (GA)	Catoosa	3A	35	Georgia (GA)	Hancock	3A	35
Georgia (GA)	Charlton	2A	29	Georgia (GA)	Haralson	3A	35
Georgia (GA)	Chatham	2A	29	Georgia (GA)	Harris	3A	35
Georgia (GA)	Chattahoochee	3A	35	Georgia (GA)	Hart	3A	35
Georgia (GA)	Chattooga	3A	35	Georgia (GA)	Heard	3A	35
Georgia (GA)	Cherokee	3A	35	Georgia (GA)	Henry	3A	35
Georgia (GA)	Clarke	3A	35	Georgia (GA)	Houston	3A	35
Georgia (GA)	Clay	3A	35	Georgia (GA)	Irwin	2A	29
Georgia (GA)	Clayton	3A	35	Georgia (GA)	Jackson	3A	35
Georgia (GA)	Clinch	2A	29	Georgia (GA)	Jasper	3A	35
Georgia (GA)	Cobb	3A	35	Georgia (GA)	Jeff Davis	2A	29
Georgia (GA)	Coffee	2A	29	Georgia (GA)	Jefferson	3A	35

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Georgia (GA)	Jenkins	3A	35	Georgia (GA)	Sumter	3A	35
Georgia (GA)	Johnson	3A	35	Georgia (GA)	Talbot	3A	35
Georgia (GA)	Jones	3A	35	Georgia (GA)	Taliaferro	3A	35
Georgia (GA)	Lamar	3A	35	Georgia (GA)	Tattnall	2A	29
Georgia (GA)	Lanier	2A	29	Georgia (GA)	Taylor	3A	35
Georgia (GA)	Laurens	3A	35	Georgia (GA)	Telfair	3A	35
Georgia (GA)	Lee	3A	35	Georgia (GA)	Terrell	3A	35
Georgia (GA)	Liberty	2A	29	Georgia (GA)	Thomas	2A	29
Georgia (GA)	Lincoln	3A	35	Georgia (GA)	Tift	2A	29
Georgia (GA)	Long	2A	29	Georgia (GA)	Toombs	2A	29
Georgia (GA)	Lowndes	2A	29	Georgia (GA)	Towns	3A	35
Georgia (GA)	Lumpkin	3A	35	Georgia (GA)	Treutlen	3A	35
Georgia (GA)	Macon	3A	35	Georgia (GA)	Troup	3A	35
Georgia (GA)	Madison	3A	35	Georgia (GA)	Turner	3A	35
Georgia (GA)	Marion	3A	35	Georgia (GA)	Twiggs	3A	35
Georgia (GA)	McDuffie	3A	35	Georgia (GA)	Union	3A	35
Georgia (GA)	McIntosh	2A	29	Georgia (GA)	Upson	3A	35
Georgia (GA)	Meriwether	3A	35	Georgia (GA)	Walker	3A	35
Georgia (GA)	Miller	2A	29	Georgia (GA)	Walton	3A	35
Georgia (GA)	Mitchell	2A	29	Georgia (GA)	Ware	2A	29
Georgia (GA)	Monroe	3A	35	Georgia (GA)	Warren	3A	35
Georgia (GA)	Montgomery	3A	35	Georgia (GA)	Washington	3A	35
Georgia (GA)	Morgan	3A	35	Georgia (GA)	Wayne	2A	29
Georgia (GA)	Murray	3A	35	Georgia (GA)	Webster	3A	35
Georgia (GA)	Muscogee	3A	35	Georgia (GA)	Wheeler	3A	35
Georgia (GA)	Newton	3A	35	Georgia (GA)	White	3A	35
Georgia (GA)	Oconee	3A	35	Georgia (GA)	Whitfield	3A	35
Georgia (GA)	Oglethorpe	3A	35	Georgia (GA)	Wilcox	3A	35
Georgia (GA)	Paulding	3A	35	Georgia (GA)	Wilkes	3A	35
Georgia (GA)	Peach	3A	35	Georgia (GA)	Wilkinson	3A	35
Georgia (GA)	Pickens	3A	35	Georgia (GA)	Worth	2A	29
Georgia (GA)	Pierce	2A	29	Hawaii (HI)	Hawaii	1A	25
Georgia (GA)	Pike	3A	35	Hawaii (HI)	Honolulu	1A	25
Georgia (GA)	Polk	3A	35	Hawaii (HI)	Kalawao	1A	25
Georgia (GA)	Pulaski	3A	35	Hawaii (HI)	Kauai	1A	25
Georgia (GA)	Putnam	3A	35	Hawaii (HI)	Maui	1A	25
Georgia (GA)	Quitman	3A	35	Idaho (ID)	Ada	5B	50
Georgia (GA)	Rabun	3A	35	Idaho (ID)	Adams	6B	55
Georgia (GA)	Randolph	3A	35	Idaho (ID)	Bannock	6B	55
Georgia (GA)	Richmond	3A	35	Idaho (ID)	Bear Lake	6B	55
Georgia (GA)	Rockdale	3A	35	Idaho (ID)	Benewah	5B	50
Georgia (GA)	Schley	3A	35	Idaho (ID)	Bingham	6B	55
Georgia (GA)	Screven	3A	35	Idaho (ID)	Blaine	6B	55
Georgia (GA)	Seminole	2A	29	Idaho (ID)	Boise	6B	55
Georgia (GA)	Spalding	3A	35	Idaho (ID)	Bonner	6B	55
Georgia (GA)	Stephens	3A	35	Idaho (ID)	Bonneville	6B	55
Georgia (GA)	Stewart	3A	35	Idaho (ID)	Boundary	6B	55

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Idaho (ID)	Butte	6B	55	Illinois (IL)	Coles	4A	42
Idaho (ID)	Camas	6B	55	Illinois (IL)	Cook	5A	50
Idaho (ID)	Canyon	5B	50	Illinois (IL)	Crawford	4A	42
Idaho (ID)	Caribou	6B	55	Illinois (IL)	Cumberland	4A	42
Idaho (ID)	Cassia	5B	50	Illinois (IL)	De Witt	5A	50
Idaho (ID)	Clark	6B	55	Illinois (IL)	DeKalb	5A	50
Idaho (ID)	Clearwater	5B	50	Illinois (IL)	Douglas	5A	50
Idaho (ID)	Custer	6B	55	Illinois (IL)	Du Page	5A	50
Idaho (ID)	Elmore	5B	50	Illinois (IL)	Edgar	5A	50
Idaho (ID)	Franklin	6B	55	Illinois (IL)	Edwards	4A	42
Idaho (ID)	Fremont	6B	55	Illinois (IL)	Effingham	4A	42
Idaho (ID)	Gem	5B	50	Illinois (IL)	Fayette	4A	42
Idaho (ID)	Gooding	5B	50	Illinois (IL)	Ford	5A	50
Idaho (ID)	Idaho	5B	50	Illinois (IL)	Franklin	4A	42
Idaho (ID)	Jefferson	6B	55	Illinois (IL)	Fulton	5A	50
Idaho (ID)	Jerome	5B	50	Illinois (IL)	Gallatin	4A	42
Idaho (ID)	Kootenai	5B	50	Illinois (IL)	Greene	4A	42
Idaho (ID)	Latah	5B	50	Illinois (IL)	Grundy	5A	50
Idaho (ID)	Lemhi	6B	55	Illinois (IL)	Hamilton	4A	42
Idaho (ID)	Lewis	5B	50	Illinois (IL)	Hancock	5A	50
Idaho (ID)	Lincoln	5B	50	Illinois (IL)	Hardin	4A	42
Idaho (ID)	Madison	6B	55	Illinois (IL)	Henderson	5A	50
Idaho (ID)	Minidoka	5B	50	Illinois (IL)	Henry	5A	50
Idaho (ID)	Nez Perce	5B	50	Illinois (IL)	Iroquois	5A	50
Idaho (ID)	Oneida	6B	55	Illinois (IL)	Jackson	4A	42
Idaho (ID)	Owyhee	5B	50	Illinois (IL)	Jasper	4A	42
Idaho (ID)	Payette	5B	50	Illinois (IL)	Jefferson	4A	42
Idaho (ID)	Power	5B	50	Illinois (IL)	Jersey	4A	42
Idaho (ID)	Shoshone	5B	50	Illinois (IL)	Jo Daviess	5A	50
Idaho (ID)	Teton	6B	55	Illinois (IL)	Johnson	4A	42
Idaho (ID)	Twin Falls	5B	50	Illinois (IL)	Kane	5A	50
Idaho (ID)	Valley	6B	55	Illinois (IL)	Kankakee	5A	50
Idaho (ID)	Washington	5B	50	Illinois (IL)	Kendall	5A	50
Illinois (IL)	Adams	5A	50	Illinois (IL)	Knox	5A	50
Illinois (IL)	Alexander	4A	42	Illinois (IL)	La Salle	5A	50
Illinois (IL)	Bond	4A	42	Illinois (IL)	Lake	5A	50
Illinois (IL)	Boone	5A	50	Illinois (IL)	Lawrence	4A	42
Illinois (IL)	Brown	5A	50	Illinois (IL)	Lee	5A	50
Illinois (IL)	Bureau	5A	50	Illinois (IL)	Livingston	5A	50
Illinois (IL)	Calhoun	4A	42	Illinois (IL)	Logan	5A	50
Illinois (IL)	Carroll	5A	50	Illinois (IL)	Macon	5A	50
Illinois (IL)	Cass	5A	50	Illinois (IL)	Macoupin	4A	42
Illinois (IL)	Champaign	5A	50	Illinois (IL)	Madison	4A	42
Illinois (IL)	Christian	4A	42	Illinois (IL)	Marion	4A	42
Illinois (IL)	Clark	4A	42	Illinois (IL)	Marshall	5A	50
Illinois (IL)	Clay	4A	42	Illinois (IL)	Mason	5A	50
Illinois (IL)	Clinton	4A	42	Illinois (IL)	Massac	4A	42

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Illinois (IL)	McDonough	5A	50	Indiana (IN)	Brown	4A	42
Illinois (IL)	McHenry	5A	50	Indiana (IN)	Carroll	5A	50
Illinois (IL)	McLean	5A	50	Indiana (IN)	Cass	5A	50
Illinois (IL)	Menard	5A	50	Indiana (IN)	Clark	4A	42
Illinois (IL)	Mercer	5A	50	Indiana (IN)	Clay	4A	42
Illinois (IL)	Monroe	4A	42	Indiana (IN)	Clinton	5A	50
Illinois (IL)	Montgomery	4A	42	Indiana (IN)	Crawford	5A	50
Illinois (IL)	Morgan	5A	50	Indiana (IN)	Daviess	4A	42
Illinois (IL)	Moultrie	5A	50	Indiana (IN)	De Kalb	5A	50
Illinois (IL)	Ogle	5A	50	Indiana (IN)	Dearborn	4A	42
Illinois (IL)	Peoria	5A	50	Indiana (IN)	Decatur	4A	42
Illinois (IL)	Perry	4A	42	Indiana (IN)	Delaware	5A	50
Illinois (IL)	Piatt	5A	50	Indiana (IN)	Dubois	4A	42
Illinois (IL)	Pike	5A	50	Indiana (IN)	Elkhart	5A	50
Illinois (IL)	Pope	4A	42	Indiana (IN)	Fayette	4A	42
Illinois (IL)	Pulaski	4A	42	Indiana (IN)	Floyd	4A	42
Illinois (IL)	Putnam	5A	50	Indiana (IN)	Fountain	5A	50
Illinois (IL)	Randolph	4A	42	Indiana (IN)	Franklin	4A	42
Illinois (IL)	Richland	4A	42	Indiana (IN)	Fulton	5A	50
Illinois (IL)	Rock Island	5A	50	Indiana (IN)	Gibson	4A	42
Illinois (IL)	Saline	4A	42	Indiana (IN)	Grant	5A	50
Illinois (IL)	Sangamon	5A	50	Indiana (IN)	Greene	4A	42
Illinois (IL)	Schuyler	5A	50	Indiana (IN)	Hamilton	5A	50
Illinois (IL)	Scott	5A	50	Indiana (IN)	Hancock	5A	50
Illinois (IL)	Shelby	4A	42	Indiana (IN)	Harrison	4A	42
Illinois (IL)	St. Clair	4A	42	Indiana (IN)	Hendricks	4A	42
Illinois (IL)	Stark	5A	50	Indiana (IN)	Henry	5A	50
Illinois (IL)	Stephenson	5A	50	Indiana (IN)	Howard	5A	50
Illinois (IL)	Tazewell	5A	50	Indiana (IN)	Huntington	5A	50
Illinois (IL)	Union	4A	42	Indiana (IN)	Jackson	4A	42
Illinois (IL)	Vermilion	5A	50	Indiana (IN)	Jasper	5A	50
Illinois (IL)	Wabash	4A	42	Indiana (IN)	Jay	5A	50
Illinois (IL)	Warren	5A	50	Indiana (IN)	Jefferson	4A	42
Illinois (IL)	Washington	4A	42	Indiana (IN)	Jennings	4A	42
Illinois (IL)	Wayne	4A	42	Indiana (IN)	Johnson	4A	42
Illinois (IL)	White	4A	42	Indiana (IN)	Knox	4A	42
Illinois (IL)	Whiteside	5A	50	Indiana (IN)	Kosciusko	5A	50
Illinois (IL)	Will	5A	50	Indiana (IN)	La Porte	5A	50
Illinois (IL)	Williamson	4A	42	Indiana (IN)	Lagrange	5A	50
Illinois (IL)	Winnebago	5A	50	Indiana (IN)	Lake	5A	50
Illinois (IL)	Woodford	5A	50	Indiana (IN)	Lawrence	4A	42
Indiana (IN)	Adams	5A	50	Indiana (IN)	Madison	5A	50
Indiana (IN)	Allen	5A	50	Indiana (IN)	Marion	4A	42
Indiana (IN)	Bartholomew	4A	42	Indiana (IN)	Marshall	5A	50
Indiana (IN)	Benton	5A	50	Indiana (IN)	Martin	4A	42
Indiana (IN)	Blackford	5A	50	Indiana (IN)	Miami	5A	50
Indiana (IN)	Boone	5A	50	Indiana (IN)	Monroe	4A	42

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Indiana (IN)	Montgomery	5A	50	Iowa (IA)	Bremer	5A	50
Indiana (IN)	Morgan	4A	42	Iowa (IA)	Buchanan	5A	50
Indiana (IN)	Newton	5A	50	Iowa (IA)	Buena Vista	5A	50
Indiana (IN)	Noble	5A	50	Iowa (IA)	Butler	5A	50
Indiana (IN)	Ohio	4A	42	Iowa (IA)	Calhoun	5A	50
Indiana (IN)	Orange	4A	42	Iowa (IA)	Carroll	5A	50
Indiana (IN)	Owen	4A	42	Iowa (IA)	Cass	5A	50
Indiana (IN)	Parke	5A	50	Iowa (IA)	Cedar	5A	50
Indiana (IN)	Perry	4A	42	Iowa (IA)	Cerro Gordo	6A	55
Indiana (IN)	Pike	4A	42	Iowa (IA)	Cherokee	5A	50
Indiana (IN)	Porter	5A	50	Iowa (IA)	Chickasaw	5A	50
Indiana (IN)	Posey	4A	42	Iowa (IA)	Clarke	5A	50
Indiana (IN)	Pulaski	5A	50	Iowa (IA)	Clay	6A	55
Indiana (IN)	Putnam	4A	42	Iowa (IA)	Clayton	5A	50
Indiana (IN)	Randolph	5A	50	Iowa (IA)	Clinton	5A	50
Indiana (IN)	Ripley	4A	42	Iowa (IA)	Crawford	5A	50
Indiana (IN)	Rush	4A	42	Iowa (IA)	Dallas	5A	50
Indiana (IN)	Scott	4A	42	Iowa (IA)	Davis	5A	50
Indiana (IN)	Shelby	4A	42	Iowa (IA)	Decatur	5A	50
Indiana (IN)	Spencer	4A	42	Iowa (IA)	Delaware	5A	50
Indiana (IN)	St. Joseph	5A	50	Iowa (IA)	Des Moines	5A	50
Indiana (IN)	Starke	5A	50	Iowa (IA)	Dickinson	6A	55
Indiana (IN)	Steuben	5A	50	Iowa (IA)	Dubuque	5A	50
Indiana (IN)	Sullivan	4A	42	Iowa (IA)	Emmet	6A	55
Indiana (IN)	Switzerland	4A	42	Iowa (IA)	Fayette	5A	50
Indiana (IN)	Tippecanoe	5A	50	Iowa (IA)	Floyd	5A	50
Indiana (IN)	Tipton	5A	50	Iowa (IA)	Franklin	5A	50
Indiana (IN)	Union	4A	42	Iowa (IA)	Fremont	5A	50
Indiana (IN)	Vanderburgh	4A	42	Iowa (IA)	Greene	5A	50
Indiana (IN)	Vermillion	5A	50	Iowa (IA)	Grundy	5A	50
Indiana (IN)	Vigo	4A	42	Iowa (IA)	Guthrie	5A	50
Indiana (IN)	Wabash	5A	50	Iowa (IA)	Hamilton	5A	50
Indiana (IN)	Warren	5A	50	Iowa (IA)	Hancock	6A	55
Indiana (IN)	Warrick	4A	42	Iowa (IA)	Hardin	5A	50
Indiana (IN)	Washington	4A	42	Iowa (IA)	Harrison	5A	50
Indiana (IN)	Wayne	5A	50	Iowa (IA)	Henry	5A	50
Indiana (IN)	Wells	5A	50	Iowa (IA)	Howard	5A	50
Indiana (IN)	White	5A	50	Iowa (IA)	Humboldt	5A	50
Indiana (IN)	Whitley	5A	50	Iowa (IA)	Ida	5A	50
Iowa (IA)	Adair	5A	50	Iowa (IA)	Iowa	5A	50
Iowa (IA)	Adams	5A	50	Iowa (IA)	Jackson	5A	50
Iowa (IA)	Allamakee	5A	50	Iowa (IA)	Jasper	5A	50
Iowa (IA)	Appanoose	5A	50	Iowa (IA)	Jefferson	5A	50
Iowa (IA)	Audubon	5A	50	Iowa (IA)	Johnson	5A	50
Iowa (IA)	Benton	5A	50	Iowa (IA)	Jones	5A	50
Iowa (IA)	Black Hawk	5A	50	Iowa (IA)	Keokuk	5A	50
Iowa (IA)	Boone	5A	50	Iowa (IA)	Kossuth	6A	55

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Iowa (IA)	Lee	5A	50	Kansas (KS)	Barber	4A	42
Iowa (IA)	Linn	5A	50	Kansas (KS)	Barton	4A	42
Iowa (IA)	Louisa	5A	50	Kansas (KS)	Bourbon	4A	42
Iowa (IA)	Lucas	5A	50	Kansas (KS)	Brown	4A	42
Iowa (IA)	Lyon	6A	55	Kansas (KS)	Butler	4A	42
Iowa (IA)	Madison	5A	50	Kansas (KS)	Chase	4A	42
Iowa (IA)	Mahaska	5A	50	Kansas (KS)	Chautauqua	4A	42
Iowa (IA)	Marion	5A	50	Kansas (KS)	Cherokee	4A	42
Iowa (IA)	Marshall	5A	50	Kansas (KS)	Cheyenne	5A	50
Iowa (IA)	Mills	5A	50	Kansas (KS)	Clark	4A	42
Iowa (IA)	Mitchell	6A	55	Kansas (KS)	Clay	4A	42
Iowa (IA)	Monona	5A	50	Kansas (KS)	Cloud	4A	42
Iowa (IA)	Monroe	5A	50	Kansas (KS)	Coffey	4A	42
Iowa (IA)	Montgomery	5A	50	Kansas (KS)	Comanche	4A	42
Iowa (IA)	Muscatine	5A	50	Kansas (KS)	Cowley	4A	42
Iowa (IA)	O'Brien	6A	55	Kansas (KS)	Crawford	4A	42
Iowa (IA)	Osceola	6A	55	Kansas (KS)	Decatur	5A	50
Iowa (IA)	Page	5A	50	Kansas (KS)	Dickinson	4A	42
Iowa (IA)	Palo Alto	6A	55	Kansas (KS)	Doniphan	4A	42
Iowa (IA)	Plymouth	5A	50	Kansas (KS)	Douglas	4A	42
Iowa (IA)	Pocahontas	5A	50	Kansas (KS)	Edwards	4A	42
Iowa (IA)	Polk	5A	50	Kansas (KS)	Elk	4A	42
Iowa (IA)	Pottawattamie	5A	50	Kansas (KS)	Ellis	4A	42
Iowa (IA)	Poweshiek	5A	50	Kansas (KS)	Ellsworth	4A	42
Iowa (IA)	Ringgold	5A	50	Kansas (KS)	Finney	4A	42
Iowa (IA)	Sac	5A	50	Kansas (KS)	Ford	4A	42
Iowa (IA)	Scott	5A	50	Kansas (KS)	Franklin	4A	42
Iowa (IA)	Shelby	5A	50	Kansas (KS)	Geary	4A	42
Iowa (IA)	Sioux	6A	55	Kansas (KS)	Gove	5A	50
Iowa (IA)	Story	5A	50	Kansas (KS)	Graham	4A	42
Iowa (IA)	Tama	5A	50	Kansas (KS)	Grant	4A	42
Iowa (IA)	Taylor	5A	50	Kansas (KS)	Gray	4A	42
Iowa (IA)	Union	5A	50	Kansas (KS)	Greeley	5A	50
Iowa (IA)	Van Buren	5A	50	Kansas (KS)	Greenwood	4A	42
Iowa (IA)	Wapello	5A	50	Kansas (KS)	Hamilton	4A	42
Iowa (IA)	Warren	5A	50	Kansas (KS)	Harper	4A	42
Iowa (IA)	Washington	5A	50	Kansas (KS)	Harvey	4A	42
Iowa (IA)	Wayne	5A	50	Kansas (KS)	Haskell	4A	42
Iowa (IA)	Webster	5A	50	Kansas (KS)	Hodgeman	4A	42
Iowa (IA)	Winnebago	6A	55	Kansas (KS)	Jackson	4A	42
Iowa (IA)	Winneshiek	5A	50	Kansas (KS)	Jefferson	4A	42
Iowa (IA)	Woodbury	5A	50	Kansas (KS)	Jewell	5A	50
Iowa (IA)	Worth	6A	55	Kansas (KS)	Johnson	4A	42
Iowa (IA)	Wright	5A	50	Kansas (KS)	Kearny	4A	42
Kansas (KS)	Allen	4A	42	Kansas (KS)	Kingman	4A	42
Kansas (KS)	Anderson	4A	42	Kansas (KS)	Kiowa	4A	42
Kansas (KS)	Atchison	4A	42	Kansas (KS)	Labette	4A	42

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Kansas (KS)	Lane	4A	42	Kansas (KS)	Trego	4A	42
Kansas (KS)	Leavenworth	4A	42	Kansas (KS)	Wabaunsee	4A	42
Kansas (KS)	Lincoln	4A	42	Kansas (KS)	Wallace	5A	50
Kansas (KS)	Linn	4A	42	Kansas (KS)	Washington	4A	42
Kansas (KS)	Logan	5A	50	Kansas (KS)	Wichita	5A	50
Kansas (KS)	Lyon	4A	42	Kansas (KS)	Wilson	4A	42
Kansas (KS)	Marion	4A	42	Kansas (KS)	Woodson	4A	42
Kansas (KS)	Marshall	4A	42	Kansas (KS)	Wyandotte	4A	42
Kansas (KS)	McPherson	4A	42	Kentucky (KY)	Adair	4A	42
Kansas (KS)	Meade	4A	42	Kentucky (KY)	Allen	4A	42
Kansas (KS)	Miami	4A	42	Kentucky (KY)	Anderson	4A	42
Kansas (KS)	Mitchell	4A	42	Kentucky (KY)	Ballard	4A	42
Kansas (KS)	Montgomery	4A	42	Kentucky (KY)	Barren	4A	42
Kansas (KS)	Morris	4A	42	Kentucky (KY)	Bath	4A	42
Kansas (KS)	Morton	4A	42	Kentucky (KY)	Bell	4A	42
Kansas (KS)	Nemaha	4A	42	Kentucky (KY)	Boone	4A	42
Kansas (KS)	Neosho	4A	42	Kentucky (KY)	Bourbon	4A	42
Kansas (KS)	Ness	4A	42	Kentucky (KY)	Boyd	4A	42
Kansas (KS)	Norton	5A	50	Kentucky (KY)	Boyle	4A	42
Kansas (KS)	Osage	4A	42	Kentucky (KY)	Bracken	4A	42
Kansas (KS)	Osborne	4A	42	Kentucky (KY)	Breathitt	4A	42
Kansas (KS)	Ottawa	4A	42	Kentucky (KY)	Breckinridge	4A	42
Kansas (KS)	Pawnee	4A	42	Kentucky (KY)	Bullitt	4A	42
Kansas (KS)	Phillips	5A	50	Kentucky (KY)	Butler	4A	42
Kansas (KS)	Pottawatomie	4A	42	Kentucky (KY)	Caldwell	4A	42
Kansas (KS)	Pratt	4A	42	Kentucky (KY)	Calloway	4A	42
Kansas (KS)	Rawlins	5A	50	Kentucky (KY)	Campbell	4A	42
Kansas (KS)	Reno	4A	42	Kentucky (KY)	Carlisle	4A	42
Kansas (KS)	Republic	5A	50	Kentucky (KY)	Carroll	4A	42
Kansas (KS)	Rice	4A	42	Kentucky (KY)	Carter	4A	42
Kansas (KS)	Riley	4A	42	Kentucky (KY)	Casey	4A	42
Kansas (KS)	Rooks	4A	42	Kentucky (KY)	Christian	4A	42
Kansas (KS)	Rush	4A	42	Kentucky (KY)	Clark	4A	42
Kansas (KS)	Russell	4A	42	Kentucky (KY)	Clay	4A	42
Kansas (KS)	Saline	4A	42	Kentucky (KY)	Clinton	4A	42
Kansas (KS)	Scott	5A	50	Kentucky (KY)	Crittenden	4A	42
Kansas (KS)	Sedgwick	4A	42	Kentucky (KY)	Cumberland	4A	42
Kansas (KS)	Seward	4A	42	Kentucky (KY)	Daviess	4A	42
Kansas (KS)	Shawnee	4A	42	Kentucky (KY)	Edmonson	4A	42
Kansas (KS)	Sheridan	5A	50	Kentucky (KY)	Elliott	4A	42
Kansas (KS)	Sherman	5A	50	Kentucky (KY)	Estill	4A	42
Kansas (KS)	Smith	5A	50	Kentucky (KY)	Fayette	4A	42
Kansas (KS)	Stafford	4A	42	Kentucky (KY)	Fleming	4A	42
Kansas (KS)	Stanton	4A	42	Kentucky (KY)	Floyd	4A	42
Kansas (KS)	Stevens	4A	42	Kentucky (KY)	Franklin	4A	42
Kansas (KS)	Sumner	4A	42	Kentucky (KY)	Fulton	4A	42
Kansas (KS)	Thomas	5A	50	Kentucky (KY)	Gallatin	4A	42

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Kentucky (KY)	Garrard	4A	42	Kentucky (KY)	Montgomery	4A	42
Kentucky (KY)	Grant	4A	42	Kentucky (KY)	Morgan	4A	42
Kentucky (KY)	Graves	4A	42	Kentucky (KY)	Muhlenberg	4A	42
Kentucky (KY)	Grayson	4A	42	Kentucky (KY)	Nelson	4A	42
Kentucky (KY)	Green	4A	42	Kentucky (KY)	Nicholas	4A	42
Kentucky (KY)	Greenup	4A	42	Kentucky (KY)	Ohio	4A	42
Kentucky (KY)	Hancock	4A	42	Kentucky (KY)	Oldham	4A	42
Kentucky (KY)	Hardin	4A	42	Kentucky (KY)	Owen	4A	42
Kentucky (KY)	Harlan	4A	42	Kentucky (KY)	Owsley	4A	42
Kentucky (KY)	Harrison	4A	42	Kentucky (KY)	Pendleton	4A	42
Kentucky (KY)	Hart	4A	42	Kentucky (KY)	Perry	4A	42
Kentucky (KY)	Henderson	4A	42	Kentucky (KY)	Pike	4A	42
Kentucky (KY)	Henry	4A	42	Kentucky (KY)	Powell	4A	42
Kentucky (KY)	Hickman	4A	42	Kentucky (KY)	Pulaski	4A	42
Kentucky (KY)	Hopkins	4A	42	Kentucky (KY)	Robertson	4A	42
Kentucky (KY)	Jackson	4A	42	Kentucky (KY)	Rockcastle	4A	42
Kentucky (KY)	Jefferson	4A	42	Kentucky (KY)	Rowan	4A	42
Kentucky (KY)	Jessamine	4A	42	Kentucky (KY)	Russell	4A	42
Kentucky (KY)	Johnson	4A	42	Kentucky (KY)	Scott	4A	42
Kentucky (KY)	Kenton	4A	42	Kentucky (KY)	Shelby	4A	42
Kentucky (KY)	Knott	4A	42	Kentucky (KY)	Simpson	4A	42
Kentucky (KY)	Knox	4A	42	Kentucky (KY)	Spencer	4A	42
Kentucky (KY)	Larue	4A	42	Kentucky (KY)	Taylor	4A	42
Kentucky (KY)	Laurel	4A	42	Kentucky (KY)	Todd	4A	42
Kentucky (KY)	Lawrence	4A	42	Kentucky (KY)	Trigg	4A	42
Kentucky (KY)	Lee	4A	42	Kentucky (KY)	Trimble	4A	42
Kentucky (KY)	Leslie	4A	42	Kentucky (KY)	Union	4A	42
Kentucky (KY)	Letcher	4A	42	Kentucky (KY)	Warren	4A	42
Kentucky (KY)	Lewis	4A	42	Kentucky (KY)	Washington	4A	42
Kentucky (KY)	Lincoln	4A	42	Kentucky (KY)	Wayne	4A	42
Kentucky (KY)	Livingston	4A	42	Kentucky (KY)	Webster	4A	42
Kentucky (KY)	Logan	4A	42	Kentucky (KY)	Whitley	4A	42
Kentucky (KY)	Lyon	4A	42	Kentucky (KY)	Wolfe	4A	42
Kentucky (KY)	Madison	4A	42	Kentucky (KY)	Woodford	4A	42
Kentucky (KY)	Magoffin	4A	42	Louisiana (LA)	Acadia	2A	29
Kentucky (KY)	Marion	4A	42	Louisiana (LA)	Allen	2A	29
Kentucky (KY)	Marshall	4A	42	Louisiana (LA)	Ascension	2A	29
Kentucky (KY)	Martin	4A	42	Louisiana (LA)	Assumption	2A	29
Kentucky (KY)	Mason	4A	42	Louisiana (LA)	Avoyelles	2A	29
Kentucky (KY)	McCracken	4A	42	Louisiana (LA)	Beauregard	2A	29
Kentucky (KY)	McCreary	4A	42	Louisiana (LA)	Bienville	3A	35
Kentucky (KY)	McLean	4A	42	Louisiana (LA)	Bossier	3A	35
Kentucky (KY)	Meade	4A	42	Louisiana (LA)	Caddo	3A	35
Kentucky (KY)	Menifee	4A	42	Louisiana (LA)	Calcasieu	2A	29
Kentucky (KY)	Mercer	4A	42	Louisiana (LA)	Caldwell	3A	35
Kentucky (KY)	Metcalfe	4A	42	Louisiana (LA)	Cameron	2A	29
Kentucky (KY)	Monroe	4A	42	Louisiana (LA)	Catahoula	3A	35

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Louisiana (LA)	Claiborne	3A	35	Louisiana (LA)	West Baton Rouge	2A	29
Louisiana (LA)	Concordia	3A	35	Louisiana (LA)	West Carroll	3A	35
Louisiana (LA)	De Soto	3A	35	Louisiana (LA)	West Feliciana	2A	29
Louisiana (LA)	East Baton Rouge	2A	29	Louisiana (LA)	Winn	3A	35
Louisiana (LA)	East Carroll	3A	35	Maine (ME)	Androscoggin	6A	55
Louisiana (LA)	East Feliciana	2A	29	Maine (ME)	Aroostook	7	59
Louisiana (LA)	Evangeline	2A	29	Maine (ME)	Cumberland	6A	55
Louisiana (LA)	Franklin	3A	35	Maine (ME)	Franklin	6A	55
Louisiana (LA)	Grant	3A	35	Maine (ME)	Hancock	6A	55
Louisiana (LA)	Iberia	2A	29	Maine (ME)	Kennebec	6A	55
Louisiana (LA)	Iberville	2A	29	Maine (ME)	Knox	6A	55
Louisiana (LA)	Jackson	3A	35	Maine (ME)	Lincoln	6A	55
Louisiana (LA)	Jefferson	2A	29	Maine (ME)	Oxford	6A	55
Louisiana (LA)	Jefferson Davis	2A	29	Maine (ME)	Penobscot	6A	55
Louisiana (LA)	La Salle	3A	35	Maine (ME)	Piscataquis	6A	55
Louisiana (LA)	Lafayette	2A	29	Maine (ME)	Sagadahoc	6A	55
Louisiana (LA)	LaFourche	2A	29	Maine (ME)	Somerset	6A	55
Louisiana (LA)	Lincoln	3A	35	Maine (ME)	Waldo	6A	55
Louisiana (LA)	Livingston	2A	29	Maine (ME)	Washington	6A	55
Louisiana (LA)	Madison	3A	35	Maine (ME)	York	6A	55
Louisiana (LA)	Morehouse	3A	35	Maryland (MD)	Allegany	5A	50
Louisiana (LA)	Natchitoches	3A	35	Maryland (MD)	Anne Arundel	4A	42
Louisiana (LA)	Orleans	2A	29	Maryland (MD)	Baltimore	4A	42
Louisiana (LA)	Ouachita	3A	35	Maryland (MD)	Baltimore	4A	42
Louisiana (LA)	Plaquemines	2A	29	Maryland (MD)	Calvert	4A	42
Louisiana (LA)	Pointe Coupee	2A	29	Maryland (MD)	Caroline	4A	42
Louisiana (LA)	Rapides	2A	29	Maryland (MD)	Carroll	4A	42
Louisiana (LA)	Red River	3A	35	Maryland (MD)	Cecil	4A	42
Louisiana (LA)	Richland	3A	35	Maryland (MD)	Charles	4A	42
Louisiana (LA)	Sabine	3A	35	Maryland (MD)	Dorchester	4A	42
Louisiana (LA)	St. Bernard	2A	29	Maryland (MD)	Frederick	4A	42
Louisiana (LA)	St. Charles	2A	29	Maryland (MD)	Garrett	5A	50
Louisiana (LA)	St. Helena	2A	29	Maryland (MD)	Harford	4A	42
Louisiana (LA)	St. James	2A	29	Maryland (MD)	Howard	4A	42
Louisiana (LA)	St. John the Baptist	2A	29	Maryland (MD)	Kent	4A	42
Louisiana (LA)	St. Landry	2A	29	Maryland (MD)	Montgomery	4A	42
Louisiana (LA)	St. Martin	2A	29	Maryland (MD)	Prince George's	4A	42
Louisiana (LA)	St. Mary	2A	29	Maryland (MD)	Queen Anne's	4A	42
Louisiana (LA)	St. Tammany	2A	29	Maryland (MD)	Somerset	4A	42
Louisiana (LA)	Tangipahoa	2A	29	Maryland (MD)	St. Mary's	4A	42
Louisiana (LA)	Tensas	3A	35	Maryland (MD)	Talbot	4A	42
Louisiana (LA)	Terrebonne	2A	29	Maryland (MD)	Washington	4A	42
Louisiana (LA)	Union	3A	35	Maryland (MD)	Wicomico	4A	42
Louisiana (LA)	Vermilion	2A	29	Maryland (MD)	Worcester	4A	42
Louisiana (LA)	Vernon	3A	35	Massachusetts (MA)	Barnstable	5A	50
Louisiana (LA)	Washington	2A	29	Massachusetts (MA)	Berkshire	5A	50
Louisiana (LA)	Webster	3A	35	Massachusetts (MA)	Bristol	5A	50

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Massachusetts (MA)	Dukes	5A	50	Michigan (MI)	Isabella	6A	55
Massachusetts (MA)	Essex	5A	50	Michigan (MI)	Jackson	5A	50
Massachusetts (MA)	Franklin	5A	50	Michigan (MI)	Kalamazoo	5A	50
Massachusetts (MA)	Hampden	5A	50	Michigan (MI)	Kalkaska	6A	55
Massachusetts (MA)	Hampshire	5A	50	Michigan (MI)	Kent	5A	50
Massachusetts (MA)	Middlesex	5A	50	Michigan (MI)	Keweenaw	7	59
Massachusetts (MA)	Nantucket	5A	50	Michigan (MI)	Lake	6A	55
Massachusetts (MA)	Norfolk	5A	50	Michigan (MI)	Lapeer	5A	50
Massachusetts (MA)	Plymouth	5A	50	Michigan (MI)	Leelanau	6A	55
Massachusetts (MA)	Suffolk	5A	50	Michigan (MI)	Lenawee	5A	50
Massachusetts (MA)	Worcester	5A	50	Michigan (MI)	Livingston	5A	50
Michigan (MI)	Alcona	6A	55	Michigan (MI)	Luce	6A	55
Michigan (MI)	Alger	6A	55	Michigan (MI)	Mackinac	6A	55
Michigan (MI)	Allegan	5A	50	Michigan (MI)	Macomb	5A	50
Michigan (MI)	Alpena	6A	55	Michigan (MI)	Manistee	6A	55
Michigan (MI)	Antrim	6A	55	Michigan (MI)	Marquette	7	59
Michigan (MI)	Arenac	6A	55	Michigan (MI)	Mason	6A	55
Michigan (MI)	Baraga	6A	55	Michigan (MI)	Mecosta	6A	55
Michigan (MI)	Barry	5A	50	Michigan (MI)	Menominee	6A	55
Michigan (MI)	Bay	5A	50	Michigan (MI)	Midland	5A	50
Michigan (MI)	Benzie	6A	55	Michigan (MI)	Missaukee	6A	55
Michigan (MI)	Berrien	5A	50	Michigan (MI)	Monroe	5A	50
Michigan (MI)	Branch	5A	50	Michigan (MI)	Montcalm	5A	50
Michigan (MI)	Calhoun	5A	50	Michigan (MI)	Montmorency	6A	55
Michigan (MI)	Cass	5A	50	Michigan (MI)	Muskegon	5A	50
Michigan (MI)	Charlevoix	6A	55	Michigan (MI)	Newaygo	6A	55
Michigan (MI)	Cheboygan	6A	55	Michigan (MI)	Oakland	5A	50
Michigan (MI)	Chippewa	6A	55	Michigan (MI)	Oceana	6A	55
Michigan (MI)	Clare	6A	55	Michigan (MI)	Ogemaw	6A	55
Michigan (MI)	Clinton	5A	50	Michigan (MI)	Ontonagon	6A	55
Michigan (MI)	Crawford	6A	55	Michigan (MI)	Osceola	6A	55
Michigan (MI)	Delta	6A	55	Michigan (MI)	Oscoda	6A	55
Michigan (MI)	Dickinson	6A	55	Michigan (MI)	Otsego	6A	55
Michigan (MI)	Eaton	5A	50	Michigan (MI)	Ottawa	5A	50
Michigan (MI)	Emmet	6A	55	Michigan (MI)	Presque Isle	6A	55
Michigan (MI)	Genesee	5A	50	Michigan (MI)	Roscommon	6A	55
Michigan (MI)	Gladwin	6A	55	Michigan (MI)	Saginaw	5A	50
Michigan (MI)	Gogebic	6A	55	Michigan (MI)	Sanilac	5A	50
Michigan (MI)	Grand Traverse	6A	55	Michigan (MI)	Schoolcraft	6A	55
Michigan (MI)	Gratiot	5A	50	Michigan (MI)	Shiawassee	5A	50
Michigan (MI)	Hillsdale	5A	50	Michigan (MI)	St. Clair	5A	50
Michigan (MI)	Houghton	6A	55	Michigan (MI)	St. Joseph	5A	50
Michigan (MI)	Huron	5A	50	Michigan (MI)	Tuscola	5A	50
Michigan (MI)	Ingham	5A	50	Michigan (MI)	Van Buren	5A	50
Michigan (MI)	Ionia	5A	50	Michigan (MI)	Washtenaw	5A	50
Michigan (MI)	Iosco	6A	55	Michigan (MI)	Wayne	5A	50
Michigan (MI)	Iron	6A	55	Michigan (MI)	Wexford	6A	55

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Minnesota (MN)	Aitkin	7	59	Minnesota (MN)	Mille Lacs	6A	55
Minnesota (MN)	Anoka	6A	55	Minnesota (MN)	Morrison	6A	55
Minnesota (MN)	Becker	6A	55	Minnesota (MN)	Mower	6A	55
Minnesota (MN)	Beltrami	7	59	Minnesota (MN)	Murray	6A	55
Minnesota (MN)	Benton	6A	55	Minnesota (MN)	Nicollet	6A	55
Minnesota (MN)	Big Stone	6A	55	Minnesota (MN)	Nobles	6A	55
Minnesota (MN)	Blue Earth	6A	55	Minnesota (MN)	Norman	7	59
Minnesota (MN)	Brown	6A	55	Minnesota (MN)	Olmsted	6A	55
Minnesota (MN)	Carlton	7	59	Minnesota (MN)	Otter Tail	6A	55
Minnesota (MN)	Carver	6A	55	Minnesota (MN)	Pennington	7	59
Minnesota (MN)	Cass	7	59	Minnesota (MN)	Pine	7	59
Minnesota (MN)	Chippewa	6A	55	Minnesota (MN)	Pipestone	6A	55
Minnesota (MN)	Chisago	6A	55	Minnesota (MN)	Polk	7	59
Minnesota (MN)	Clay	6A	55	Minnesota (MN)	Pope	6A	55
Minnesota (MN)	Clearwater	7	59	Minnesota (MN)	Ramsey	6A	55
Minnesota (MN)	Cook	7	59	Minnesota (MN)	Red Lake	7	59
Minnesota (MN)	Cottonwood	6A	55	Minnesota (MN)	Redwood	6A	55
Minnesota (MN)	Crow Wing	7	59	Minnesota (MN)	Renville	6A	55
Minnesota (MN)	Dakota	6A	55	Minnesota (MN)	Rice	6A	55
Minnesota (MN)	Dodge	6A	55	Minnesota (MN)	Rock	6A	55
Minnesota (MN)	Douglas	6A	55	Minnesota (MN)	Roseau	7	59
Minnesota (MN)	Faribault	6A	55	Minnesota (MN)	Scott	6A	55
Minnesota (MN)	Fillmore	5A	50	Minnesota (MN)	Sherburne	6A	55
Minnesota (MN)	Freeborn	6A	55	Minnesota (MN)	Sibley	6A	55
Minnesota (MN)	Goodhue	6A	55	Minnesota (MN)	St. Louis	7	59
Minnesota (MN)	Grant	6A	55	Minnesota (MN)	Stearns	6A	55
Minnesota (MN)	Hennepin	6A	55	Minnesota (MN)	Steele	6A	55
Minnesota (MN)	Houston	5A	50	Minnesota (MN)	Stevens	6A	55
Minnesota (MN)	Hubbard	7	59	Minnesota (MN)	Swift	6A	55
Minnesota (MN)	Isanti	6A	55	Minnesota (MN)	Todd	6A	55
Minnesota (MN)	Itasca	7	59	Minnesota (MN)	Traverse	6A	55
Minnesota (MN)	Jackson	6A	55	Minnesota (MN)	Wabasha	6A	55
Minnesota (MN)	Kanabec	6A	55	Minnesota (MN)	Wadena	7	59
Minnesota (MN)	Kandiyohi	6A	55	Minnesota (MN)	Waseca	6A	55
Minnesota (MN)	Kittson	7	59	Minnesota (MN)	Washington	6A	55
Minnesota (MN)	Koochiching	7	59	Minnesota (MN)	Watonwan	6A	55
Minnesota (MN)	Lac Qui Parle	6A	55	Minnesota (MN)	Wilkin	6A	55
Minnesota (MN)	Lake	7	59	Minnesota (MN)	Winona	5A	50
Minnesota (MN)	Lake of the Woods	7	59	Minnesota (MN)	Wright	6A	55
Minnesota (MN)	Le Sueur	6A	55	Minnesota (MN)	Yellow Medicine	6A	55
Minnesota (MN)	Lincoln	6A	55	Mississippi (MS)	Adams	3A	35
Minnesota (MN)	Lyon	6A	55	Mississippi (MS)	Alcorn	3A	35
Minnesota (MN)	Mahnomen	7	59	Mississippi (MS)	Amite	3A	35
Minnesota (MN)	Marshall	7	59	Mississippi (MS)	Attala	3A	35
Minnesota (MN)	Martin	6A	55	Mississippi (MS)	Benton	3A	35
Minnesota (MN)	McLeod	6A	55	Mississippi (MS)	Bolivar	3A	35
Minnesota (MN)	Meeker	6A	55	Mississippi (MS)	Calhoun	3A	35

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Mississippi (MS)	Carroll	3A	35	Mississippi (MS)	Pearl River	2A	29
Mississippi (MS)	Chickasaw	3A	35	Mississippi (MS)	Perry	3A	35
Mississippi (MS)	Choctaw	3A	35	Mississippi (MS)	Pike	3A	35
Mississippi (MS)	Claiborne	3A	35	Mississippi (MS)	Pontotoc	3A	35
Mississippi (MS)	Clarke	3A	35	Mississippi (MS)	Prentiss	3A	35
Mississippi (MS)	Clay	3A	35	Mississippi (MS)	Quitman	3A	35
Mississippi (MS)	Coahoma	3A	35	Mississippi (MS)	Rankin	3A	35
Mississippi (MS)	Copiah	3A	35	Mississippi (MS)	Scott	3A	35
Mississippi (MS)	Covington	3A	35	Mississippi (MS)	Sharkey	3A	35
Mississippi (MS)	DeSoto	3A	35	Mississippi (MS)	Simpson	3A	35
Mississippi (MS)	Forrest	3A	35	Mississippi (MS)	Smith	3A	35
Mississippi (MS)	Franklin	3A	35	Mississippi (MS)	Stone	2A	29
Mississippi (MS)	George	2A	29	Mississippi (MS)	Sunflower	3A	35
Mississippi (MS)	Greene	3A	35	Mississippi (MS)	Tallahatchie	3A	35
Mississippi (MS)	Grenada	3A	35	Mississippi (MS)	Tate	3A	35
Mississippi (MS)	Hancock	2A	29	Mississippi (MS)	Tippah	3A	35
Mississippi (MS)	Harrison	2A	29	Mississippi (MS)	Tishomingo	3A	35
Mississippi (MS)	Hinds	3A	35	Mississippi (MS)	Tunica	3A	35
Mississippi (MS)	Holmes	3A	35	Mississippi (MS)	Union	3A	35
Mississippi (MS)	Humphreys	3A	35	Mississippi (MS)	Walthall	3A	35
Mississippi (MS)	Issaquena	3A	35	Mississippi (MS)	Warren	3A	35
Mississippi (MS)	Itawamba	3A	35	Mississippi (MS)	Washington	3A	35
Mississippi (MS)	Jackson	2A	29	Mississippi (MS)	Wayne	3A	35
Mississippi (MS)	Jasper	3A	35	Mississippi (MS)	Webster	3A	35
Mississippi (MS)	Jefferson	3A	35	Mississippi (MS)	Wilkinson	3A	35
Mississippi (MS)	Jefferson Davis	3A	35	Mississippi (MS)	Winston	3A	35
Mississippi (MS)	Jones	3A	35	Mississippi (MS)	Yalobusha	3A	35
Mississippi (MS)	Kemper	3A	35	Mississippi (MS)	Yazoo	3A	35
Mississippi (MS)	Lafayette	3A	35	Missouri (MO)	Adair	5A	50
Mississippi (MS)	Lamar	3A	35	Missouri (MO)	Andrew	5A	50
Mississippi (MS)	Lauderdale	3A	35	Missouri (MO)	Atchison	5A	50
Mississippi (MS)	Lawrence	3A	35	Missouri (MO)	Audrain	4A	42
Mississippi (MS)	Leake	3A	35	Missouri (MO)	Barry	4A	42
Mississippi (MS)	Lee	3A	35	Missouri (MO)	Barton	4A	42
Mississippi (MS)	Leflore	3A	35	Missouri (MO)	Bates	4A	42
Mississippi (MS)	Lincoln	3A	35	Missouri (MO)	Benton	4A	42
Mississippi (MS)	Lowndes	3A	35	Missouri (MO)	Bollinger	4A	42
Mississippi (MS)	Madison	3A	35	Missouri (MO)	Boone	4A	42
Mississippi (MS)	Marion	3A	35	Missouri (MO)	Buchanan	4A	42
Mississippi (MS)	Marshall	3A	35	Missouri (MO)	Butler	4A	42
Mississippi (MS)	Monroe	3A	35	Missouri (MO)	Caldwell	4A	42
Mississippi (MS)	Montgomery	3A	35	Missouri (MO)	Callaway	4A	42
Mississippi (MS)	Neshoba	3A	35	Missouri (MO)	Camden	4A	42
Mississippi (MS)	Newton	3A	35	Missouri (MO)	Cape Girardeau	4A	42
Mississippi (MS)	Noxubee	3A	35	Missouri (MO)	Carroll	4A	42
Mississippi (MS)	Oktibbeha	3A	35	Missouri (MO)	Carter	4A	42
Mississippi (MS)	Panola	3A	35	Missouri (MO)	Cass	4A	42

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Missouri (MO)	Cedar	4A	42	Missouri (MO)	Mississippi	4A	42
Missouri (MO)	Chariton	4A	42	Missouri (MO)	Moniteau	4A	42
Missouri (MO)	Christian	4A	42	Missouri (MO)	Monroe	4A	42
Missouri (MO)	Clark	5A	50	Missouri (MO)	Montgomery	4A	42
Missouri (MO)	Clay	4A	42	Missouri (MO)	Morgan	4A	42
Missouri (MO)	Clinton	4A	42	Missouri (MO)	New Madrid	4A	42
Missouri (MO)	Cole	4A	42	Missouri (MO)	Newton	4A	42
Missouri (MO)	Cooper	4A	42	Missouri (MO)	Nodaway	5A	50
Missouri (MO)	Crawford	4A	42	Missouri (MO)	Oregon	4A	42
Missouri (MO)	Dade	4A	42	Missouri (MO)	Osage	4A	42
Missouri (MO)	Dallas	4A	42	Missouri (MO)	Ozark	4A	42
Missouri (MO)	Daviess	5A	50	Missouri (MO)	Pemiscot	3A	35
Missouri (MO)	DeKalb	5A	50	Missouri (MO)	Perry	4A	42
Missouri (MO)	Dent	4A	42	Missouri (MO)	Pettis	4A	42
Missouri (MO)	Douglas	4A	42	Missouri (MO)	Phelps	4A	42
Missouri (MO)	Dunklin	3A	35	Missouri (MO)	Pike	5A	50
Missouri (MO)	Franklin	4A	42	Missouri (MO)	Platte	4A	42
Missouri (MO)	Gasconade	4A	42	Missouri (MO)	Polk	4A	42
Missouri (MO)	Gentry	5A	50	Missouri (MO)	Pulaski	4A	42
Missouri (MO)	Greene	4A	42	Missouri (MO)	Putnam	5A	50
Missouri (MO)	Grundy	5A	50	Missouri (MO)	Ralls	5A	50
Missouri (MO)	Harrison	5A	50	Missouri (MO)	Randolph	4A	42
Missouri (MO)	Henry	4A	42	Missouri (MO)	Ray	4A	42
Missouri (MO)	Hickory	4A	42	Missouri (MO)	Reynolds	4A	42
Missouri (MO)	Holt	5A	50	Missouri (MO)	Ripley	4A	42
Missouri (MO)	Howard	4A	42	Missouri (MO)	Saline	4A	42
Missouri (MO)	Howell	4A	42	Missouri (MO)	Schuyler	5A	50
Missouri (MO)	Iron	4A	42	Missouri (MO)	Scotland	5A	50
Missouri (MO)	Jackson	4A	42	Missouri (MO)	Scott	4A	42
Missouri (MO)	Jasper	4A	42	Missouri (MO)	Shannon	4A	42
Missouri (MO)	Jefferson	4A	42	Missouri (MO)	Shelby	5A	50
Missouri (MO)	Johnson	4A	42	Missouri (MO)	St. Charles	4A	42
Missouri (MO)	Knox	5A	50	Missouri (MO)	St. Clair	4A	42
Missouri (MO)	Laclede	4A	42	Missouri (MO)	St. Francois	4A	42
Missouri (MO)	Lafayette	4A	42	Missouri (MO)	St. Louis	4A	42
Missouri (MO)	Lawrence	4A	42	Missouri (MO)	St. Louis	4A	42
Missouri (MO)	Lewis	5A	50	Missouri (MO)	Ste. Genevieve	4A	42
Missouri (MO)	Lincoln	4A	42	Missouri (MO)	Stoddard	4A	42
Missouri (MO)	Linn	5A	50	Missouri (MO)	Stone	4A	42
Missouri (MO)	Livingston	5A	50	Missouri (MO)	Sullivan	5A	50
Missouri (MO)	Macon	5A	50	Missouri (MO)	Taney	4A	42
Missouri (MO)	Madison	4A	42	Missouri (MO)	Texas	4A	42
Missouri (MO)	Maries	4A	42	Missouri (MO)	Vernon	4A	42
Missouri (MO)	Marion	5A	50	Missouri (MO)	Warren	4A	42
Missouri (MO)	McDonald	4A	42	Missouri (MO)	Washington	4A	42
Missouri (MO)	Mercer	5A	50	Missouri (MO)	Wayne	4A	42
Missouri (MO)	Miller	4A	42	Missouri (MO)	Webster	4A	42

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Missouri (MO)	Worth	5A	50	Montana (MT)	Sheridan	6B	55
Missouri (MO)	Wright	4A	42	Montana (MT)	Silver Bow	6B	55
Montana (MT)	Beaverhead	6B	55	Montana (MT)	Stillwater	6B	55
Montana (MT)	Big Horn	6B	55	Montana (MT)	Sweet Grass	6B	55
Montana (MT)	Blaine	6B	55	Montana (MT)	Teton	6B	55
Montana (MT)	Broadwater	6B	55	Montana (MT)	Toole	6B	55
Montana (MT)	Carbon	6B	55	Montana (MT)	Treasure	6B	55
Montana (MT)	Carter	6B	55	Montana (MT)	Valley	6B	55
Montana (MT)	Cascade	6B	55	Montana (MT)	Wheatland	6B	55
Montana (MT)	Chouteau	6B	55	Montana (MT)	Wibaux	6B	55
Montana (MT)	Custer	6B	55	Montana (MT)	Yellowstone	6B	55
Montana (MT)	Daniels	6B	55	Nebraska (NE)	Adams	5A	50
Montana (MT)	Dawson	6B	55	Nebraska (NE)	Antelope	5A	50
Montana (MT)	Deer Lodge	6B	55	Nebraska (NE)	Arthur	5A	50
Montana (MT)	Fallon	6B	55	Nebraska (NE)	Banner	5A	50
Montana (MT)	Fergus	6B	55	Nebraska (NE)	Blaine	5A	50
Montana (MT)	Flathead	6B	55	Nebraska (NE)	Boone	5A	50
Montana (MT)	Gallatin	6B	55	Nebraska (NE)	Box Butte	5A	50
Montana (MT)	Garfield	6B	55	Nebraska (NE)	Boyd	5A	50
Montana (MT)	Glacier	6B	55	Nebraska (NE)	Brown	5A	50
Montana (MT)	Golden Valley	6B	55	Nebraska (NE)	Buffalo	5A	50
Montana (MT)	Granite	6B	55	Nebraska (NE)	Burt	5A	50
Montana (MT)	Hill	6B	55	Nebraska (NE)	Butler	5A	50
Montana (MT)	Jefferson	6B	55	Nebraska (NE)	Cass	5A	50
Montana (MT)	Judith Basin	6B	55	Nebraska (NE)	Cedar	5A	50
Montana (MT)	Lake	6B	55	Nebraska (NE)	Chase	5A	50
Montana (MT)	Lewis and Clark	6B	55	Nebraska (NE)	Cherry	5A	50
Montana (MT)	Liberty	6B	55	Nebraska (NE)	Cheyenne	5A	50
Montana (MT)	Lincoln	6B	55	Nebraska (NE)	Clay	5A	50
Montana (MT)	Madison	6B	55	Nebraska (NE)	Colfax	5A	50
Montana (MT)	McCone	6B	55	Nebraska (NE)	Cuming	5A	50
Montana (MT)	Meagher	6B	55	Nebraska (NE)	Custer	5A	50
Montana (MT)	Mineral	6B	55	Nebraska (NE)	Dakota	5A	50
Montana (MT)	Missoula	6B	55	Nebraska (NE)	Dawes	5A	50
Montana (MT)	Musselshell	6B	55	Nebraska (NE)	Dawson	5A	50
Montana (MT)	Park	6B	55	Nebraska (NE)	Deuel	5A	50
Montana (MT)	Petroleum	6B	55	Nebraska (NE)	Dixon	5A	50
Montana (MT)	Phillips	6B	55	Nebraska (NE)	Dodge	5A	50
Montana (MT)	Pondera	6B	55	Nebraska (NE)	Douglas	5A	50
Montana (MT)	Powder River	6B	55	Nebraska (NE)	Dundy	5A	50
Montana (MT)	Powell	6B	55	Nebraska (NE)	Fillmore	5A	50
Montana (MT)	Prairie	6B	55	Nebraska (NE)	Franklin	5A	50
Montana (MT)	Ravalli	6B	55	Nebraska (NE)	Frontier	5A	50
Montana (MT)	Richland	6B	55	Nebraska (NE)	Furnas	5A	50
Montana (MT)	Roosevelt	6B	55	Nebraska (NE)	Gage	5A	50
Montana (MT)	Rosebud	6B	55	Nebraska (NE)	Garden	5A	50
Montana (MT)	Sanders	6B	55	Nebraska (NE)	Garfield	5A	50

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Nebraska (NE)	Gosper	5A	50	Nebraska (NE)	Stanton	5A	50
Nebraska (NE)	Grant	5A	50	Nebraska (NE)	Thayer	5A	50
Nebraska (NE)	Greeley	5A	50	Nebraska (NE)	Thomas	5A	50
Nebraska (NE)	Hall	5A	50	Nebraska (NE)	Thurston	5A	50
Nebraska (NE)	Hamilton	5A	50	Nebraska (NE)	Valley	5A	50
Nebraska (NE)	Harlan	5A	50	Nebraska (NE)	Washington	5A	50
Nebraska (NE)	Hayes	5A	50	Nebraska (NE)	Wayne	5A	50
Nebraska (NE)	Hitchcock	5A	50	Nebraska (NE)	Webster	5A	50
Nebraska (NE)	Holt	5A	50	Nebraska (NE)	Wheeler	5A	50
Nebraska (NE)	Hooker	5A	50	Nebraska (NE)	York	5A	50
Nebraska (NE)	Howard	5A	50	Nevada (NV)	Carson City	4B	43
Nebraska (NE)	Jefferson	5A	50	Nevada (NV)	Churchill	5B	50
Nebraska (NE)	Johnson	5A	50	Nevada (NV)	Clark	3B	36
Nebraska (NE)	Kearney	5A	50	Nevada (NV)	Douglas	4B	43
Nebraska (NE)	Keith	5A	50	Nevada (NV)	Elko	5B	50
Nebraska (NE)	Keya Paha	5A	50	Nevada (NV)	Esmeralda	4B	43
Nebraska (NE)	Kimball	5A	50	Nevada (NV)	Eureka	5B	50
Nebraska (NE)	Knox	5A	50	Nevada (NV)	Humboldt	5B	50
Nebraska (NE)	Lancaster	5A	50	Nevada (NV)	Lander	5B	50
Nebraska (NE)	Lincoln	5A	50	Nevada (NV)	Lincoln	4B	43
Nebraska (NE)	Logan	5A	50	Nevada (NV)	Lyon	4B	43
Nebraska (NE)	Loup	5A	50	Nevada (NV)	Mineral	4B	43
Nebraska (NE)	Madison	5A	50	Nevada (NV)	Nye	4B	43
Nebraska (NE)	McPherson	5A	50	Nevada (NV)	Pershing	5B	50
Nebraska (NE)	Merrick	5A	50	Nevada (NV)	Storey	5B	50
Nebraska (NE)	Morrill	5A	50	Nevada (NV)	Washoe	5B	50
Nebraska (NE)	Nance	5A	50	Nevada (NV)	White Pine	5B	50
Nebraska (NE)	Nemaha	5A	50	New Hampshire (NH)	Belknap	6A	55
Nebraska (NE)	Nuckolls	5A	50	New Hampshire (NH)	Carroll	6A	55
Nebraska (NE)	Otoe	5A	50	New Hampshire (NH)	Cheshire	6A	55
Nebraska (NE)	Pawnee	5A	50	New Hampshire (NH)	Coos	6A	55
Nebraska (NE)	Perkins	5A	50	New Hampshire (NH)	Grafton	6A	55
Nebraska (NE)	Phelps	5A	50	New Hampshire (NH)	Hillsborough	5A	50
Nebraska (NE)	Pierce	5A	50	New Hampshire (NH)	Merrimack	5A	50
Nebraska (NE)	Platte	5A	50	New Hampshire (NH)	Rockingham	5A	50
Nebraska (NE)	Polk	5A	50	New Hampshire (NH)	Strafford	5A	50
Nebraska (NE)	Red Willow	5A	50	New Hampshire (NH)	Sullivan	6A	55
Nebraska (NE)	Richardson	5A	50	New Jersey (NJ)	Atlantic	4A	42
Nebraska (NE)	Rock	5A	50	New Jersey (NJ)	Bergen	5A	50
Nebraska (NE)	Saline	5A	50	New Jersey (NJ)	Burlington	4A	42
Nebraska (NE)	Sarpy	5A	50	New Jersey (NJ)	Camden	4A	42
Nebraska (NE)	Saunders	5A	50	New Jersey (NJ)	Cape May	4A	42
Nebraska (NE)	Scotts Bluff	5A	50	New Jersey (NJ)	Cumberland	4A	42
Nebraska (NE)	Seward	5A	50	New Jersey (NJ)	Essex	4A	42
Nebraska (NE)	Sheridan	5A	50	New Jersey (NJ)	Gloucester	4A	42
Nebraska (NE)	Sherman	5A	50	New Jersey (NJ)	Hudson	4A	42
Nebraska (NE)	Sioux	5A	50	New Jersey (NJ)	Hunterdon	5A	50

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New Jersey (NJ)	Mercer	4A	42	New York (NY)	Broome	5A	50
New Jersey (NJ)	Middlesex	4A	42	New York (NY)	Cattaraugus	5A	50
New Jersey (NJ)	Monmouth	4A	42	New York (NY)	Cayuga	5A	50
New Jersey (NJ)	Morris	5A	50	New York (NY)	Chautauqua	5A	50
New Jersey (NJ)	Ocean	4A	42	New York (NY)	Chemung	5A	50
New Jersey (NJ)	Passaic	5A	50	New York (NY)	Chenango	6A	55
New Jersey (NJ)	Salem	4A	42	New York (NY)	Clinton	6A	55
New Jersey (NJ)	Somerset	5A	50	New York (NY)	Columbia	5A	50
New Jersey (NJ)	Sussex	5A	50	New York (NY)	Cortland	5A	50
New Jersey (NJ)	Union	4A	42	New York (NY)	Delaware	6A	55
New Jersey (NJ)	Warren	5A	50	New York (NY)	Dutchess	5A	50
New Mexico (NM)	Bernalillo	4B	43	New York (NY)	Erie	5A	50
New Mexico (NM)	Catron	4B	43	New York (NY)	Essex	6A	55
New Mexico (NM)	Chaves	3B	36	New York (NY)	Franklin	6A	55
New Mexico (NM)	Cibola	5B	50	New York (NY)	Fulton	6A	55
New Mexico (NM)	Colfax	5B	50	New York (NY)	Genesee	5A	50
New Mexico (NM)	Curry	4B	43	New York (NY)	Greene	5A	50
New Mexico (NM)	DeBaca	4B	43	New York (NY)	Hamilton	6A	55
New Mexico (NM)	Dona Ana	3B	36	New York (NY)	Herkimer	6A	55
New Mexico (NM)	Eddy	3B	36	New York (NY)	Jefferson	6A	55
New Mexico (NM)	Grant	4B	43	New York (NY)	Kings	4A	42
New Mexico (NM)	Guadalupe	4B	43	New York (NY)	Lewis	6A	55
New Mexico (NM)	Harding	5B	50	New York (NY)	Livingston	5A	50
New Mexico (NM)	Hidalgo	3B	36	New York (NY)	Madison	6A	55
New Mexico (NM)	Lea	3B	36	New York (NY)	Monroe	5A	50
New Mexico (NM)	Lincoln	4B	43	New York (NY)	Montgomery	6A	55
New Mexico (NM)	Los Alamos	5B	50	New York (NY)	Nassau	4A	42
New Mexico (NM)	Luna	3B	36	New York (NY)	New York	4A	42
New Mexico (NM)	McKinley	5B	50	New York (NY)	Niagara	5A	50
New Mexico (NM)	Mora	5B	50	New York (NY)	Oneida	6A	55
New Mexico (NM)	Otero	3B	36	New York (NY)	Onondaga	5A	50
New Mexico (NM)	Quay	4B	43	New York (NY)	Ontario	5A	50
New Mexico (NM)	Rio Arriba	5B	50	New York (NY)	Orange	5A	50
New Mexico (NM)	Roosevelt	4B	43	New York (NY)	Orleans	5A	50
New Mexico (NM)	San Juan	5B	50	New York (NY)	Oswego	5A	50
New Mexico (NM)	San Miguel	5B	50	New York (NY)	Otsego	6A	55
New Mexico (NM)	Sandoval	5B	50	New York (NY)	Putnam	5A	50
New Mexico (NM)	Santa Fe	5B	50	New York (NY)	Queens	4A	42
New Mexico (NM)	Sierra	3B	36	New York (NY)	Rensselaer	5A	50
New Mexico (NM)	Socorro	4B	43	New York (NY)	Richmond	4A	42
New Mexico (NM)	Taos	5B	50	New York (NY)	Rockland	5A	50
New Mexico (NM)	Torrance	5B	50	New York (NY)	Saratoga	5A	50
New Mexico (NM)	Union	4B	43	New York (NY)	Schenectady	5A	50
New Mexico (NM)	Valencia	4B	43	New York (NY)	Schoharie	5A	50
New York (NY)	Albany	5A	50	New York (NY)	Schuyler	5A	50
New York (NY)	Allegany	5A	50	New York (NY)	Seneca	5A	50
New York (NY)	Bronx	4A	42	New York (NY)	St. Lawrence	6A	55

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New York (NY)	Steuben	5A	50	North Carolina (NC)	Gaston	3A	35
New York (NY)	Suffolk	4A	42	North Carolina (NC)	Gates	3A	35
New York (NY)	Sullivan	6A	55	North Carolina (NC)	Graham	4A	42
New York (NY)	Tioga	5A	50	North Carolina (NC)	Granville	3A	35
New York (NY)	Tompkins	5A	50	North Carolina (NC)	Greene	3A	35
New York (NY)	Ulster	6A	55	North Carolina (NC)	Guilford	3A	35
New York (NY)	Warren	6A	55	North Carolina (NC)	Halifax	3A	35
New York (NY)	Washington	5A	50	North Carolina (NC)	Harnett	3A	35
New York (NY)	Wayne	5A	50	North Carolina (NC)	Haywood	4A	42
New York (NY)	Westchester	5A	50	North Carolina (NC)	Henderson	4A	42
New York (NY)	Wyoming	5A	50	North Carolina (NC)	Hertford	3A	35
New York (NY)	Yates	5A	50	North Carolina (NC)	Hoke	3A	35
North Carolina (NC)	Alamance	3A	35	North Carolina (NC)	Hyde	3A	35
North Carolina (NC)	Alexander	3A	35	North Carolina (NC)	Iredell	3A	35
North Carolina (NC)	Alleghany	4A	42	North Carolina (NC)	Jackson	4A	42
North Carolina (NC)	Anson	3A	35	North Carolina (NC)	Johnston	3A	35
North Carolina (NC)	Ashe	4A	42	North Carolina (NC)	Jones	3A	35
North Carolina (NC)	Avery	4A	42	North Carolina (NC)	Lee	3A	35
North Carolina (NC)	Beaufort	3A	35	North Carolina (NC)	Lenoir	3A	35
North Carolina (NC)	Bertie	3A	35	North Carolina (NC)	Lincoln	3A	35
North Carolina (NC)	Bladen	3A	35	North Carolina (NC)	Macon	4A	42
North Carolina (NC)	Brunswick	3A	35	North Carolina (NC)	Madison	4A	42
North Carolina (NC)	Buncombe	4A	42	North Carolina (NC)	Martin	3A	35
North Carolina (NC)	Burke	4A	42	North Carolina (NC)	McDowell	4A	42
North Carolina (NC)	Cabarrus	3A	35	North Carolina (NC)	Mecklenburg	3A	35
North Carolina (NC)	Caldwell	4A	42	North Carolina (NC)	Mitchell	4A	42
North Carolina (NC)	Camden	3A	35	North Carolina (NC)	Montgomery	3A	35
North Carolina (NC)	Carteret	3A	35	North Carolina (NC)	Moore	3A	35
North Carolina (NC)	Caswell	3A	35	North Carolina (NC)	Nash	3A	35
North Carolina (NC)	Catawba	3A	35	North Carolina (NC)	New Hanover	3A	35
North Carolina (NC)	Chatham	3A	35	North Carolina (NC)	Northampton	3A	35
North Carolina (NC)	Cherokee	3A	35	North Carolina (NC)	Onslow	3A	35
North Carolina (NC)	Chowan	3A	35	North Carolina (NC)	Orange	3A	35
North Carolina (NC)	Clay	3A	35	North Carolina (NC)	Pamlico	3A	35
North Carolina (NC)	Cleveland	3A	35	North Carolina (NC)	Pasquotank	3A	35
North Carolina (NC)	Columbus	3A	35	North Carolina (NC)	Pender	3A	35
North Carolina (NC)	Craven	3A	35	North Carolina (NC)	Perquimans	3A	35
North Carolina (NC)	Cumberland	3A	35	North Carolina (NC)	Person	3A	35
North Carolina (NC)	Currituck	3A	35	North Carolina (NC)	Pitt	3A	35
North Carolina (NC)	Dare	3A	35	North Carolina (NC)	Polk	3A	35
North Carolina (NC)	Davidson	3A	35	North Carolina (NC)	Randolph	3A	35
North Carolina (NC)	Davie	3A	35	North Carolina (NC)	Richmond	3A	35
North Carolina (NC)	Duplin	3A	35	North Carolina (NC)	Robeson	3A	35
North Carolina (NC)	Durham	3A	35	North Carolina (NC)	Rockingham	3A	35
North Carolina (NC)	Edgecombe	3A	35	North Carolina (NC)	Rowan	3A	35
North Carolina (NC)	Forsyth	3A	35	North Carolina (NC)	Rutherford	3A	35
North Carolina (NC)	Franklin	3A	35	North Carolina (NC)	Sampson	3A	35

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North Carolina (NC)	Scotland	3A	35	North Dakota (ND)	Morton	6A	55
North Carolina (NC)	Stanly	3A	35	North Dakota (ND)	Mountrail	6A	55
North Carolina (NC)	Stokes	4A	42	North Dakota (ND)	Nelson	7	59
North Carolina (NC)	Surry	4A	42	North Dakota (ND)	Oliver	6A	55
North Carolina (NC)	Swain	4A	42	North Dakota (ND)	Pembina	7	59
North Carolina (NC)	Transylvania	4A	42	North Dakota (ND)	Pierce	7	59
North Carolina (NC)	Tyrrell	3A	35	North Dakota (ND)	Ramsey	7	59
North Carolina (NC)	Union	3A	35	North Dakota (ND)	Ransom	6A	55
North Carolina (NC)	Vance	3A	35	North Dakota (ND)	Renville	7	59
North Carolina (NC)	Wake	3A	35	North Dakota (ND)	Richland	6A	55
North Carolina (NC)	Warren	3A	35	North Dakota (ND)	Rolette	7	59
North Carolina (NC)	Washington	3A	35	North Dakota (ND)	Sargent	6A	55
North Carolina (NC)	Watauga	4A	42	North Dakota (ND)	Sheridan	6A	55
North Carolina (NC)	Wayne	3A	35	North Dakota (ND)	Sioux	6A	55
North Carolina (NC)	Wilkes	4A	42	North Dakota (ND)	Slope	6A	55
North Carolina (NC)	Wilson	3A	35	North Dakota (ND)	Stark	6A	55
North Carolina (NC)	Yadkin	4A	42	North Dakota (ND)	Steele	6A	55
North Carolina (NC)	Yancey	4A	42	North Dakota (ND)	Stutsman	6A	55
North Dakota (ND)	Adams	6A	55	North Dakota (ND)	Towner	7	59
North Dakota (ND)	Barnes	6A	55	North Dakota (ND)	Traill	6A	55
North Dakota (ND)	Benson	7	59	North Dakota (ND)	Walsh	7	59
North Dakota (ND)	Billings	6A	55	North Dakota (ND)	Ward	7	59
North Dakota (ND)	Bottineau	7	59	North Dakota (ND)	Wells	6A	55
North Dakota (ND)	Bowman	6A	55	North Dakota (ND)	Williams	6A	55
North Dakota (ND)	Burke	7	59	Ohio (OH)	Adams	4A	42
North Dakota (ND)	Burleigh	6A	55	Ohio (OH)	Allen	5A	50
North Dakota (ND)	Cass	6A	55	Ohio (OH)	Ashland	5A	50
North Dakota (ND)	Cavalier	7	59	Ohio (OH)	Ashtabula	5A	50
North Dakota (ND)	Dickey	6A	55	Ohio (OH)	Athens	4A	42
North Dakota (ND)	Divide	7	59	Ohio (OH)	Auglaize	5A	50
North Dakota (ND)	Dunn	6A	55	Ohio (OH)	Belmont	5A	50
North Dakota (ND)	Eddy	6A	55	Ohio (OH)	Brown	4A	42
North Dakota (ND)	Emmons	6A	55	Ohio (OH)	Butler	4A	42
North Dakota (ND)	Foster	6A	55	Ohio (OH)	Carroll	5A	50
North Dakota (ND)	Golden Valley	6A	55	Ohio (OH)	Champaign	5A	50
North Dakota (ND)	Grand Forks	7	59	Ohio (OH)	Clark	5A	50
North Dakota (ND)	Grant	6A	55	Ohio (OH)	Clermont	4A	42
North Dakota (ND)	Griggs	6A	55	Ohio (OH)	Clinton	4A	42
North Dakota (ND)	Hettinger	6A	55	Ohio (OH)	Columbiana	5A	50
North Dakota (ND)	Kidder	6A	55	Ohio (OH)	Coshocton	5A	50
North Dakota (ND)	LaMoure	6A	55	Ohio (OH)	Crawford	5A	50
North Dakota (ND)	Logan	6A	55	Ohio (OH)	Cuyahoga	5A	50
North Dakota (ND)	McHenry	7	59	Ohio (OH)	Darke	5A	50
North Dakota (ND)	McIntosh	6A	55	Ohio (OH)	Defiance	5A	50
North Dakota (ND)	McKenzie	6A	55	Ohio (OH)	Delaware	5A	50
North Dakota (ND)	McLean	6A	55	Ohio (OH)	Erie	5A	50
North Dakota (ND)	Mercer	6A	55	Ohio (OH)	Fairfield	5A	50

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Ohio (OH)	Fayette	4A	42	Ohio (OH)	Ross	4A	42
Ohio (OH)	Franklin	4A	42	Ohio (OH)	Sandusky	5A	50
Ohio (OH)	Fulton	5A	50	Ohio (OH)	Scioto	4A	42
Ohio (OH)	Gallia	4A	42	Ohio (OH)	Seneca	5A	50
Ohio (OH)	Geauga	5A	50	Ohio (OH)	Shelby	5A	50
Ohio (OH)	Greene	4A	42	Ohio (OH)	Stark	5A	50
Ohio (OH)	Guernsey	5A	50	Ohio (OH)	Summit	5A	50
Ohio (OH)	Hamilton	4A	42	Ohio (OH)	Trumbull	5A	50
Ohio (OH)	Hancock	5A	50	Ohio (OH)	Tuscarawas	5A	50
Ohio (OH)	Hardin	5A	50	Ohio (OH)	Union	5A	50
Ohio (OH)	Harrison	5A	50	Ohio (OH)	Van Wert	5A	50
Ohio (OH)	Henry	5A	50	Ohio (OH)	Vinton	4A	42
Ohio (OH)	Highland	4A	42	Ohio (OH)	Warren	4A	42
Ohio (OH)	Hocking	4A	42	Ohio (OH)	Washington	4A	42
Ohio (OH)	Holmes	5A	50	Ohio (OH)	Wayne	5A	50
Ohio (OH)	Huron	5A	50	Ohio (OH)	Williams	5A	50
Ohio (OH)	Jackson	4A	42	Ohio (OH)	Wood	5A	50
Ohio (OH)	Jefferson	5A	50	Ohio (OH)	Wyandot	5A	50
Ohio (OH)	Knox	5A	50	Oklahoma (OK)	Adair	4A	42
Ohio (OH)	Lake	5A	50	Oklahoma (OK)	Alfalfa	3A	35
Ohio (OH)	Lawrence	4A	42	Oklahoma (OK)	Atoka	3A	35
Ohio (OH)	Licking	5A	50	Oklahoma (OK)	Beaver	4B	43
Ohio (OH)	Logan	5A	50	Oklahoma (OK)	Beckham	3A	35
Ohio (OH)	Lorain	5A	50	Oklahoma (OK)	Blaine	3A	35
Ohio (OH)	Lucas	5A	50	Oklahoma (OK)	Bryan	3A	35
Ohio (OH)	Madison	4A	42	Oklahoma (OK)	Caddo	3A	35
Ohio (OH)	Mahoning	5A	50	Oklahoma (OK)	Canadian	3A	35
Ohio (OH)	Marion	5A	50	Oklahoma (OK)	Carter	3A	35
Ohio (OH)	Medina	5A	50	Oklahoma (OK)	Cherokee	3A	35
Ohio (OH)	Meigs	4A	42	Oklahoma (OK)	Choctaw	3A	35
Ohio (OH)	Mercer	5A	50	Oklahoma (OK)	Cimarron	4B	43
Ohio (OH)	Miami	5A	50	Oklahoma (OK)	Cleveland	3A	35
Ohio (OH)	Monroe	5A	50	Oklahoma (OK)	Coal	3A	35
Ohio (OH)	Montgomery	5A	50	Oklahoma (OK)	Comanche	3A	35
Ohio (OH)	Morgan	5A	50	Oklahoma (OK)	Cotton	3A	35
Ohio (OH)	Morrow	5A	50	Oklahoma (OK)	Craig	4A	42
Ohio (OH)	Muskingum	5A	50	Oklahoma (OK)	Creek	3A	35
Ohio (OH)	Noble	5A	50	Oklahoma (OK)	Custer	3A	35
Ohio (OH)	Ottawa	5A	50	Oklahoma (OK)	Delaware	4A	42
Ohio (OH)	Paulding	5A	50	Oklahoma (OK)	Dewey	3A	35
Ohio (OH)	Perry	5A	50	Oklahoma (OK)	Ellis	4A	42
Ohio (OH)	Pickaway	4A	42	Oklahoma (OK)	Garfield	4A	42
Ohio (OH)	Pike	4A	42	Oklahoma (OK)	Garvin	3A	35
Ohio (OH)	Portage	5A	50	Oklahoma (OK)	Grady	3A	35
Ohio (OH)	Preble	5A	50	Oklahoma (OK)	Grant	4A	42
Ohio (OH)	Putnam	5A	50	Oklahoma (OK)	Greer	3A	35
Ohio (OH)	Richland	5A	50	Oklahoma (OK)	Harmon	3A	35

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Oklahoma (OK)	Harper	4A	42	Oklahoma (OK)	Woodward	4A	42
Oklahoma (OK)	Haskell	3A	35	Oregon (OR)	Baker	5B	50
Oklahoma (OK)	Hughes	3A	35	Oregon (OR)	Benton	4C	44
Oklahoma (OK)	Jackson	3A	35	Oregon (OR)	Clackamas	4C	44
Oklahoma (OK)	Jefferson	3A	35	Oregon (OR)	Clatsop	4C	44
Oklahoma (OK)	Johnston	3A	35	Oregon (OR)	Columbia	4C	44
Oklahoma (OK)	Kay	4A	42	Oregon (OR)	Coos	4C	44
Oklahoma (OK)	Kingfisher	3A	35	Oregon (OR)	Crook	5B	50
Oklahoma (OK)	Kiowa	3A	35	Oregon (OR)	Curry	4C	44
Oklahoma (OK)	Latimer	3A	35	Oregon (OR)	Deschutes	5B	50
Oklahoma (OK)	Le Flore	3A	35	Oregon (OR)	Douglas	4C	44
Oklahoma (OK)	Lincoln	3A	35	Oregon (OR)	Gilliam	5B	50
Oklahoma (OK)	Logan	3A	35	Oregon (OR)	Grant	5B	50
Oklahoma (OK)	Love	3A	35	Oregon (OR)	Harney	5B	50
Oklahoma (OK)	Major	4A	42	Oregon (OR)	Hood River	5B	50
Oklahoma (OK)	Marshall	3A	35	Oregon (OR)	Jackson	4C	44
Oklahoma (OK)	Mayes	3A	35	Oregon (OR)	Jefferson	5B	50
Oklahoma (OK)	McClain	3A	35	Oregon (OR)	Josephine	4C	44
Oklahoma (OK)	McCurtain	3A	35	Oregon (OR)	Klamath	5B	50
Oklahoma (OK)	McIntosh	3A	35	Oregon (OR)	Lake	5B	50
Oklahoma (OK)	Murray	3A	35	Oregon (OR)	Lane	4C	44
Oklahoma (OK)	Muskogee	3A	35	Oregon (OR)	Lincoln	4C	44
Oklahoma (OK)	Noble	3A	35	Oregon (OR)	Linn	4C	44
Oklahoma (OK)	Nowata	4A	42	Oregon (OR)	Malheur	5B	50
Oklahoma (OK)	Okfuskee	3A	35	Oregon (OR)	Marion	4C	44
Oklahoma (OK)	Oklahoma	3A	35	Oregon (OR)	Morrow	5B	50
Oklahoma (OK)	Okmulgee	3A	35	Oregon (OR)	Multnomah	4C	44
Oklahoma (OK)	Osage	4A	42	Oregon (OR)	Polk	4C	44
Oklahoma (OK)	Ottawa	4A	42	Oregon (OR)	Sherman	5B	50
Oklahoma (OK)	Pawnee	3A	35	Oregon (OR)	Tillamook	4C	44
Oklahoma (OK)	Payne	3A	35	Oregon (OR)	Umatilla	5B	50
Oklahoma (OK)	Pittsburg	3A	35	Oregon (OR)	Union	5B	50
Oklahoma (OK)	Pontotoc	3A	35	Oregon (OR)	Wallowa	5B	50
Oklahoma (OK)	Pottawatomie	3A	35	Oregon (OR)	Wasco	5B	50
Oklahoma (OK)	Pushmataha	3A	35	Oregon (OR)	Washington	4C	44
Oklahoma (OK)	Roger Mills	3A	35	Oregon (OR)	Wheeler	5B	50
Oklahoma (OK)	Rogers	3A	35	Oregon (OR)	Yamhill	4C	44
Oklahoma (OK)	Seminole	3A	35	Pennsylvania (PA)	Adams	4A	42
Oklahoma (OK)	Sequoyah	3A	35	Pennsylvania (PA)	Allegheny	5A	50
Oklahoma (OK)	Stephens	3A	35	Pennsylvania (PA)	Armstrong	5A	50
Oklahoma (OK)	Texas	4B	43	Pennsylvania (PA)	Beaver	5A	50
Oklahoma (OK)	Tillman	3A	35	Pennsylvania (PA)	Bedford	5A	50
Oklahoma (OK)	Tulsa	3A	35	Pennsylvania (PA)	Berks	4A	42
Oklahoma (OK)	Wagoner	3A	35	Pennsylvania (PA)	Blair	5A	50
Oklahoma (OK)	Washington	4A	42	Pennsylvania (PA)	Bradford	5A	50
Oklahoma (OK)	Washita	3A	35	Pennsylvania (PA)	Bucks	4A	42
Oklahoma (OK)	Woods	4A	42	Pennsylvania (PA)	Butler	5A	50

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Pennsylvania (PA)	Cambria	5A	50	Pennsylvania (PA)	Susquehanna	5A	50
Pennsylvania (PA)	Cameron	5A	50	Pennsylvania (PA)	Tioga	5A	50
Pennsylvania (PA)	Carbon	5A	50	Pennsylvania (PA)	Union	5A	50
Pennsylvania (PA)	Centre	5A	50	Pennsylvania (PA)	Venango	5A	50
Pennsylvania (PA)	Chester	4A	42	Pennsylvania (PA)	Warren	5A	50
Pennsylvania (PA)	Clarion	5A	50	Pennsylvania (PA)	Washington	5A	50
Pennsylvania (PA)	Clearfield	5A	50	Pennsylvania (PA)	Wayne	5A	50
Pennsylvania (PA)	Clinton	5A	50	Pennsylvania (PA)	Westmoreland	5A	50
Pennsylvania (PA)	Columbia	5A	50	Pennsylvania (PA)	Wyoming	5A	50
Pennsylvania (PA)	Crawford	5A	50	Pennsylvania (PA)	York	4A	42
Pennsylvania (PA)	Cumberland	4A	42	Rhode Island (RI)	Bristol	5A	50
Pennsylvania (PA)	Dauphin	4A	42	Rhode Island (RI)	Kent	5A	50
Pennsylvania (PA)	Delaware	4A	42	Rhode Island (RI)	Newport	5A	50
Pennsylvania (PA)	Elk	5A	50	Rhode Island (RI)	Providence	5A	50
Pennsylvania (PA)	Erie	5A	50	Rhode Island (RI)	Washington	5A	50
Pennsylvania (PA)	Fayette	5A	50	South Carolina (SC)	Abbeville	3A	35
Pennsylvania (PA)	Forest	5A	50	South Carolina (SC)	Aiken	3A	35
Pennsylvania (PA)	Franklin	4A	42	South Carolina (SC)	Allendale	3A	35
Pennsylvania (PA)	Fulton	5A	50	South Carolina (SC)	Anderson	3A	35
Pennsylvania (PA)	Greene	5A	50	South Carolina (SC)	Bamberg	3A	35
Pennsylvania (PA)	Huntingdon	5A	50	South Carolina (SC)	Barnwell	3A	35
Pennsylvania (PA)	Indiana	5A	50	South Carolina (SC)	Beaufort	2A	29
Pennsylvania (PA)	Jefferson	5A	50	South Carolina (SC)	Berkeley	3A	35
Pennsylvania (PA)	Juniata	5A	50	South Carolina (SC)	Calhoun	3A	35
Pennsylvania (PA)	Lackawanna	5A	50	South Carolina (SC)	Charleston	3A	35
Pennsylvania (PA)	Lancaster	4A	42	South Carolina (SC)	Cherokee	3A	35
Pennsylvania (PA)	Lawrence	5A	50	South Carolina (SC)	Chester	3A	35
Pennsylvania (PA)	Lebanon	4A	42	South Carolina (SC)	Chesterfield	3A	35
Pennsylvania (PA)	Lehigh	5A	50	South Carolina (SC)	Clarendon	3A	35
Pennsylvania (PA)	Luzerne	5A	50	South Carolina (SC)	Colleton	3A	35
Pennsylvania (PA)	Lycoming	5A	50	South Carolina (SC)	Darlington	3A	35
Pennsylvania (PA)	McKean	5A	50	South Carolina (SC)	Dillon	3A	35
Pennsylvania (PA)	Mercer	5A	50	South Carolina (SC)	Dorchester	3A	35
Pennsylvania (PA)	Mifflin	5A	50	South Carolina (SC)	Edgefield	3A	35
Pennsylvania (PA)	Monroe	5A	50	South Carolina (SC)	Fairfield	3A	35
Pennsylvania (PA)	Montgomery	4A	42	South Carolina (SC)	Florence	3A	35
Pennsylvania (PA)	Montour	5A	50	South Carolina (SC)	Georgetown	3A	35
Pennsylvania (PA)	Northampton	5A	50	South Carolina (SC)	Greenville	3A	35
Pennsylvania (PA)	Northumberland	5A	50	South Carolina (SC)	Greenwood	3A	35
Pennsylvania (PA)	Perry	4A	42	South Carolina (SC)	Hampton	3A	35
Pennsylvania (PA)	Philadelphia	4A	42	South Carolina (SC)	Horry	3A	35
Pennsylvania (PA)	Pike	5A	50	South Carolina (SC)	Jasper	2A	29
Pennsylvania (PA)	Potter	5A	50	South Carolina (SC)	Kershaw	3A	35
Pennsylvania (PA)	Schuylkill	5A	50	South Carolina (SC)	Lancaster	3A	35
Pennsylvania (PA)	Snyder	5A	50	South Carolina (SC)	Laurens	3A	35
Pennsylvania (PA)	Somerset	5A	50	South Carolina (SC)	Lee	3A	35
Pennsylvania (PA)	Sullivan	5A	50	South Carolina (SC)	Lexington	3A	35

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South Carolina (SC)	Marion	3A	35	South Dakota (SD)	Hyde	6A	55
South Carolina (SC)	Marlboro	3A	35	South Dakota (SD)	Jackson	5A	50
South Carolina (SC)	McCormick	3A	35	South Dakota (SD)	Jerauld	6A	55
South Carolina (SC)	Newberry	3A	35	South Dakota (SD)	Jones	5A	50
South Carolina (SC)	Oconee	3A	35	South Dakota (SD)	Kingsbury	6A	55
South Carolina (SC)	Orangeburg	3A	35	South Dakota (SD)	Lake	6A	55
South Carolina (SC)	Pickens	3A	35	South Dakota (SD)	Lawrence	6A	55
South Carolina (SC)	Richland	3A	35	South Dakota (SD)	Lincoln	6A	55
South Carolina (SC)	Saluda	3A	35	South Dakota (SD)	Lyman	5A	50
South Carolina (SC)	Spartanburg	3A	35	South Dakota (SD)	Marshall	6A	55
South Carolina (SC)	Sumter	3A	35	South Dakota (SD)	McCook	6A	55
South Carolina (SC)	Union	3A	35	South Dakota (SD)	McPherson	6A	55
South Carolina (SC)	Williamsburg	3A	35	South Dakota (SD)	Meade	6A	55
South Carolina (SC)	York	3A	35	South Dakota (SD)	Mellette	5A	50
South Dakota (SD)	Aurora	6A	55	South Dakota (SD)	Miner	6A	55
South Dakota (SD)	Beadle	6A	55	South Dakota (SD)	Minnehaha	6A	55
South Dakota (SD)	Bennett	5A	50	South Dakota (SD)	Moody	6A	55
South Dakota (SD)	Bon Homme	5A	50	South Dakota (SD)	Pennington	6A	55
South Dakota (SD)	Brookings	6A	55	South Dakota (SD)	Perkins	6A	55
South Dakota (SD)	Brown	6A	55	South Dakota (SD)	Potter	6A	55
South Dakota (SD)	Brule	5A	50	South Dakota (SD)	Roberts	6A	55
South Dakota (SD)	Buffalo	6A	55	South Dakota (SD)	Sanborn	6A	55
South Dakota (SD)	Butte	6A	55	South Dakota (SD)	Shannon	6A	55
South Dakota (SD)	Campbell	6A	55	South Dakota (SD)	Spink	6A	55
South Dakota (SD)	Charles Mix	5A	50	South Dakota (SD)	Stanley	5A	50
South Dakota (SD)	Clark	6A	55	South Dakota (SD)	Sully	6A	55
South Dakota (SD)	Clay	5A	50	South Dakota (SD)	Todd	5A	50
South Dakota (SD)	Codington	6A	55	South Dakota (SD)	Tripp	5A	50
South Dakota (SD)	Corson	6A	55	South Dakota (SD)	Turner	6A	55
South Dakota (SD)	Custer	6A	55	South Dakota (SD)	Union	5A	50
South Dakota (SD)	Davison	6A	55	South Dakota (SD)	Walworth	6A	55
South Dakota (SD)	Day	6A	55	South Dakota (SD)	Yankton	5A	50
South Dakota (SD)	Deuel	6A	55	South Dakota (SD)	Ziebach	6A	55
South Dakota (SD)	Dewey	6A	55	Tennessee (TN)	Anderson	4A	42
South Dakota (SD)	Douglas	5A	50	Tennessee (TN)	Bedford	3A	35
South Dakota (SD)	Edmunds	6A	55	Tennessee (TN)	Benton	4A	42
South Dakota (SD)	Fall River	6A	55	Tennessee (TN)	Bledsoe	4A	42
South Dakota (SD)	Faulk	6A	55	Tennessee (TN)	Blount	4A	42
South Dakota (SD)	Grant	6A	55	Tennessee (TN)	Bradley	4A	42
South Dakota (SD)	Gregory	5A	50	Tennessee (TN)	Campbell	4A	42
South Dakota (SD)	Haakon	5A	50	Tennessee (TN)	Cannon	4A	42
South Dakota (SD)	Hamlin	6A	55	Tennessee (TN)	Carroll	4A	42
South Dakota (SD)	Hand	6A	55	Tennessee (TN)	Carter	4A	42
South Dakota (SD)	Hanson	6A	55	Tennessee (TN)	Cheatham	4A	42
South Dakota (SD)	Harding	6A	55	Tennessee (TN)	Chester	3A	35
South Dakota (SD)	Hughes	6A	55	Tennessee (TN)	Claiborne	4A	42
South Dakota (SD)	Hutchinson	5A	50	Tennessee (TN)	Clay	4A	42

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Tennessee (TN)	Coffee	3A	35	Tennessee (TN)	Montgomery	4A	42
Tennessee (TN)	Crockett	3A	35	Tennessee (TN)	Moore	3A	35
Tennessee (TN)	Cumberland	4A	42	Tennessee (TN)	Morgan	4A	42
Tennessee (TN)	Davidson	3A	35	Tennessee (TN)	Obion	4A	42
Tennessee (TN)	Decatur	3A	35	Tennessee (TN)	Overton	4A	42
Tennessee (TN)	DeKalb	4A	42	Tennessee (TN)	Perry	3A	35
Tennessee (TN)	Dickson	4A	42	Tennessee (TN)	Pickett	4A	42
Tennessee (TN)	Dyer	3A	35	Tennessee (TN)	Polk	4A	42
Tennessee (TN)	Fayette	3A	35	Tennessee (TN)	Putnam	4A	42
Tennessee (TN)	Fentress	4A	42	Tennessee (TN)	Rhea	4A	42
Tennessee (TN)	Franklin	3A	35	Tennessee (TN)	Roane	4A	42
Tennessee (TN)	Gibson	3A	35	Tennessee (TN)	Robertson	4A	42
Tennessee (TN)	Giles	3A	35	Tennessee (TN)	Rutherford	3A	35
Tennessee (TN)	Grainger	4A	42	Tennessee (TN)	Scott	4A	42
Tennessee (TN)	Greene	4A	42	Tennessee (TN)	Sequatchie	4A	42
Tennessee (TN)	Grundy	3A	35	Tennessee (TN)	Sevier	4A	42
Tennessee (TN)	Hamblen	4A	42	Tennessee (TN)	Shelby	3A	35
Tennessee (TN)	Hamilton	3A	35	Tennessee (TN)	Smith	4A	42
Tennessee (TN)	Hancock	4A	42	Tennessee (TN)	Stewart	4A	42
Tennessee (TN)	Hardeman	3A	35	Tennessee (TN)	Sullivan	4A	42
Tennessee (TN)	Hardin	3A	35	Tennessee (TN)	Sumner	4A	42
Tennessee (TN)	Hawkins	4A	42	Tennessee (TN)	Tipton	3A	35
Tennessee (TN)	Haywood	3A	35	Tennessee (TN)	Trousdale	4A	42
Tennessee (TN)	Henderson	3A	35	Tennessee (TN)	Unicoi	4A	42
Tennessee (TN)	Henry	4A	42	Tennessee (TN)	Union	4A	42
Tennessee (TN)	Hickman	3A	35	Tennessee (TN)	Van Buren	4A	42
Tennessee (TN)	Houston	4A	42	Tennessee (TN)	Warren	4A	42
Tennessee (TN)	Humphreys	4A	42	Tennessee (TN)	Washington	4A	42
Tennessee (TN)	Jackson	4A	42	Tennessee (TN)	Wayne	3A	35
Tennessee (TN)	Jefferson	4A	42	Tennessee (TN)	Weakley	4A	42
Tennessee (TN)	Johnson	4A	42	Tennessee (TN)	White	4A	42
Tennessee (TN)	Knox	4A	42	Tennessee (TN)	Williamson	3A	35
Tennessee (TN)	Lake	4A	42	Tennessee (TN)	Wilson	4A	42
Tennessee (TN)	Lauderdale	3A	35	Texas (TX)	Anderson	2A	29
Tennessee (TN)	Lawrence	3A	35	Texas (TX)	Andrews	3B	36
Tennessee (TN)	Lewis	3A	35	Texas (TX)	Angelina	2A	29
Tennessee (TN)	Lincoln	3A	35	Texas (TX)	Aransas	2A	29
Tennessee (TN)	Loudon	4A	42	Texas (TX)	Archer	3A	35
Tennessee (TN)	Macon	4A	42	Texas (TX)	Armstrong	4B	43
Tennessee (TN)	Madison	3A	35	Texas (TX)	Atascosa	2A	29
Tennessee (TN)	Marion	3A	35	Texas (TX)	Austin	2A	29
Tennessee (TN)	Marshall	3A	35	Texas (TX)	Bailey	4B	43
Tennessee (TN)	Maury	3A	35	Texas (TX)	Bandera	2B	30
Tennessee (TN)	McMinn	4A	42	Texas (TX)	Bastrop	2A	29
Tennessee (TN)	McNairy	3A	35	Texas (TX)	Baylor	3B	36
Tennessee (TN)	Meigs	4A	42	Texas (TX)	Bee	2A	29

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Texas (TX)	Bexar	2A	29	Texas (TX)	DeWitt	2A	29
Texas (TX)	Blanco	3A	35	Texas (TX)	Dickens	3B	36
Texas (TX)	Borden	3B	36	Texas (TX)	Dimmit	2B	30
Texas (TX)	Bosque	2A	29	Texas (TX)	Donley	4B	43
Texas (TX)	Bowie	3A	35	Texas (TX)	Duval	2A	29
Texas (TX)	Brazoria	2A	29	Texas (TX)	Eastland	3A	35
Texas (TX)	Brazos	2A	29	Texas (TX)	Ector	3B	36
Texas (TX)	Brewster	3B	36	Texas (TX)	Edwards	2B	30
Texas (TX)	Briscoe	4B	43	Texas (TX)	El Paso	3B	36
Texas (TX)	Brooks	2A	29	Texas (TX)	Ellis	3A	35
Texas (TX)	Brown	3A	35	Texas (TX)	Erath	3A	35
Texas (TX)	Burleson	2A	29	Texas (TX)	Falls	2A	29
Texas (TX)	Burnet	3A	35	Texas (TX)	Fannin	3A	35
Texas (TX)	Caldwell	2A	29	Texas (TX)	Fayette	2A	29
Texas (TX)	Calhoun	2A	29	Texas (TX)	Fisher	3B	36
Texas (TX)	Callahan	3B	36	Texas (TX)	Floyd	4B	43
Texas (TX)	Cameron	1A	25	Texas (TX)	Foard	3B	36
Texas (TX)	Camp	3A	35	Texas (TX)	Fort Bend	2A	29
Texas (TX)	Carson	4B	43	Texas (TX)	Franklin	3A	35
Texas (TX)	Cass	3A	35	Texas (TX)	Freestone	2A	29
Texas (TX)	Castro	4B	43	Texas (TX)	Frio	2B	30
Texas (TX)	Chambers	2A	29	Texas (TX)	Gaines	3B	36
Texas (TX)	Cherokee	2A	29	Texas (TX)	Galveston	2A	29
Texas (TX)	Childress	3B	36	Texas (TX)	Garza	3B	36
Texas (TX)	Clay	3A	35	Texas (TX)	Gillespie	3A	35
Texas (TX)	Cochran	4B	43	Texas (TX)	Glasscock	3B	36
Texas (TX)	Coke	3B	36	Texas (TX)	Goliad	2A	29
Texas (TX)	Coleman	3B	36	Texas (TX)	Gonzales	2A	29
Texas (TX)	Collin	3A	35	Texas (TX)	Gray	4B	43
Texas (TX)	Collingsworth	3B	36	Texas (TX)	Grayson	3A	35
Texas (TX)	Colorado	2A	29	Texas (TX)	Gregg	3A	35
Texas (TX)	Comal	2A	29	Texas (TX)	Grimes	2A	29
Texas (TX)	Comanche	3A	35	Texas (TX)	Guadalupe	2A	29
Texas (TX)	Concho	3B	36	Texas (TX)	Hale	4B	43
Texas (TX)	Cooke	3A	35	Texas (TX)	Hall	3B	36
Texas (TX)	Coryell	2A	29	Texas (TX)	Hamilton	3A	35
Texas (TX)	Cottle	3B	36	Texas (TX)	Hansford	4B	43
Texas (TX)	Crane	3B	36	Texas (TX)	Hardeman	3B	36
Texas (TX)	Crockett	3B	36	Texas (TX)	Hardin	2A	29
Texas (TX)	Crosby	3B	36	Texas (TX)	Harris	2A	29
Texas (TX)	Culberson	3B	36	Texas (TX)	Harrison	3A	35
Texas (TX)	Dallam	4B	43	Texas (TX)	Hartley	4B	43
Texas (TX)	Dallas	2A	29	Texas (TX)	Haskell	3B	36
Texas (TX)	Dawson	3B	36	Texas (TX)	Hays	2A	29
Texas (TX)	Deaf Smith	4B	43	Texas (TX)	Hemphill	3B	36
Texas (TX)	Delta	3A	35	Texas (TX)	Henderson	3A	35

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Texas (TX)	Hill	2A	29	Texas (TX)	Martin	3B	36
Texas (TX)	Hockley	4B	43	Texas (TX)	Mason	3B	36
Texas (TX)	Hood	3A	35	Texas (TX)	Matagorda	2A	29
Texas (TX)	Hopkins	3A	35	Texas (TX)	Maverick	2B	30
Texas (TX)	Houston	2A	29	Texas (TX)	McCulloch	3B	36
Texas (TX)	Howard	3B	36	Texas (TX)	McLennan	2A	29
Texas (TX)	Hudspeth	3B	36	Texas (TX)	McMullen	2A	29
Texas (TX)	Hunt	3A	35	Texas (TX)	Medina	2B	30
Texas (TX)	Hutchinson	4B	43	Texas (TX)	Menard	3B	36
Texas (TX)	Irion	3B	36	Texas (TX)	Midland	3B	36
Texas (TX)	Jack	3A	35	Texas (TX)	Milam	2A	29
Texas (TX)	Jackson	2A	29	Texas (TX)	Mills	3A	35
Texas (TX)	Jasper	2A	29	Texas (TX)	Mitchell	3B	36
Texas (TX)	Jeff Davis	3B	36	Texas (TX)	Montague	3A	35
Texas (TX)	Jefferson	2A	29	Texas (TX)	Montgomery	2A	29
Texas (TX)	Jim Hogg	2A	29	Texas (TX)	Moore	3A	35
Texas (TX)	Jim Wells	2A	29	Texas (TX)	Morris	4B	43
Texas (TX)	Johnson	3A	35	Texas (TX)	Motley	3B	36
Texas (TX)	Jones	3B	36	Texas (TX)	Nacogdoches	3A	35
Texas (TX)	Karnes	2A	29	Texas (TX)	Navarro	3A	35
Texas (TX)	Kaufman	3A	35	Texas (TX)	Newton	2A	29
Texas (TX)	Kendall	3A	35	Texas (TX)	Nolan	3B	36
Texas (TX)	Kenedy	2A	29	Texas (TX)	Nueces	2A	29
Texas (TX)	Kent	3B	36	Texas (TX)	Ochiltree	4B	43
Texas (TX)	Kerr	3B	36	Texas (TX)	Oldham	4B	43
Texas (TX)	Kimble	3B	36	Texas (TX)	Orange	2A	29
Texas (TX)	King	3B	36	Texas (TX)	Palo Pinto	3A	35
Texas (TX)	Kinney	2B	30	Texas (TX)	Panola	3A	35
Texas (TX)	Kleberg	2A	29	Texas (TX)	Parker	3A	35
Texas (TX)	Knox	3B	36	Texas (TX)	Parmer	4B	43
Texas (TX)	La Salle	2B	30	Texas (TX)	Pecos	3B	36
Texas (TX)	Lamar	3A	35	Texas (TX)	Polk	2A	29
Texas (TX)	Lamb	4B	43	Texas (TX)	Potter	4B	43
Texas (TX)	Lampasas	3A	35	Texas (TX)	Presidio	3B	36
Texas (TX)	Lavaca	2A	29	Texas (TX)	Rains	3A	35
Texas (TX)	Lee	2A	29	Texas (TX)	Randall	4B	43
Texas (TX)	Leon	2A	29	Texas (TX)	Reagan	3B	36
Texas (TX)	Liberty	2A	29	Texas (TX)	Real	2B	30
Texas (TX)	Limestone	2A	29	Texas (TX)	Red River	3A	35
Texas (TX)	Lipscomb	4B	43	Texas (TX)	Reeves	3B	36
Texas (TX)	Live Oak	2A	29	Texas (TX)	Refugio	2A	29
Texas (TX)	Llano	3A	35	Texas (TX)	Roberts	4B	43
Texas (TX)	Loving	3B	36	Texas (TX)	Robertson	2A	29
Texas (TX)	Lubbock	3B	36	Texas (TX)	Rockwall	3A	35
Texas (TX)	Lynn	3B	36	Texas (TX)	Runnels	3B	36
Texas (TX)	Madison	2A	29	Texas (TX)	Rusk	3A	35

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Texas (TX)	San Augustine	3A	35	Texas (TX)	Wood	3A	35
Texas (TX)	San Jacinto	2A	29	Texas (TX)	Yoakum	3A	35
Texas (TX)	San Patricio	2A	29	Texas (TX)	Young	4B	43
Texas (TX)	San Saba	3A	35	Texas (TX)	Zapata	3A	35
Texas (TX)	Schleicher	3B	36	Texas (TX)	Zavala	3A	35
Texas (TX)	Scurry	3B	36	Utah (UT)	Beaver	5B	50
Texas (TX)	Shackelford	3B	36	Utah (UT)	Box Elder	5B	50
Texas (TX)	Shelby	3A	35	Utah (UT)	Cache	5B	50
Texas (TX)	Sherman	4B	43	Utah (UT)	Carbon	5B	50
Texas (TX)	Smith	3A	35	Utah (UT)	Daggett	6B	55
Texas (TX)	Somervell	3A	35	Utah (UT)	Davis	5B	50
Texas (TX)	Starr	2A	29	Utah (UT)	Duchesne	6B	55
Texas (TX)	Stephens	3A	35	Utah (UT)	Emery	5B	50
Texas (TX)	Sterling	3B	36	Utah (UT)	Garfield	5B	50
Texas (TX)	Stonewall	3B	36	Utah (UT)	Grand	5B	50
Texas (TX)	Sutton	3B	36	Utah (UT)	Iron	5B	50
Texas (TX)	Swisher	4B	43	Utah (UT)	Juab	5B	50
Texas (TX)	Tarrant	2A	29	Utah (UT)	Kane	5B	50
Texas (TX)	Taylor	3B	36	Utah (UT)	Millard	5B	50
Texas (TX)	Terrell	3B	36	Utah (UT)	Morgan	6B	55
Texas (TX)	Terry	3B	36	Utah (UT)	Piute	5B	50
Texas (TX)	Throckmorton	3B	36	Utah (UT)	Rich	6B	55
Texas (TX)	Titus	3A	35	Utah (UT)	Salt Lake	5B	50
Texas (TX)	Tom Green	3B	36	Utah (UT)	San Juan	5B	50
Texas (TX)	Travis	2A	29	Utah (UT)	Sanpete	5B	50
Texas (TX)	Trinity	2A	29	Utah (UT)	Sevier	5B	50
Texas (TX)	Tyler	2A	29	Utah (UT)	Summit	6B	55
Texas (TX)	Upshur	3A	35	Utah (UT)	Tooele	5B	50
Texas (TX)	Upton	3B	36	Utah (UT)	Uintah	6B	55
Texas (TX)	Uvalde	2B	30	Utah (UT)	Utah	5B	50
Texas (TX)	Val Verde	2B	30	Utah (UT)	Wasatch	6B	55
Texas (TX)	Van Zandt	3A	35	Utah (UT)	Washington	3B	36
Texas (TX)	Victoria	2A	29	Utah (UT)	Wayne	5B	50
Texas (TX)	Walker	2A	29	Utah (UT)	Weber	5B	50
Texas (TX)	Waller	2A	29	Vermont (VT)	Addison	6A	55
Texas (TX)	Ward	3B	36	Vermont (VT)	Bennington	6A	55
Texas (TX)	Washington	2A	29	Vermont (VT)	Caledonia	6A	55
Texas (TX)	Webb	2B	30	Vermont (VT)	Chittenden	6A	55
Texas (TX)	Wharton	2A	29	Vermont (VT)	Essex	6A	55
Texas (TX)	Wheeler	3B	36	Vermont (VT)	Franklin	6A	55
Texas (TX)	Wichita	3A	35	Vermont (VT)	Grand Isle	6A	55
Texas (TX)	Wilbarger	3B	36	Vermont (VT)	Lamoille	6A	55
Texas (TX)	Willacy	1A	25	Vermont (VT)	Orange	6A	55
Texas (TX)	Williamson	2A	29	Vermont (VT)	Orleans	6A	55
Texas (TX)	Wilson	2A	29	Vermont (VT)	Rutland	6A	55
Texas (TX)	Winkler	3B	36	Vermont (VT)	Washington	6A	55

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Vermont (VT)	Windsor	6A	55	Virginia (VA)	Frederick	4A	42
Virginia (VA)	Accomack	4A	42	Virginia (VA)	Fredericksburg	4A	42
Virginia (VA)	Albemarle	4A	42	Virginia (VA)	Galax	4A	42
Virginia (VA)	Alexandria	4A	42	Virginia (VA)	Giles	4A	42
Virginia (VA)	Alleghany	5A	50	Virginia (VA)	Gloucester	4A	42
Virginia (VA)	Amelia	4A	42	Virginia (VA)	Goochland	4A	42
Virginia (VA)	Amherst	4A	42	Virginia (VA)	Grayson	4A	42
Virginia (VA)	Appomattox	4A	42	Virginia (VA)	Greene	4A	42
Virginia (VA)	Arlington	4A	42	Virginia (VA)	Greensville	3A	35
Virginia (VA)	Augusta	4A	42	Virginia (VA)	Halifax	3A	35
Virginia (VA)	Bath	5A	50	Virginia (VA)	Hampton	3A	35
Virginia (VA)	Bedford	4A	42	Virginia (VA)	Hanover	4A	42
Virginia (VA)	Bedford	4A	42	Virginia (VA)	Harrisonburg	4A	42
Virginia (VA)	Bland	4A	42	Virginia (VA)	Henrico	4A	42
Virginia (VA)	Botetourt	4A	42	Virginia (VA)	Henry	4A	42
Virginia (VA)	Bristol	4A	42	Virginia (VA)	Highland	5A	50
Virginia (VA)	Brunswick	3A	35	Virginia (VA)	Hopewell	4A	42
Virginia (VA)	Buchanan	4A	42	Virginia (VA)	Isle of Wight	3A	35
Virginia (VA)	Buckingham	4A	42	Virginia (VA)	James City	4A	42
Virginia (VA)	Buena Vista	4A	42	Virginia (VA)	King and Queen	4A	42
Virginia (VA)	Campbell	4A	42	Virginia (VA)	King George	4A	42
Virginia (VA)	Caroline	4A	42	Virginia (VA)	King William	4A	42
Virginia (VA)	Carroll	4A	42	Virginia (VA)	Lancaster	4A	42
Virginia (VA)	Charles City	4A	42	Virginia (VA)	Lee	4A	42
Virginia (VA)	Charlotte	4A	42	Virginia (VA)	Lexington	4A	42
Virginia (VA)	Charlottesville	4A	42	Virginia (VA)	Loudoun	4A	42
Virginia (VA)	Chesapeake	3A	35	Virginia (VA)	Louisa	4A	42
Virginia (VA)	Chesterfield	4A	42	Virginia (VA)	Lunenburg	4A	42
Virginia (VA)	Clarke	4A	42	Virginia (VA)	Lynchburg	4A	42
Virginia (VA)	Colonial Heights	4A	42	Virginia (VA)	Madison	4A	42
Virginia (VA)	Covington	5A	50	Virginia (VA)	Manassas	4A	42
Virginia (VA)	Craig	4A	42	Virginia (VA)	Manassas Park	4A	42
Virginia (VA)	Culpeper	4A	42	Virginia (VA)	Martinsville	4A	42
Virginia (VA)	Cumberland	4A	42	Virginia (VA)	Mathews	4A	42
Virginia (VA)	Danville	4A	42	Virginia (VA)	Mecklenburg	3A	35
Virginia (VA)	Dickenson	4A	42	Virginia (VA)	Middlesex	4A	42
Virginia (VA)	Dinwiddie	4A	42	Virginia (VA)	Montgomery	4A	42
Virginia (VA)	Emporia	3A	35	Virginia (VA)	Nelson	4A	42
Virginia (VA)	Essex	4A	42	Virginia (VA)	New Kent	4A	42
Virginia (VA)	Fairfax	4A	42	Virginia (VA)	Newport News	3A	35
Virginia (VA)	Fairfax	4A	42	Virginia (VA)	Norfolk	3A	35
Virginia (VA)	Falls Church	4A	42	Virginia (VA)	Northampton	4A	42
Virginia (VA)	Fauquier	4A	42	Virginia (VA)	Northumberland	4A	42
Virginia (VA)	Floyd	4A	42	Virginia (VA)	Norton	4A	42
Virginia (VA)	Fluvanna	4A	42	Virginia (VA)	Nottoway	4A	42
Virginia (VA)	Franklin	4A	42	Virginia (VA)	Orange	4A	42

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Virginia (VA)	Petersburg	4A	42	Washington (WA)	Cowlitz	4C	44
Virginia (VA)	Pittsylvania	3A	35	Washington (WA)	Douglas	5B	50
Virginia (VA)	Poquoson	4A	42	Washington (WA)	Ferry	6B	55
Virginia (VA)	Portsmouth	3A	35	Washington (WA)	Franklin	5B	50
Virginia (VA)	Powhatan	4A	42	Washington (WA)	Garfield	5B	50
Virginia (VA)	Prince Edward	4A	42	Washington (WA)	Grant	5B	50
Virginia (VA)	Prince George	4A	42	Washington (WA)	Grant	5B	50
Virginia (VA)	Prince William	4A	42	Washington (WA)	Grays Harbor	4C	44
Virginia (VA)	Pulaski	4A	42	Washington (WA)	Island	5C	50
Virginia (VA)	Radford	4A	42	Washington (WA)	Jefferson	4C	44
Virginia (VA)	Rappahannock	4A	42	Washington (WA)	King	4C	44
Virginia (VA)	Richmond	4A	42	Washington (WA)	Kitsap	5C	50
Virginia (VA)	Richmond	4A	42	Washington (WA)	Kittitas	6B	55
Virginia (VA)	Roanoke	4A	42	Washington (WA)	Klickitat	5B	50
Virginia (VA)	Roanoke	4A	42	Washington (WA)	Lewis	4C	44
Virginia (VA)	Rockbridge	4A	42	Washington (WA)	Lincoln	5B	50
Virginia (VA)	Rockingham	4A	42	Washington (WA)	Mason	4C	44
Virginia (VA)	Russell	4A	42	Washington (WA)	Okanogan	5B	50
Virginia (VA)	Salem	4A	42	Washington (WA)	Pacific	4C	44
Virginia (VA)	Scott	4A	42	Washington (WA)	Pend Oreille	6B	55
Virginia (VA)	Shenandoah	4A	42	Washington (WA)	Pierce	4C	44
Virginia (VA)	Smyth	4A	42	Washington (WA)	San Juan	5C	50
Virginia (VA)	Southampton	3A	35	Washington (WA)	Skagit	4C	44
Virginia (VA)	Spotsylvania	4A	42	Washington (WA)	Skamania	5B	50
Virginia (VA)	Stafford	4A	42	Washington (WA)	Snohomish	4C	44
Virginia (VA)	Staunton	4A	42	Washington (WA)	Spokane	5B	50
Virginia (VA)	Suffolk	3A	35	Washington (WA)	Stevens	6B	55
Virginia (VA)	Surry	3A	35	Washington (WA)	Thurston	4C	44
Virginia (VA)	Sussex	3A	35	Washington (WA)	Wahkiakum	4C	44
Virginia (VA)	Tazewell	4A	42	Washington (WA)	Walla Walla	5B	50
Virginia (VA)	Virginia Beach	3A	35	Washington (WA)	Whatcom	4C	44
Virginia (VA)	Warren	4A	42	Washington (WA)	Whitman	5B	50
Virginia (VA)	Washington	4A	42	Washington (WA)	Yakima	5B	50
Virginia (VA)	Waynesboro	4A	42	West Virginia (WV)	Barbour	5A	50
Virginia (VA)	Westmoreland	4A	42	West Virginia (WV)	Berkeley	4A	42
Virginia (VA)	Williamsburg	4A	42	West Virginia (WV)	Boone	4A	42
Virginia (VA)	Winchester	4A	42	West Virginia (WV)	Braxton	4A	42
Virginia (VA)	Wise	4A	42	West Virginia (WV)	Brooke	5A	50
Virginia (VA)	Wythe	4A	42	West Virginia (WV)	Cabell	4A	42
Virginia (VA)	York	4A	42	West Virginia (WV)	Calhoun	4A	42
Washington (WA)	Adams	5B	50	West Virginia (WV)	Clay	4A	42
Washington (WA)	Asotin	5B	50	West Virginia (WV)	Doddridge	4A	42
Washington (WA)	Benton	5B	50	West Virginia (WV)	Fayette	4A	42
Washington (WA)	Chelan	5B	50	West Virginia (WV)	Gilmer	4A	42
Washington (WA)	Clallam	5C	50	West Virginia (WV)	Grant	5A	50

State	County/City	ASHRAE Climate Zone	Page #	State	County/City	ASHRAE Climate Zone	Page #
West Virginia (WV)	Greenbrier	4A	42	Wisconsin (WI)	Brown	6A	55
West Virginia (WV)	Hampshire	5A	50	Wisconsin (WI)	Buffalo	6A	55
West Virginia (WV)	Hancock	5A	50	Wisconsin (WI)	Burnett	6A	55
West Virginia (WV)	Hardy	5A	50	Wisconsin (WI)	Calumet	6A	55
West Virginia (WV)	Harrison	5A	50	Wisconsin (WI)	Chippewa	6A	55
West Virginia (WV)	Jackson	4A	42	Wisconsin (WI)	Clark	6A	55
West Virginia (WV)	Jefferson	4A	42	Wisconsin (WI)	Columbia	6A	55
West Virginia (WV)	Kanawha	4A	42	Wisconsin (WI)	Crawford	6A	55
West Virginia (WV)	Lewis	4A	42	Wisconsin (WI)	Dane	6A	55
West Virginia (WV)	Lincoln	4A	42	Wisconsin (WI)	Dodge	6A	55
West Virginia (WV)	Logan	4A	42	Wisconsin (WI)	Door	6A	55
West Virginia (WV)	Marion	5A	50	Wisconsin (WI)	Douglas	6A	55
West Virginia (WV)	Marshall	5A	50	Wisconsin (WI)	Dunn	6A	55
West Virginia (WV)	Mason	4A	42	Wisconsin (WI)	Eau Claire	6A	55
West Virginia (WV)	McDowell	4A	42	Wisconsin (WI)	Florence	6A	55
West Virginia (WV)	Mercer	4A	42	Wisconsin (WI)	Fond Du Lac	6A	55
West Virginia (WV)	Mineral	5A	50	Wisconsin (WI)	Forest	6A	55
West Virginia (WV)	Mingo	4A	42	Wisconsin (WI)	Grant	5A	50
West Virginia (WV)	Monongalia	5A	50	Wisconsin (WI)	Green	5A	50
West Virginia (WV)	Monroe	4A	42	Wisconsin (WI)	Green Lake	5A	50
West Virginia (WV)	Morgan	4A	42	Wisconsin (WI)	Iowa	5A	50
West Virginia (WV)	Nicholas	4A	42	Wisconsin (WI)	Iron	5A	50
West Virginia (WV)	Ohio	5A	50	Wisconsin (WI)	Jackson	5A	50
West Virginia (WV)	Pendleton	5A	50	Wisconsin (WI)	Jefferson	5A	50
West Virginia (WV)	Pleasants	4A	42	Wisconsin (WI)	Juneau	5A	50
West Virginia (WV)	Pocahontas	5A	50	Wisconsin (WI)	Kenosha	5A	50
West Virginia (WV)	Preston	5A	50	Wisconsin (WI)	Kewaunee	5A	50
West Virginia (WV)	Putnam	4A	42	Wisconsin (WI)	La Crosse	5A	50
West Virginia (WV)	Raleigh	4A	42	Wisconsin (WI)	Lafayette	5A	50
West Virginia (WV)	Randolph	5A	50	Wisconsin (WI)	Langlade	5A	50
West Virginia (WV)	Ritchie	4A	42	Wisconsin (WI)	Lincoln	5A	50
West Virginia (WV)	Roane	4A	42	Wisconsin (WI)	Manitowoc	5A	50
West Virginia (WV)	Summers	4A	42	Wisconsin (WI)	Marathon	5A	50
West Virginia (WV)	Taylor	5A	50	Wisconsin (WI)	Marinette	5A	50
West Virginia (WV)	Tucker	5A	50	Wisconsin (WI)	Marquette	5A	50
West Virginia (WV)	Tyler	4A	42	Wisconsin (WI)	Menominee	5A	50
West Virginia (WV)	Upshur	4A	42	Wisconsin (WI)	Milwaukee	5A	50
West Virginia (WV)	Wayne	4A	42	Wisconsin (WI)	Monroe	5A	50
West Virginia (WV)	Webster	4A	42	Wisconsin (WI)	Oconto	5A	50
West Virginia (WV)	Wetzel	5A	50	Wisconsin (WI)	Oneida	5A	50
West Virginia (WV)	Wirt	4A	42	Wisconsin (WI)	Outagamie	5A	50
West Virginia (WV)	Wood	4A	42	Wisconsin (WI)	Ozaukee	5A	50
West Virginia (WV)	Wyoming	4A	42	Wisconsin (WI)	Pepin	5A	50
Wisconsin (WI)	Adams	6A	55	Wisconsin (WI)	Pierce	5A	50
Wisconsin (WI)	Ashland	6A	55	Wisconsin (WI)	Polk	5A	50
Wisconsin (WI)	Barron	6A	55	Wisconsin (WI)	Portage	5A	50
Wisconsin (WI)	Bayfield	6A	55	Wisconsin (WI)	Price	5A	50

State	County/City	ASHRAE Climate Zone	Page #
Wisconsin (WI)	Racine	5A	50
Wisconsin (WI)	Richland	5A	50
Wisconsin (WI)	Rock	5A	50
Wisconsin (WI)	Rusk	5A	50
Wisconsin (WI)	Sauk	5A	50
Wisconsin (WI)	Sawyer	5A	50
Wisconsin (WI)	Shawano	5A	50
Wisconsin (WI)	Sheboygan	5A	50
Wisconsin (WI)	St. Croix	5A	50
Wisconsin (WI)	Taylor	5A	50
Wisconsin (WI)	Trempealeau	5A	50
Wisconsin (WI)	Vernon	5A	50
Wisconsin (WI)	Vilas	7	59
Wisconsin (WI)	Walworth	5A	50
Wisconsin (WI)	Washburn	6A	55
Wisconsin (WI)	Washington	5A	50
Wisconsin (WI)	Waukesha	5A	50
Wisconsin (WI)	Waupaca	6A	55
Wisconsin (WI)	Waushara	6A	55
Wisconsin (WI)	Winnebago	6A	55
Wisconsin (WI)	Wood	6A	55
Wyoming (WY)	Albany	6B	55
Wyoming (WY)	Big Horn	6B	55
Wyoming (WY)	Campbell	6B	55
Wyoming (WY)	Carbon	6B	55
Wyoming (WY)	Converse	6B	55
Wyoming (WY)	Crook	6B	55
Wyoming (WY)	Fremont	6B	55
Wyoming (WY)	Goshen	5B	50
Wyoming (WY)	Hot Springs	6B	55
Wyoming (WY)	Johnson	6B	55
Wyoming (WY)	Laramie	5B	50
Wyoming (WY)	Lincoln	7	59
Wyoming (WY)	Natrona	6B	55
Wyoming (WY)	Niobrara	6B	55
Wyoming (WY)	Park	6B	55
Wyoming (WY)	Platte	5B	50
Wyoming (WY)	Sheridan	6B	55
Wyoming (WY)	Sublette	7	59
Wyoming (WY)	Sweetwater	6B	55
Wyoming (WY)	Teton	7	59
Wyoming (WY)	Uinta	6B	55
Wyoming (WY)	Washakie	6B	55
Wyoming (WY)	Weston	6B	55

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