American Standard
NEW STANDARDS FOR LIVING™

Application Guide

ALG16-APG01-EN

American Standard Allegiance and Heritage 16
Two stage cooling units and heat pumps

Low Outdoor Operating Temperature
Unit Mounting
Minimum Clearances
Refrigerant Piping Limitations

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The purpose of this bulletin is to provide cumulative application criteria as related to the American Standard Allegiance / Heritage16 cooling units and heat pumps.

This bulletin discusses:

I. Off Season Cooling Operation
II. Unit Mounting
III. Minimum Operating Clearances
IV. Refrigerant Piping Limitations

ISSUED BY:
Product Training and Application Department
American Standard
Tyler, Texas

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Section I - Off Season Cooling Operation

The American Standard Allegiance / Heritage 16 may be operated in the cooling mode to 45°F as shipped from the factory. These units shall only be matched with variable speed air handling units or variable speed furnace / coil combinations. The coils have factory supplied non - bleed TXV's.

Please refer to the accessory table below when determining if the unit will operate at the specified conditions as well as required accessories.

REQUIRED ACCESSORIES @ OD TEMPERATURE			
Model	**45 °F**	**30 / 40 °F**	**0 °F**
Allegiance 16	As Shipped	EDC / Hard start / Compressor Sump Heater	Not Approved
Heritage 16	As Shipped	EDC / Hard Start / Compressor Sump Heater	Not Approved

Evaporator Defrost Control Kits (EDC)
AY28X079 - Cooling only
AY28X084 - Heat pumps

Compressor Crankcase Heater Kit - BAYCCHT
Compressor Hard Start Kits - BAYKSKT

Unit Model	Required CCHT	Required Hard Start Kit	Unit Model	Required CCHT	Required Hard Start Kit
4A7A6024A	BAYCCHT301	BAYKSKT260	4A6H6024A	Factory Installed	BAYKSKT260
4A7A6036A	BAYCCHT301	BAYKSKT260	4A6H6036A	Factory Installed	BAYKSKT260
4A7A6048A	BAYCCHT301	BAYKSKT260	4A6H6048A	Factory Installed	BAYKSKT260
4A7A6060A	Factory Installed	Factory Installed	4A6H6060A	Factory Installed	Factory Installed

Windshields
Windshields may be required, please refer to page 14 of this document for information reagarding the installation of wind barriers.

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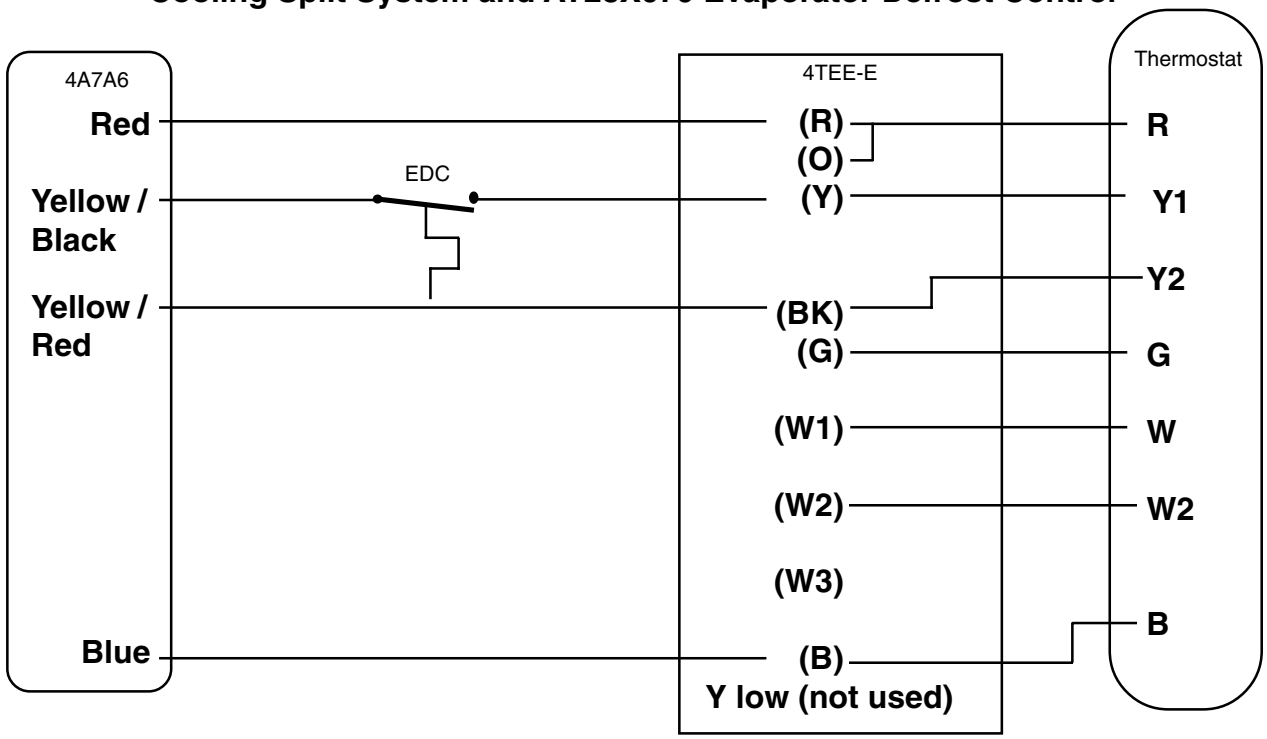
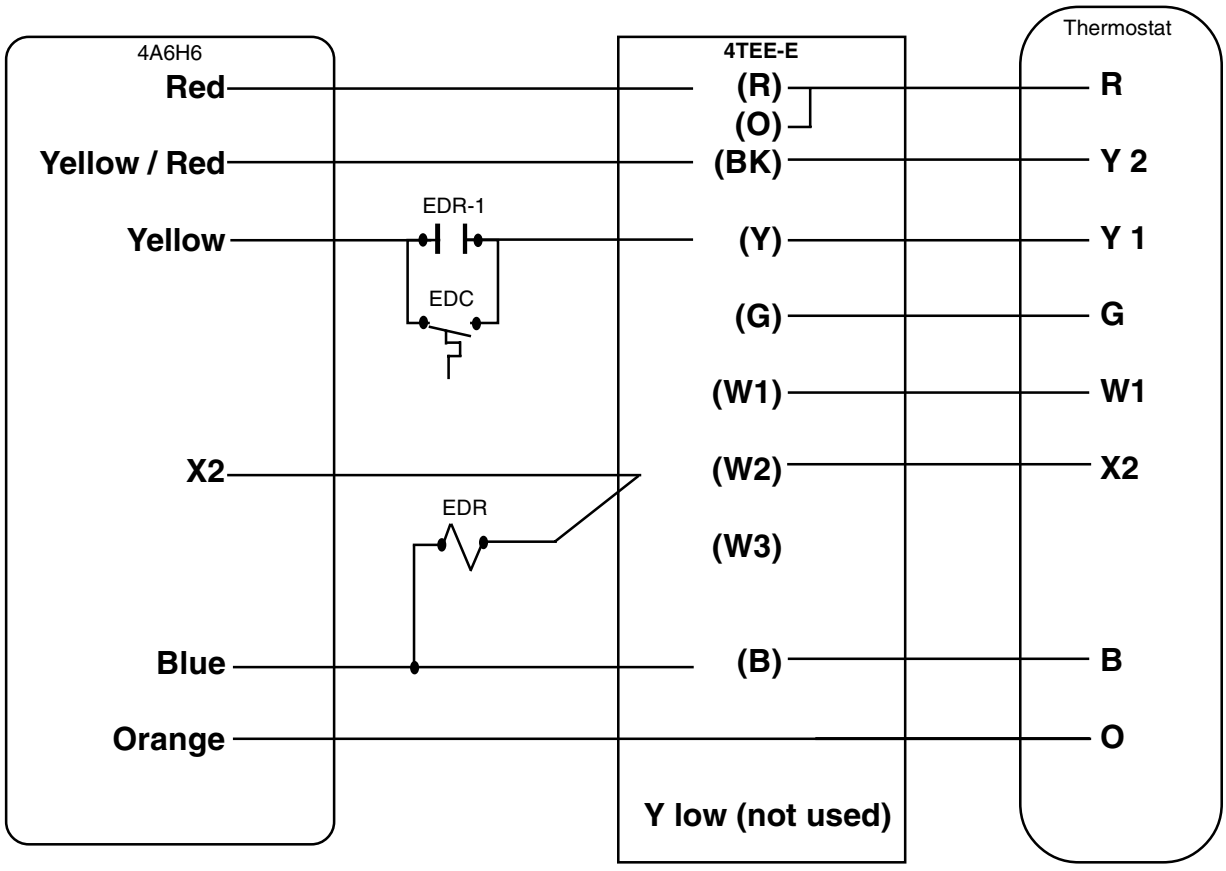
Typical wiring when using the evaporator defrost control (EDC) for operation

Note: Remove factory installed jumper between R and BK at the fan control board. Connect R to O on the terminal strip These terminals on the AHU / Gas furnace must be jumpered together. Please refer to the equipment's installation manual for complete control wiring.

Cooling Split System and AY28X079 Evaporator Defrost Control



Heat Pump Split System and AY28X084 Evaporator Defrost Control



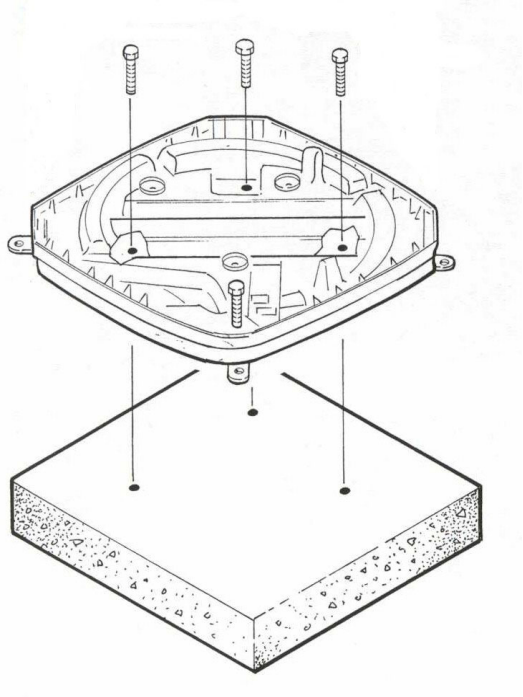
SECTION II - Unit Mounting

This section describes appropriate methods for mounting and securing the Allegiance / Heritage 16, however, if these units are to be mounted in a region where high winds are an issue, please refer to the American Standard BAYECMT001 extreme conditions mounting kit installation instructions publication Number #18-HE44D1-* (* latest version). The BAYECMT001 is not suitable for seizmic restraint; please refer to local professionals who specialize in seizmic restraint.

When mounting or securing American Standard 1 - 6 ton condensing units and heat pumps please observe the following:

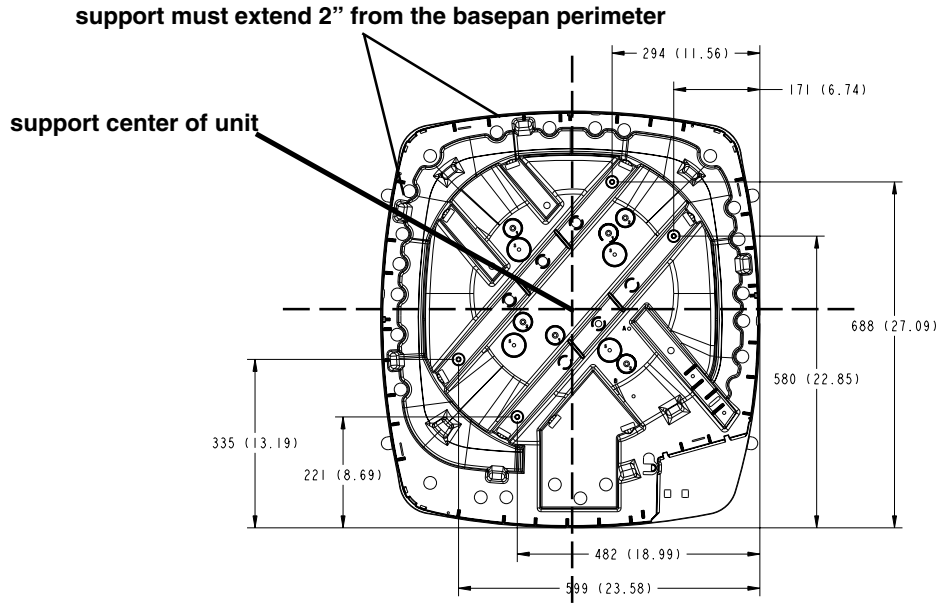
1. Anytime the unit is to be supported from the edge, the supporting material shall extend a minimum of two inches under the perimeter of the unit's base.
2. The mounting hole locations are molded in the basepan, however, they must be drilled.
   a) Hole locations are identified on page 6.
   b) Hole diameter is 5/16".
3. Washers should be placed in between the fastener head and the basepan.
4. American Standard recommends supporting the center of the unit.
5. Base 4 pans have four mounting holes.

Refer to the dimension tables for actual unit size.
Please refer to the following illustrations for dimensions and general information.

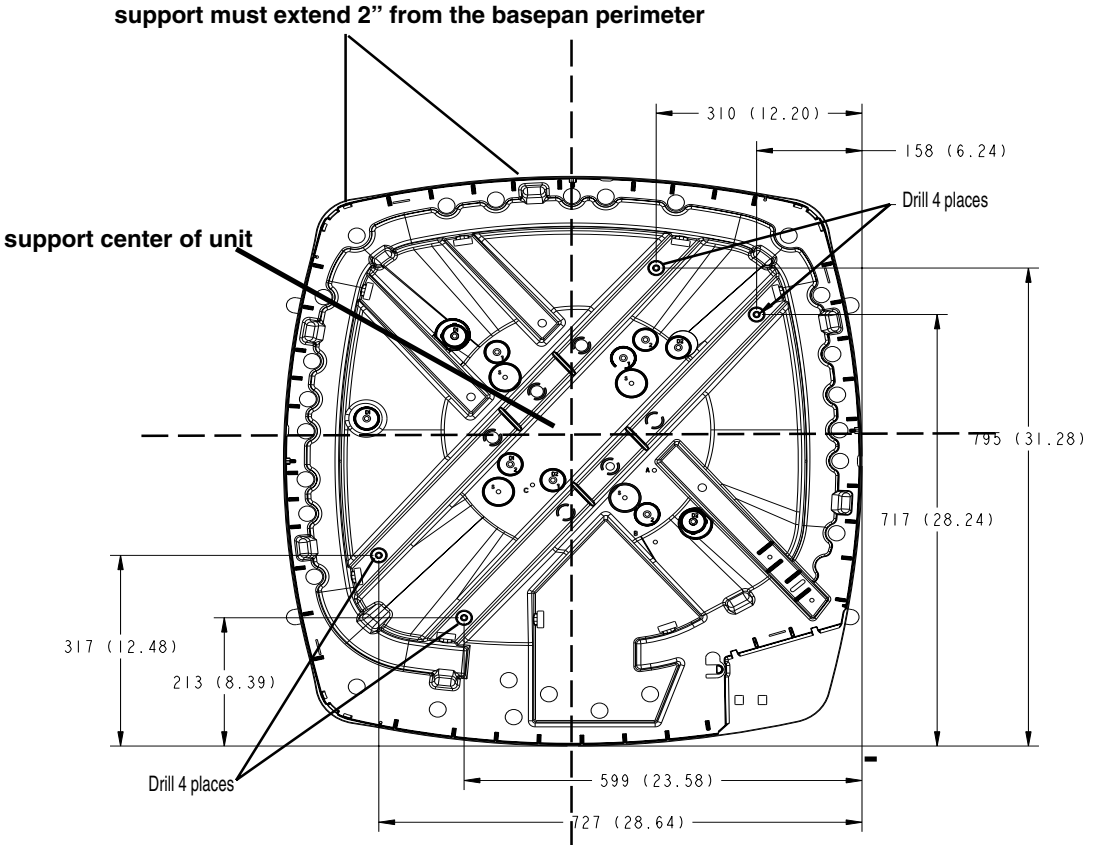


Drawing for illustration purposes only.

BASE PAN MOUNTING HOLE LOCATIONS
(location only, holes must be drilled)



BASE 3



BASE 4

If supporting the base pan from the perimeter, the support must extend under the base pan at least 2”. American Standard recommends supporting the middle of the base pan with a cross member.

Section III - Minimum Operating Clearances

This section discusses applying a condensing unit / heat pump in installations where there are space constraints.

These concerns must be addressed:

1. System Operation - Adequate airflow must be provided to the condensing unit / heat pump in order to enable appropriate heat transfer. If this is accomplished, head pressure will remain within an effective operating range.
2. System Serviceability - Proper space must be allowed for the HVAC service technician to properly maintain the condensing unit / heat pump. Furthermore, space must be allowed for major component change out in the event of a failure. Working space is determined by the National Electric Code.
3. Space Maintenance - Appropriate area must be allowed in order to maintain the ground area where the units are positioned to prohibit debris from collecting on the panels, thus further providing unobstructed airflow to the condensing unit.
4. State, Local Codes, and National Codes shall prevail. Check with the local jurisdiction before installation to assure compliance.

Numerous projects require reduced clearances between outdoor units and adjacent walls, fences and other units. The obstruction in question is usually one of the following:

1. One or more walls of an adjacent building.
2. Fences or barriers provided to reduce sound transmission or visually screen the equipment.
3. Other outdoor units in a multi-unit installation.
4. Overhangs
5. A combination of the above.

The prime considerations involved in establishing minimum clearances are:

1. Adequate airflow to the outdoor coil with minimum recirculation.
2. Service access to the equipment.
3. Compliance with the National Electric Code and other applicable codes.
4. Design temperature - Design temperatures greater than 105°F require additional consideration.

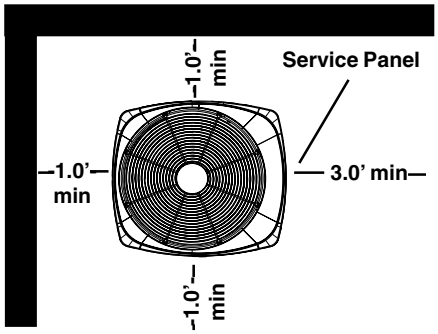
I. In order to assure that adequate airflow reaches the Allegiance/Heritage 16 condensing unit, size free air passages at 300 feet per minute (FPM) maximum velocity. See condensing unit airflow performance on page 16 of this document; or, for the most current information, consult the unit's product data manual.

II. The importance of providing sufficient access for maintenance and service to equipment cannot be overemphasized. The HVAC service technician's job may be performed with greater ease and at lower cost if adequate space is allowed.

III. Knowledge of the National Electric Code and other applicable codes for the job site location is a necessity in order to satisfy local inspectors. These codes are in place for service as well as safety.

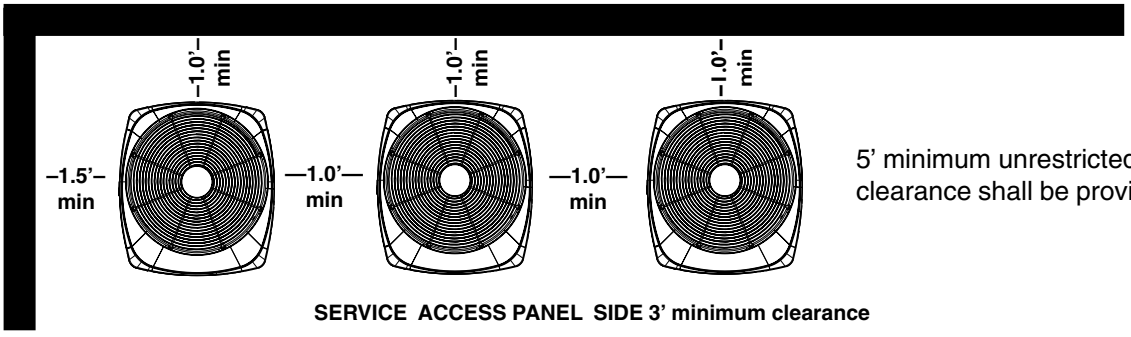
IV. Be sure to read all provisions and footnotes contained in this document. When ambient temperatures exceed 105°F, more space may be required for minimum operating clearances.

1. **Installation of a single Allegiance / Heritage 16 condensing unit / heat pump in a corner with unrestricted top clearance.**
   A) For locations where the design ambient temperature is below 105°F:
      1) 1' clearance on 2 sides - If shrubbery is to be placed by the unit's other side, then allow 1' minimum clearance from the unit.
      2) Service access side minimum 3'. Consult Local, State, and National Electric Codes for minimum service clearance.
   B) For locations where the design ambient temperature exceeds 105°F:
      1) 1.5' clearance on 2 walls. - If shrubbery is to be placed by the unit other side, then allow 1' minimum clearance from the unit.
      2) Service access side minimum 3'.
   C) If unit is located in such a way that service panel is facing the wall:
      1) NEC requires minimum 3' between the unit and the wall.
         a) This space may be increased to 3.5'. Consult the National Electric Code for more information regarding minimum clearances for working spaces.



5' minimum unrestricted top clearance shall be provided.

2. **Installation of two or more Allegiance / Heritage 16 units where two adjacent walls form a corner and unrestricted top clearance**.
   A) For locations where the design ambient temperature is below 105°F:
      1) Corner unit shall have1.5' clearance from side wall and 1' clearance from back wall.
      2) 1' clearance in between units, unless service panels face each other. (if service panels face each other, this clearance may be increased to 4' per NEC)
   B) For locations where the design ambient temperature exceeds 105°F:
      1) 2' clearance from both walls.
      2) 2' clearance in between units, unless service panels face each other. (if service panels face each other, this clearance may be increased to 4' per NEC).
   C) If unit's are located in such a way that the service panels are facing the wall:
      1) NEC requires minimum 3' between the unit and the wall
         a) This space may be increased to 3.5'. Consult the most current edition of the National Electric Code for more information regarding minimum clearances for working spaces.



5' minimum unrestricted top clearance shall be provided.

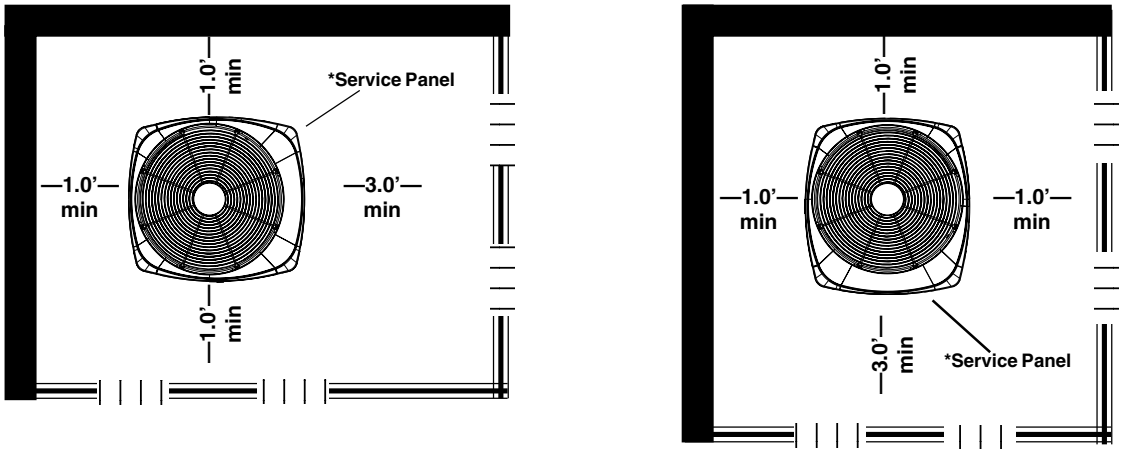
SERVICE ACCESS PANEL SIDE 3' minimum clearance

3. Single Allegiance / Heritage 16 condensing unit / heat pump in a fenced corner with unrestricted top clearance.

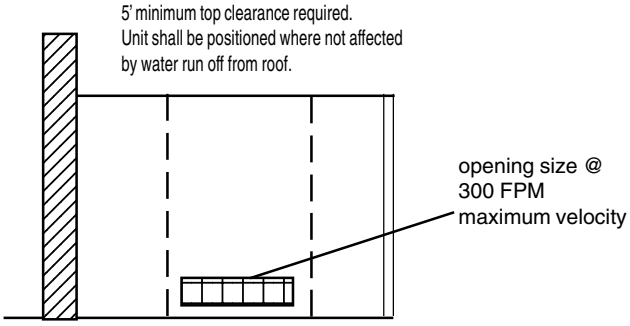
A) For locations where the design ambient temperature is below 105°F:
   1) 1' clearance from both walls.
   2) 1' fence clearance - openings shall be provided to allow free air passage to unit (Free air passage shall be sized @ 300 FPM Velocity).
   3) Service access shall be 3' minimum.

B) For locations where the design ambient temperature exceeds 105°F:
   1) 1.5' clearance from both walls.
   2) Service access shall be 3' minimum.
   3) 1.5' clearance from fence-openings shall be provided to allow free air passage to unit (Free air passage shall be sized @ a maximum of 300 FPM Velocity).

C) If unit is located in such a way that service panel is facing the wall:
   1) NEC requires minimum 3' between the unit and the wall.
      a) This space may be increased to 3.5'. Consult the National Electric Code for more information regarding minimum clearances for working spaces.



* If removable panels are used and acceptable to local inspection agency, the clearance to the removable panel may be reduced to 2'.



SIngle Unit - Solid Fence

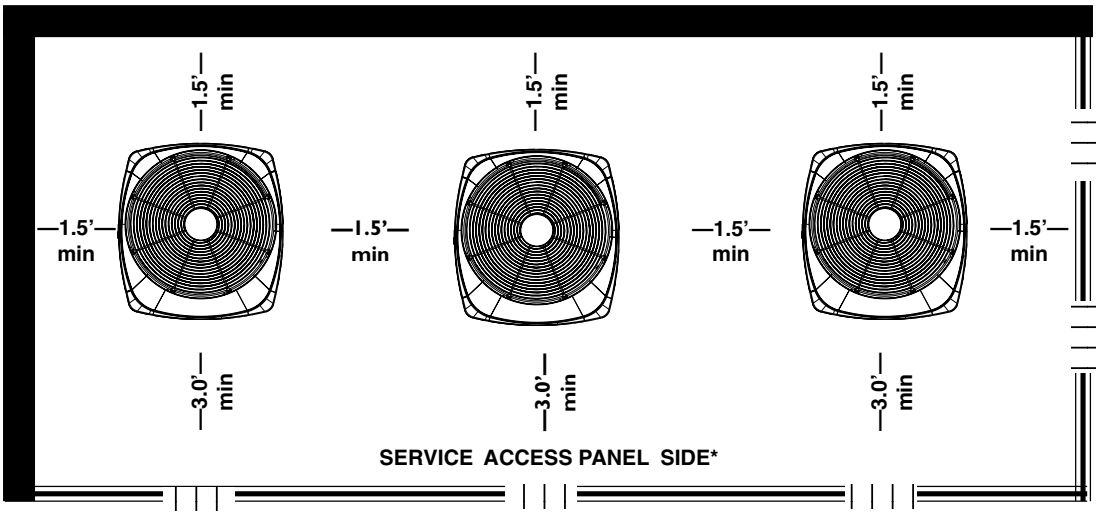
Solid Fence: Fence height not to exceed top of unit. Provide openings in fence that will allow maximum 300 FPM air velocity. These openings shall be located at the lower portion of the fence. If acceptable, the lower portion of the fence may be cut to provide open bottom clearance provided that debris, grass and vegetation will not obstruct air passageway.

4. Installation of two or more Allegiance / Heritage 16 units where two adjacent walls form a fenced corner with unobstructed top clearance.

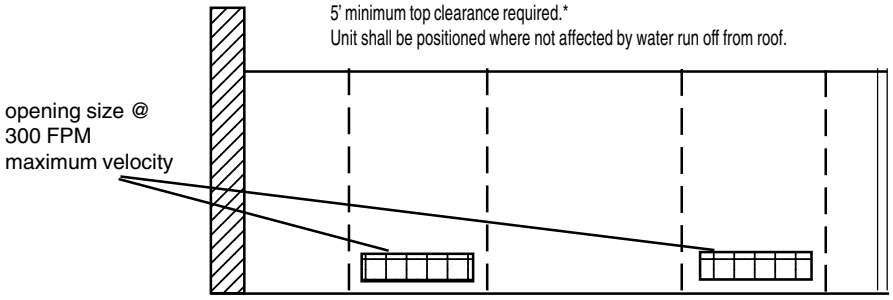
A) For locations where the design ambient temperature is below 105°F:
   1) Corner unit shall have1.5' clearance from one wall and 1' clearance from the other wall.
   2) 1.5' clearance in between units.
   3) NEC requires 3'clearance for service. This may be reduced to 2' if removable panels are used.
   4) Free air passage shall be cut in order to allow maximum 300 FPM air velocity.

B) For locations where the design ambient temperature exceeds 105°F:
   1) Corner unit shall have 2' clearance from one wall and 1.5' clearance from the other wall.
   2) 2' clearance in between units.
   3) NEC requires 3' clearance for service. This may be reduced to 2.5' if removable panels are used.

C) If unit's are located in such a way that the service panels are facing the wall:
   1) NEC requires minimum 3' between the unit and the wall.
      a) This space may be increased to 3.5'. Consult the most current edition of the National Electric Code for more information regarding minimum clearances for working spaces.



* If removable panels are used and acceptable to local inspection agency, the clearance to the removable panel may be reduced to 2'.



Multiple Units Solid Fence

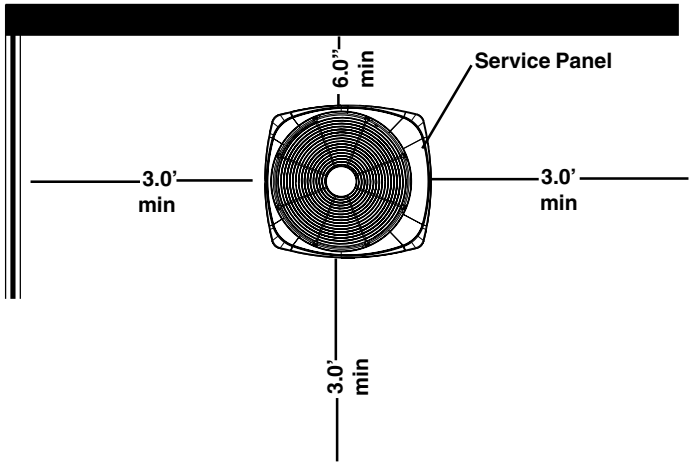
Solid Fence: Fence height not to exceed top of unit. Provide openings in fence that will allow maximum 300 FPM air velocity. These openings shall be located at the lower portion of the fence. If acceptable, the lower portion of the fence may be cut to provide open bottom clearance provided that debris, grass and vegetation will not obstruct air passageway.

*For best performance, it is recommended to not construct cover over the unit's in this type of multiple unit application.

5. Installation of a single Allegiance / Heritage 16 style condensing unit / heat pump next to one wall with unrestricted top clearance.

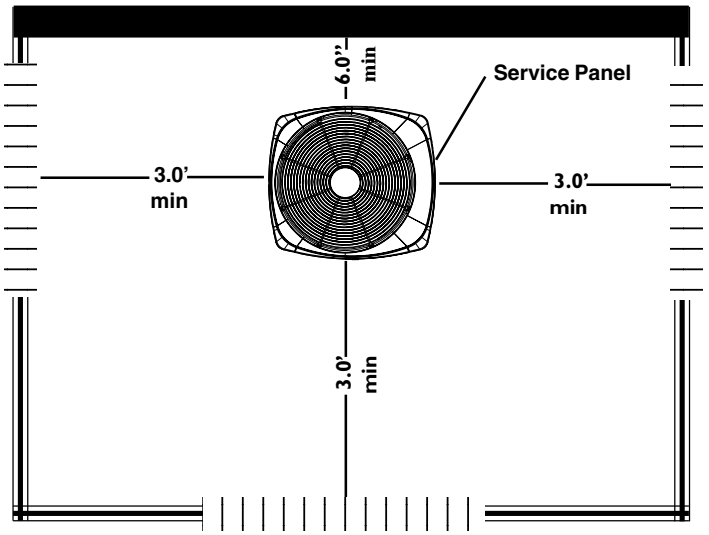
A) For locations where the design ambient temperature is below 105°F:
   1) 6” clearance on 1 side.
   2) 3’ clearance on other three sides.
   3) If fence or barrier is constructed around unit, 3’ clearance is required on three sides. The fence/barrier height shall not exceed the height of the unit.
   4) Free air passage shall be cut in order to allow maximum 300 FPM air velocity if fence / barrier is constructed.
   5) Service access side minimum 3’.

C) If unit is located in such a way that service panel is facing the wall:
   1) NEC requires minimum 3’ between the unit and the wall.
      a) This space may be increased to 3.5’. Consult the National Electric Code for more information regarding minimum clearances for working spaces.



5’ minimum unrestricted top clearance shall be provided.

3’ minimum clearance on 3 sides. Unit to be positioned where not affected by roof run off water.



5’ minimum unrestricted top clearance shall be provided.

3’ minimum clearance on 3 sides. Unit to be positioned where not affected by roof run off water.

Louvers / Free area shall be cut in fence / barrier to provide maximum 300 FPM air velocity. Lower portion of fence / barrier may be undercut to allow free air passage to unit providing that vegetation and debris will not block air passage.

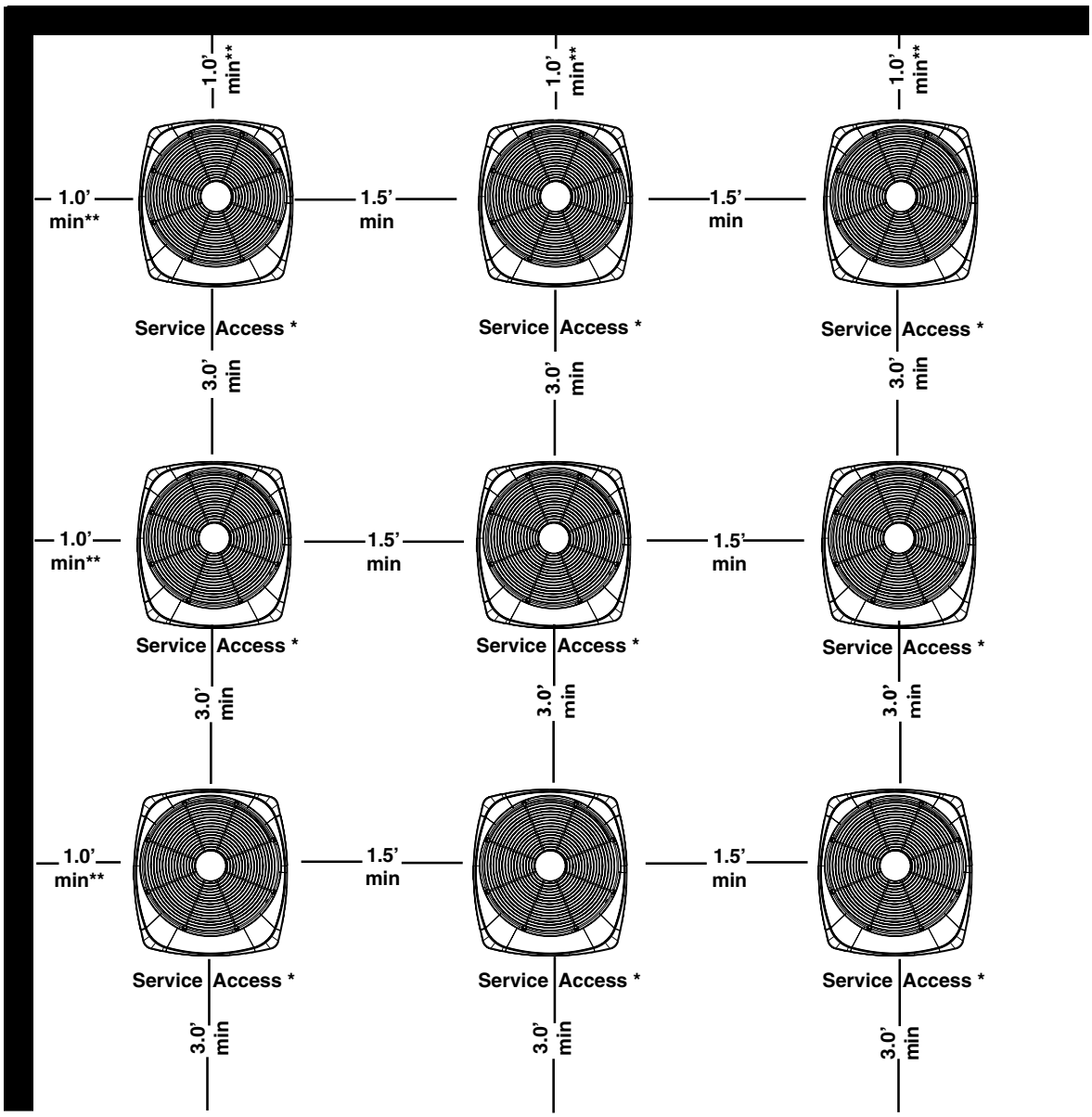
6A. Installation of multiple units on a pad or rooftop with unobstructed top clearance.

A) Refer to drawing for minimum clearances.
   1) Do not construct cover over units in this application.

B) National Electric Code requires 3' minimum (4' if certain conditions are present) clearance between service access panel and adjacent unit. If service access panel faces the wall, the required space between the the wall and the unit shall be minimum 3'. (May require as much as 3.5').

C) Walls shall not be higher than top of units.

D) National, State, and Local Codes must be observed.



*** Units may be rotated, as shown on the following page, in order that service access sides face each other provided that 3 feet minimum clearance be maintained between the units. In order to comply with NEC, this may increase to 4' minimum clearance.**

**** If wall or fence is to be constructed around the entire perimeter of the mechanical yard, maintain minimum 1.5' clearance from the units. The fence height shall not exceed that of the unit. It is recommended to install louvers in the fence to allow no greater than 300 feet per minute velocity. Consult the table on page 16 for unit airflow. Place louvers in the lower section of the fence by each unit in order to provide air access to each unit located by the fence. The lower portion of the fence may also be cut in order to equal the calculated free area.**

Clearances apply to geographical areas where the design outdoor dry bulb = 105 °F or less

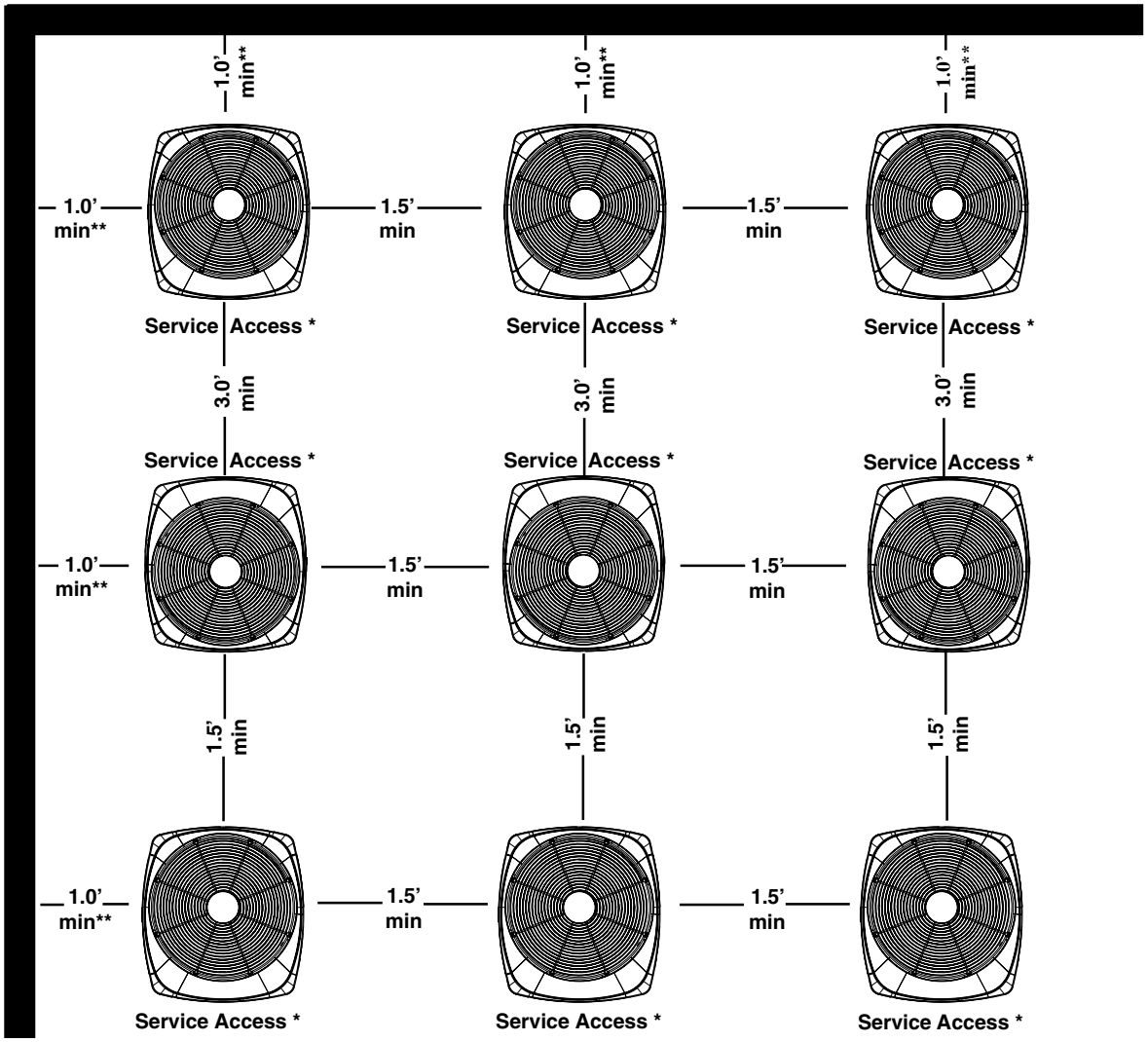
6B. Installation of multiple units on a pad or rooftop with unobstructed top clearance.

A) Refer to drawing for minimum clearances.
   1) Do not construct cover over units in this application.

B) National Electric Code requires 3' minimum (4' if certain conditions are present) clearance between service access panel and adjacent unit. If service access panel faces the wall, the required space between the the wall and the unit shall be minimum 3'. (May require as much as 3.5').

C) Walls shall not be higher than top of units.

D) National, State, and Local Codes must be observed.



*** Units may be rotated as shown above, in order that service access sides face each other provided that 3 feet minimum clearance be maintained between the units. In order to comply with NEC, this may increase to 4' minimum clearance.**

**** If wall or fence is to be constructed around the entire perimeter of the mechanical yard, maintain minimum 1.5' clearance from the units. The fence height shall not exceed that of the unit. It is recommended to install louvers in the fence to allow no greater than 300 feet per minute velocity. Consult the table on page 16 for unit airflow. Place louvers in the lower section of the fence by each unit in order to provide air access to each unit located by the fence. The lower portion of the fence may also be cut in order to equal the calculated free area.**

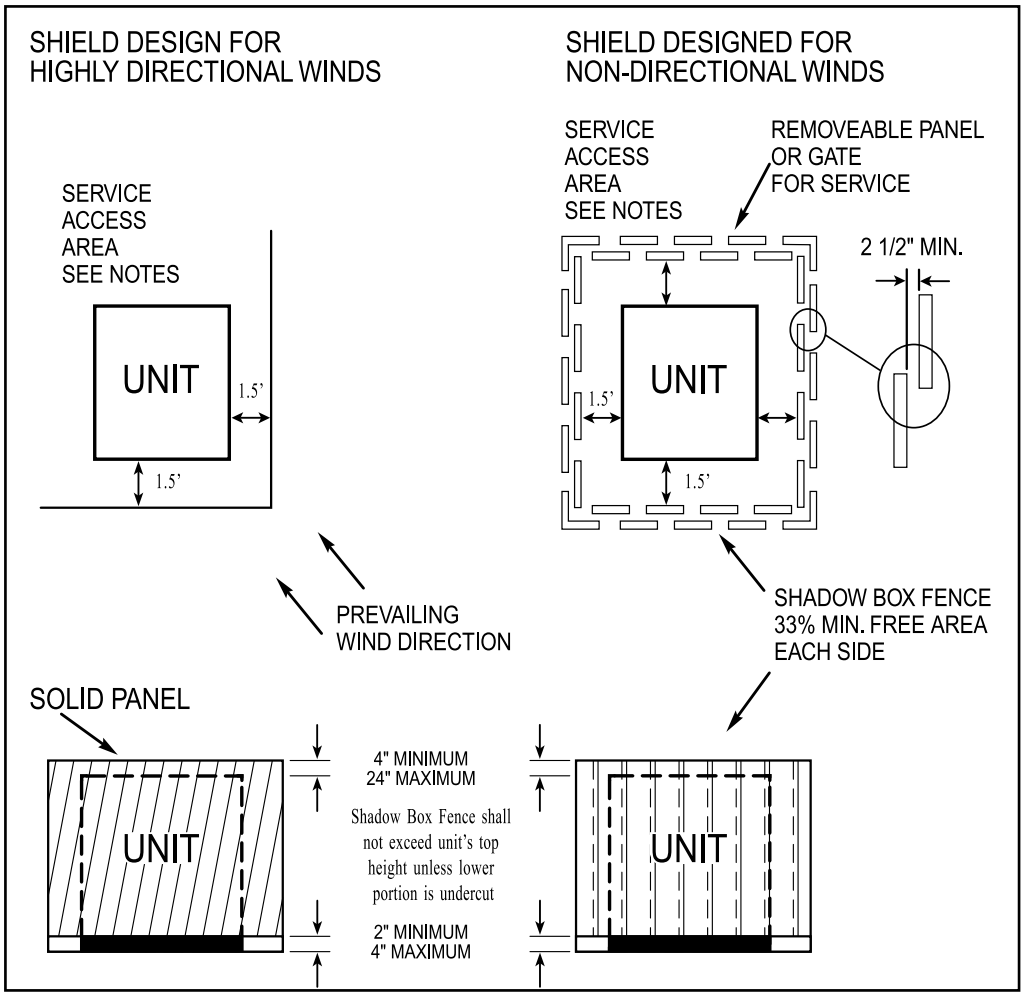
Clearances apply to geographical areas where the design outdoor dry bulb = 105° F or less

7. Fence construction.

A) Height shall not exceed the top of the unit.
B) Free air passages shall be sized at no greater than 300 FPM velocity.
C) Free air passages shall be cut at the lower portion of the fence.
D) Fence may also be undercut to allow free air passage provided grass, vegetation, or debris will not obstruct the free air passage.
E) Shrubbery shall not be planted within one foot of the fence.
F) If removable panel is utilized, the distance from the unit's service panel to the removable panel may be reduced to 2'. (3' if geographical location's design outdoor dry bulb is greater than 105^0F.

8. Windshields:

If low ambient operation of 30°F or lower is required, windshields may be required to block prevailing winds from impacting system performance at low outdoor temperatures.



Note:
Minimum working clearance must be in compliance with the National Electric Code. Currently, the minimum clearance between a wood or suitable grounding material type fence requires minimum 3'. If other material is used to form the windshield, the minimum space may be increased to 3.5'. Please consult the 2002 or current Edition of the National Electric Code, Article 110 for the most up to date information.

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Electrical Code Information

Compliance with Local, State, and National Codes is a must on every HVAC Installation. This page discusses the criteria regarding minimum working spaces as defined in the 2002 National Electric Code.
The main concern is the safety of the HVAC service / maintenance person. Minimum working clearances are specified in the National Electric Code (NEC) Article 110.26.

For electrical equipment that from ground to power the voltage is 600 volts or less:
The National Electric Code specifically states that service area around electrical equipment shall provide sufficient access, and shall be properly maintained in order to permit safe operation and maintenance of the equipment. Table 110.26(A)(1) as well as the figures beside the table describe the minimum clearance for proper service and access to electrical equipment.

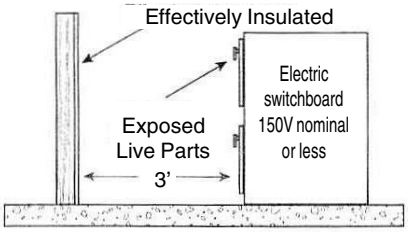
American Standard residential and light commercial condensing units ranging from 1 to 6 ton require access to the side service panel as indicated on the previous pages to gain access to the electrical controls.

The table and figure below are excerpts from the National Electric Code 2002:

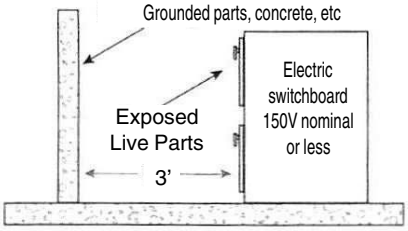
Table 110.26(A)(1) Working Clearances

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0-150	900 mm (3 FT)	900 mm (3 FT)	900 mm (3FT)
151-600	900 mm (3FT)	1 M (3.5FT)	1.2 M (4FT)

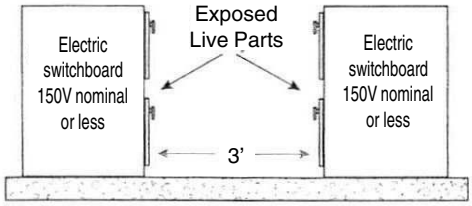
Note: Where the conditions are as follows
Condition 1 - Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be considered live parts.
Condition 2 - Exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls shall be considered as grounded.
Condition 3 - Exposed live parts on both sides of the work space (not guarded as provided in Condition 1) with the operator between.



Condition 1
(3 ft min. for 151 - 600 V)



Condition 2
(Space would increase to 3 1/2 ft for 151 - 600 V)



Condition 3
(Space would increase to 4 ft for 151 - 600 V)

Allegiance / Heritage Outdoor Unit Airflow Table			
Cooling Units		**Heat Pump Units**	
Unit Model Number	**CFM**	**Unit Model Number**	**CFM**
4A7A6024A	**2000**	**4A6H6024A**	**2700**
4A7A6036A	**3900**	**4A6H6036A**	**3975**
4A7A6048A	**4500**	**4A6H6048A**	**4200**
4A7A6060A	**4300**	**4A6H6060A**	**4400**

***Table produced Jan. 2003. For the most current information, please refer to specific equipment Product Data.**

Required Opening = CFM / 300 FPM (Maximum)

Example:

Given:

Qty. of 2 units in an area surrounded by a fence on two sides and solid walls on the other two sides. Units are 4A7A6060A1000A.

Required:

Determine free air opening space required in fence.

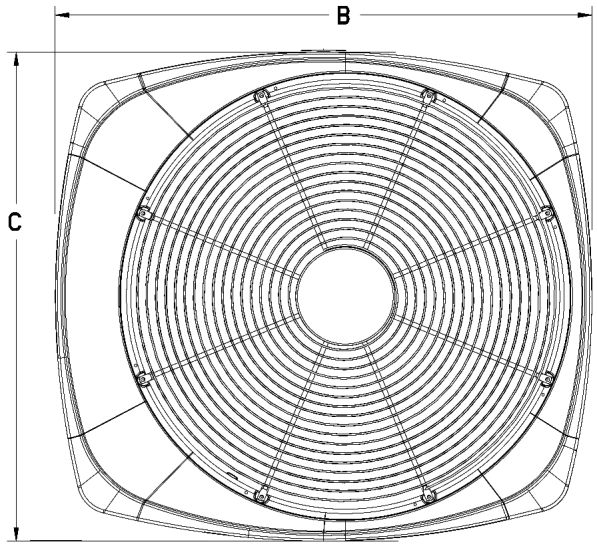
Solution:

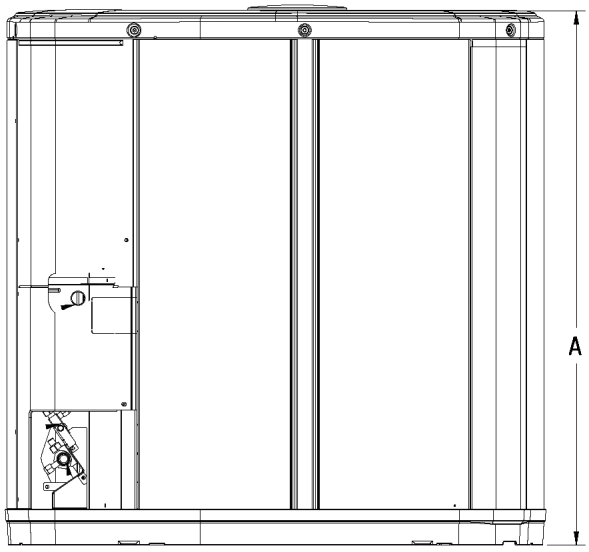
4300 CFM X Qty. of 2 = 8600 CFM

8600 CFM / 300 FPM = 28.66 square feet

Round 28.66 to 29 square feet of free air opening in the fence sections surrounding the units. It is recommended to place these opening equally on all four sides, however, if one or two of the sides are sections of the building structure, it is acceptable to place them on two sides.

Allegiance / Heritage 16 unit dimensions





Unit Model	Base	A	B	C		Unit Model	Base Size	A	B	C
4A7A6024A	3	36 3/4"	32 5/8"	29 3/4"		4A6H6024A1	3	36 3/4"	32 5/8"	29 3/4"
4A7A6036A	4	33 1/8"	37 1/4"	34 1/4"		4A6H6036A1	4	37 1/8"	37 1/4"	34 1/4"
4A7A6048A	4	41 1/8"	37 1/4"	34 1/4"		4A6H6048A1	4	41 1/8"	37 1/4"	34 1/4"
4A7A6060A	4	41 1/8"	37 1/4"	34 1/4"		4A6H6060A1	4	41 1/8"	37 1/4"	34 1/4"

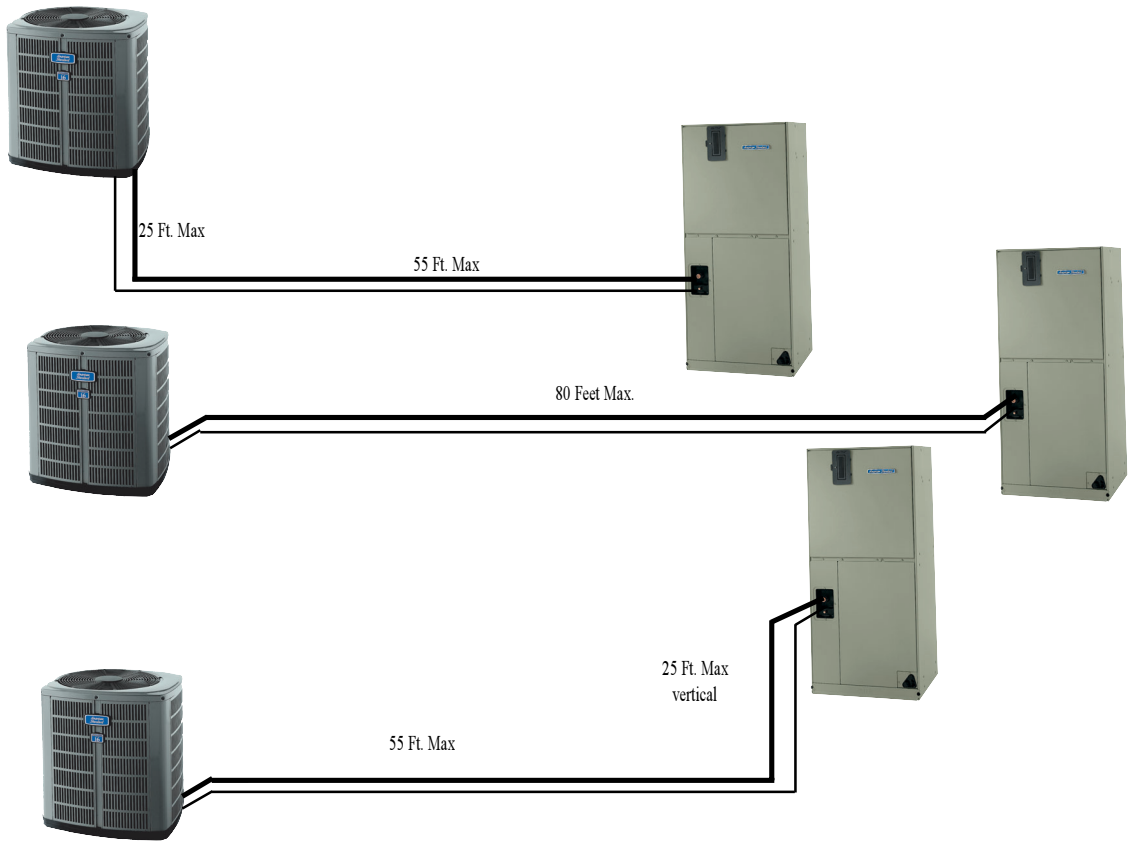
Section IV - Refrigerant Piping

A) Purpose
   1) Liquid line - The purpose of the liquid refrigerant line is to convey refrigerant, in the liquid state, from the outdoor unit to the indoor unit in the cooling mode and from the indoor unit to the outdoor unit in the heating mode.
   2) Gas line - The purpose of the gas line is to convey refrigerant in the gas state and oil from the indoor unit to the outdoor unit in the cooling mode and from the outdoor unit to the indoor unit in the heating mode.

B) Limitations:
   1) The Allegiance / Heritage 16 utilizes a single unloading scroll type compressor. Therefore, it is crucial that refrigerant lines are properly sized and do not exceed the length set forth in the unit's installation manual.
   2) Line length limits:
      A. Gas line = 80' linear length. Of the linear length, 25' may be installed vertically.
      B. Liquid line = 80' linear length. Of the linear length, 25' may be installed vertically.
   3) No exceptions shall be allowed to these piping limitations.

C) Explanation:
   1) Refrigerant lines shall not exceed 80' total line length. 25' of the 80' may be vertical.
   2) Liquid subcooling may not be achieved on first stage if the liquid line exceeds 80' / 25' vertical.
   3) Insufficient oil return during first stage operation if the gas line exceeds 80' / 25' vertical.

D) For greater detail regarding refrigerant piping refer to Publication 32-3009-* (*latest version).



NOTES

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