**45VMF---3**
**Sizes 9K-48K**
**Four-Way Cassette for Variable Refrigerant Flow (VRF)**

# Engineering Databook

Table of Contents



**Fig. 1 —Unit Image**

**NOTE: Carrier is committed to continuously improving its products to ensure the highest quality and reliability standards, and to meet local regulations and market requirements. All features and specifications are subject to change without prior notice.**

# SPECIFICATIONS

## Table 1 — Specifications (Sizes 9K-18K)

| Model | | | 45VMF09 | 45VMF12 | 45VMF15 | 45VMF18 |
|---|---|---|---|---|---|---|
| Power supply | | | 1-phase, 208/230V, 60Hz | | | |
| Cooling[1] | Capacity | kW | 2.6 | 3.5 | 4.4 | 5.3 |
| | | kBtu/h | 9 | 12 | 15 | 18 |
| | Power input | W | 18 | 34 | 34 | 34 |
| Heating[2] | Capacity | kW | 2.9 | 4.0 | 5.0 | 6.2 |
| | | kBtu/h | 10 | 13.5 | 17 | 21 |
| | Power input | W | 18 | 34 | 34 | 34 |
| Fan motor type | | | DC | | | |
| Indoor coil | Number of rows | | 2 | 3 | 2 | 3 |
| | Tube pitch × row pitch | In. | 11/16×7/6 | | | |
| | Fin spacing and type | fins/in. | 21 Hydrophilic aluminum | | | |
| | Tube OD and type | In. | Φ3/16 Inner-groove | | | |
| | Dimensions (L×H×W) | In. | 84-3/16×5-11/16×7/8 | 84-3/16×5-11/16×1-1/4 | 84-3/16×7-13/16×7/8 | 84-3/16×7-13/16×1-1/4 |
| | Number of circuits | | 8 | 8 | 11 | 11 |
| Air flow rate[3] | | CFM | 467/445/424/402/380/359/337 | 544/503/461/420/379/337/296 | 693/662/631/600/569/538/507 | 598/579/560/542/523/504/485 |
| Sound pressure level[4] | | dB(A) | 36.5/35.7/34.3/33.4/32.3/31.4/30.7 | 41.4/40.7/39.3/37.6/36.0/34.7/32 | 45/43.2/42.2/41/40.2/38.5/36 | 46/45.1/44.7/42.8/41.5/40.8/40 |
| Main body | Net dimensions[5] (W×H×D) | In. | 33-1/16×8×33-1/16 | | 33-1/16×9-11/16×33-1/16 | |
| | Packed dimensions (W×H×D) | In. | 39-15/16×10-13/16×39-15/16 | | 39-15/16×12-3/8×39-15/16 | |
| | Net/Gross weight | Lbs | 45.2/60.6 | 50.7/63.9 | 51.8/67.2 | 57.3/72.8 |
| Panel | Net dimensions[6] (W×H×D) | In. | 37-3/8×3×37-3/8 | | | |
| | Packed dimensions (W×H×D) | In. | 40-3/16×3-9/16×40-3/16 | | | |
| | Net/Gross weight | Lbs | 12.8/16.8 | | | |
| Refrigerant type | | | R454B | | | |
| Design pressure (H/L) | | MPa | 4.4/2.6 | | | |
| Pipe connections | Liquid/Gas pipe | In. | Φ1/4/Φ1/2 | | | |
| | Drain pipe | In. | OD Φ1 | | | |

**NOTES:**

1. Indoor temperature 80?DB, 67?WB; outdoor temperature 95?DB, 75?WB; equivalent refrigerant piping length 295-1/4in. with zero level difference.
2. Indoor temperature 70?DB, 60?WB; outdoor temperature 47?DB, 43?WB; equivalent refrigerant piping length 295-1/4in. with zero level difference.
3. Air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
4. Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured 55-1/8in. below the unit in a semi-anechoic chamber.
5. The dimension is only the body size, excluding the size of the installation lug, connecting copper pipe, etc. For detailed dimensions, please refer to the installation manual.
6. Exposed height of the panel after being installed on the ceiling.

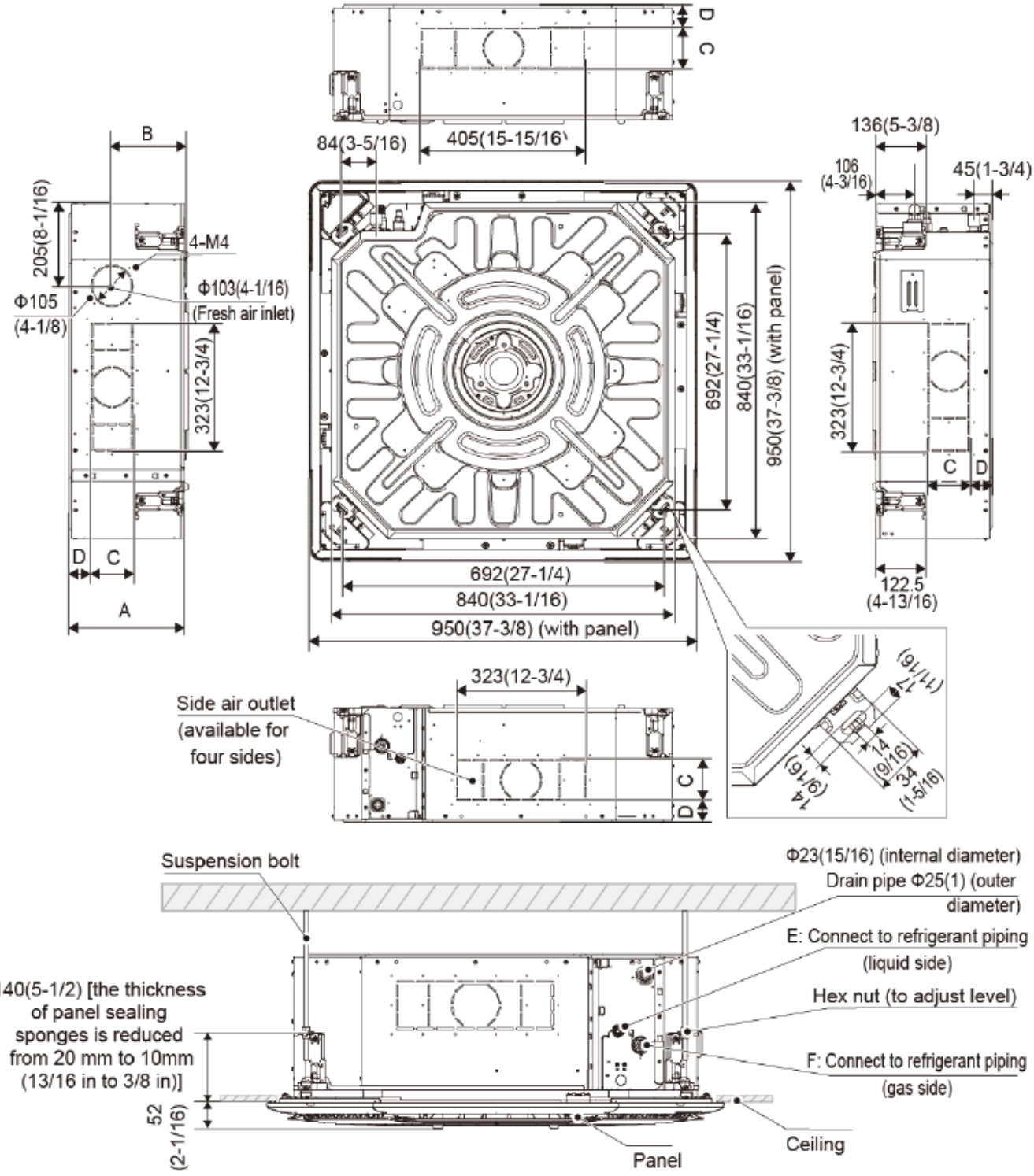
## Table 2 — Specifications (Sizes 24K-48K)

| Model | | | 45VMF24 | 45VMF30 | 45VMF36 | 45VMF48 |
|---|---|---|---|---|---|---|
| Power supply | | | 1-phase, 208/230V, 60Hz | | | |
| Cooling[1] | Capacity | kW | 7 | 8.8 | 10.6 | 14.1 |
| | | kBtu/h | 24 | 30 | 36 | 48 |
| | Power input | W | 59 | 93 | 146 | 165 |
| Heating[2] | Capacity | kW | 7.9 | 10 | 11.7 | 15.8 |
| | | kBtu/h | 27 | 34 | 40 | 54 |
| | Power input | W | 59 | 93 | 146 | 165 |
| Fan motor type | | | DC | | | |
| Indoor coil | Number of rows | | 3 | 3 | 3 | 3 |
| | Tube pitch × row pitch | In. | 11/16×7/6 | | | |
| | Fin spacing and type | fins/in. | 21 Hydrophilic aluminum | | | |
| | Tube OD and type | In. | Φ3/16 Inner-groove | | | |
| | Dimensions (L×H×W) | In. | 84-3/16×7-13/16×1-1/4 | 84-3/16×9-15/16×1-1/4 | | |
| | Number of circuits | | 14 | 14 | 14 | 14 |
| Air flow rate[3] | | CFM | 751/720/688/657/625/594/562 | 976/925/874/824/773/722/671 | 1107/1051/994/938/882/825/769 | 1207/1146/1085/1024/962/901/840 |
| Sound pressure level[4] | | dB(A) | 44/43.3/42.5/42/41.5/41/40.6/40 | 49/48.1/46.6/45.6/43.2/41.5/42 | 53/52.6/51.8/50/48.8/47.9/47 | 55/54.8/54.2/54/52.8/51.6/50 |
| Main body | Net dimensions[5] (W×H×D) | In. | 33-1/16×9-11/16×33-1/16 | 33-1/16×11-5/16×33-1/16 | | |
| | Packed dimensions (W×H×D) | In. | 39-15/16×12-3/8×39-15/16 | 39-15/16×14×39-15/16 | | |
| | Net/Gross weight | Lbs | 57.3/72.8 | 61.7/78.3 | | |
| Panel | Net dimensions[6] (W×H×D) | In. | 37-3/8×3×37-3/8 | | | |
| | Packed dimensions (W×H×D) | In. | 40-3/16×3-9/16×40-3/16 | | | |
| | Net/Gross weight | Lbs | 12.8/16.8 | | | |
| Refrigerant type | | | R454B | | | |
| Design pressure (H/L) | | MPa | 4.4/2.6 | | | |
| Pipe connections | Liquid/Gas pipe | In. | Φ3/8/Φ5/8 | | | |
| | Drain pipe | In. | OD Φ1 | | | |

## NOTES:

1. Indoor temperature 80?DB, 67?WB; outdoor temperature 95?DB, 75?WB; equivalent refrigerant piping length 295-1/4in. with zero level difference.
2. Indoor temperature 70?DB, 60?WB; outdoor temperature 47?DB, 43?WB; equivalent refrigerant piping length 295-1/4in. with zero level difference.
3. Air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
4. Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured 55-1/8in. below the unit in a semi-anechoic chamber.
5. The dimension is only the body size, excluding the size of the installation lug, connecting copper pipe, etc. For detailed dimensions, please refer to the installation manual.
6. Exposed height of the panel after being installed on the ceiling.

# DIMENSIONS




| Capacity (kBtu/h) | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| kBtu/h ≤ 12 | 204(8) | 141(5-9/16) | 63(2-1/2) | 41.5(1-5/8) | Φ 12.7(1/2) | Φ 6.35(1/4) |
| 12 < kBtu/h ≤ 18 | 246(9-11/16) | 163(4-1/16) | 103(4-1/16) | 41.5(1-5/8) | Φ 12.7(1/2) | Φ 6.35(1/4) |
| 18 < kBtu/h ≤ 24 | 246(9-11/16) | 163(4-1/16) | 103(4-1/16) | 41.5(1-5/8) | Φ 15.9(5/8) | Φ 9.52(3/8) |
| 24 < kBtu/h ≤ 48 | 288(11-5/16) | 190(7-1/2) | 103(4-1/16) | 56.5(2-1/4) | Φ 15.9(5/8) | Φ 9.52(3/8) |

**Fig. 2 —Dimensions - All Sizes**

# UNIT PLACEMENT

## PLACEMENT CONSIDERATION

Unit placement should take account of the following considerations:

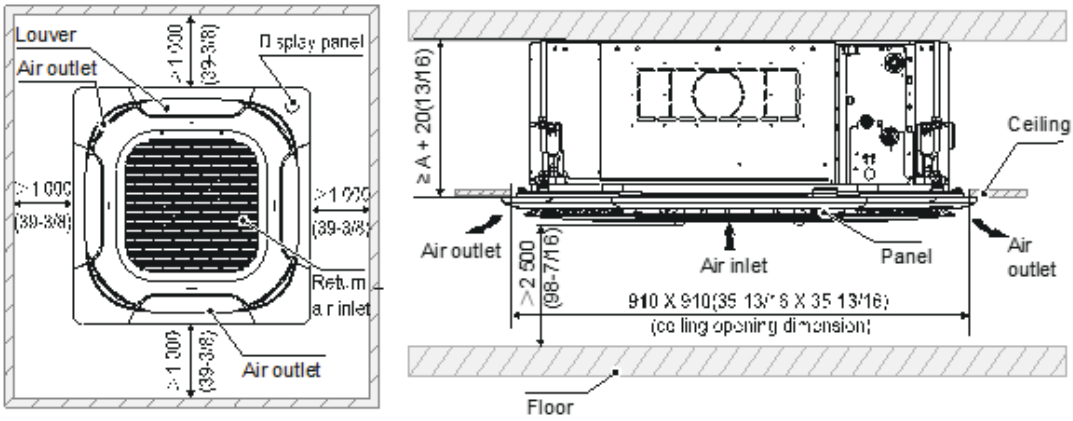
**Units should not be installed in the following locations:**

- A place filled with mineral oil, fumes or mist, like a kitchen.
- A place where there are corrosive gases, such as acid or alkaline gases.
- A place exposed to combustible gases and using volatile combustible gases such as diluent or gasoline.
- A place where there is equipment emitting electromagnetic radiation.
- A place where there is a high salt content in the air like a coast.
- Do not use the air conditioner in an environment where an explosion may occur.
- Places like in vehicles or cabin rooms.
- Factories with major voltage fluctuations in the power supplies.
- Other special environmental conditions.

**Units should be installed in positions where:**

- Ensure that the airflow in and out of the IDU is reasonably organized to form an air circulation in the room.
- Ensure IDU maintenance space.
- The nearer the drainage pipe and copper pipe are to the ODU, the lower the pipe cost is.
- Prevent the air conditioner from blowing directly to the human body.
- The closer the wiring to the power cabinet, the lower the wiring cost is.
- Keep the air-conditioning return air away from the setting sun of the room.
- Be careful not to interfere with the light tank, fire pipe, gas pipe and other facilities.
- The IDU should not be lifted in the places like load-bearing beam and columns that affect the structural safety of the house.
- Wired controller and IDU should be in same installation space; otherwise, the sampling point setting of wired controller will need to be changed.

## SPACE REQUIREMENTS




| Capacity (kBtu/h) | A |
|---|---|
| kBtu/h ≤ 12 | 204(8) |
| 12 < kBtu/h ≤ 24 | 246(9-11/16) |
| 24 < kBtu/h ≤ 48 | 288(11-5/16) |

**Fig. 3 —Four-Way Cassette Space Requirements (unit: in.)**

**NOTE: The centerline of the maintenance hole should be in the same position as the centerline of the indoor unit.**

# PIPING DIAGRAM

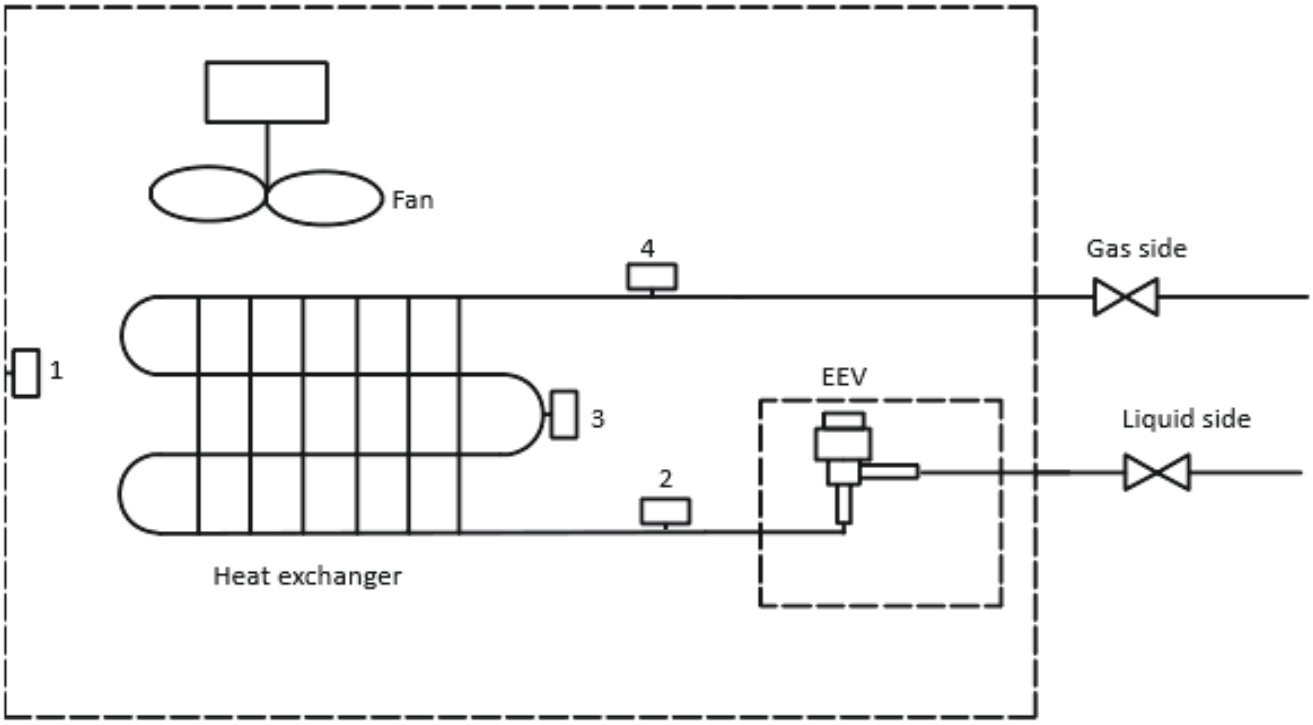



**Fig. 4 —Piping Diagram**

**Table 3 — Legend**

| Legend | Code | Description |
|---|---|---|
| 1 | T1 | Inlet Air Temp. Sensor |
| 2 | T2A | Liquid Pipe Temp. Sensor |
| 3 | T2 | Middle Pipe Temp. Sensor |
| 4 | T2B | Gas Pipe Temp. Sensor |

# WIRING DIAGRAM

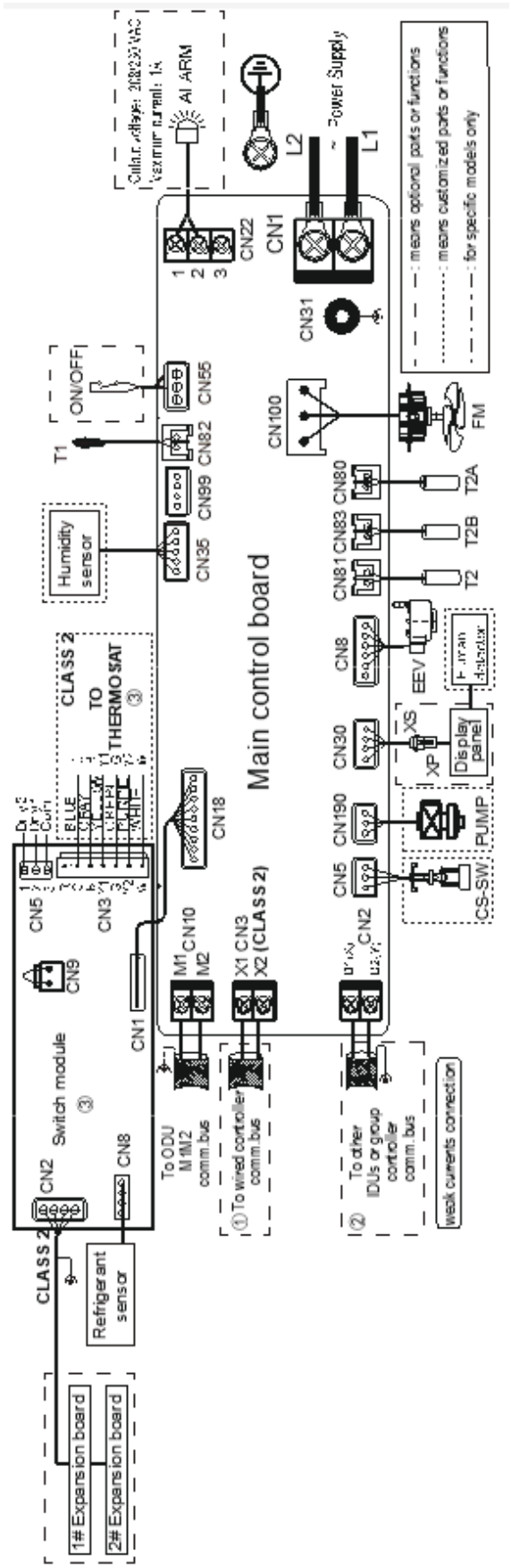



**Fig. 5 —Wiring Diagram**

# ⚠ CAUTION

All installation, servicing and maintenance must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.

Units should be grounded in accordance with all applicable legislation. Metal and other conductive components should be insulated in accordance with all applicable legislation.

Power supply wiring should be securely fastened at the power supply terminals – loose power supply wiring would represent a fire risk.

After installation, servicing or maintenance, the electric control box cover should be closed. Failing to close the electric control box cover risks fire or electric shock.

The dotted lines indicate the field wiring or optional function.

D1D2 communication ports are used for group control communication. When connecting the group controller, the D1D2 port of the indoor units that are to be group controlled must be connected in daisy chain, and the group controller must be connected to the X1X2 port of one of the indoor units in the group control, and set to group control mode. In addition, D1D2 communication ports can also be connected to the central controller.

## CAPACITY TABLES

### Table 4 — Cooling Capacity Table

| Model | Indoor air temperature (°F WB/DB)(°C WB/DB) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14/20 | | 16/23 | | 18/26 | | 19/27 | | 20/28 | | 22/30 | | 24/32 | |
| | TC | SC | TC | SC | TC | SC | TC | SC | TC | SC | TC | SC | TC | SC |
| 45VMF09 | 46 (7.8) | 45 (7.5) | 47 (8.5) | 46 (7.8) | 48 (8.9) | 46 (7.8) | 48 (9.0) | 45 (7.5) | 49 (9.2) | 45 (7.5) | 49 (9.2) | 44 (6.8) | 49 (9.6) | 43 (6.5) |
| 45VMF12 | 51 (10.6) | 50 (10.2) | 52 (11.3) | 50 (10.2) | 54 (11.9) | 50 (10.2) | 54 (12.0) | 50 (10.2) | 54 (12.3) | 50 (10.2) | 55 (12.6) | 49 (9.2) | 55 (13.0) | 48 (8.9) |
| 45VMF15 | 56 (13.3) | 55 (13.0) | 58 (14.3) | 56 (13.3) | 59 (15.0) | 55 (13.0) | 59 (15.0) | 54 (12.3) | 60 (15.4) | 54 (12.3) | 60 (15.7) | 53 (11.6) | 61 (16.0) | 52 (10.9) |
| 45VMF18 | 61 (16.0) | 60 (15.4) | 63 (17.1) | 60 (15.4) | 65 (18.1) | 60 (15.4) | 64 (18.0) | 58 (14.7) | 65 (18.4) | 58 (14.3) | 66 (18.8) | 56 (13.6) | 67 (19.4) | 56 (13.3) |
| 45VMF24 | 70 (21.2) | 68 (20.1) | 72 (22.5) | 68 (20.1) | 74 (23.5) | 68 (20.1) | 75 (24.0) | 67 (19.4) | 76 (24.2) | 66 (19.1) | 77 (24.9) | 65 (18.1) | 78 (25.6) | 63 (17.4) |
| 45VMF30 | 80 (26.6) | 77 (24.9) | 83 (28.3) | 77 (25.2) | 85 (29.7) | 77 (24.9) | 86 (30.0) | 76 (24.2) | 87 (30.4) | 74 (23.5) | 89 (31.4) | 73 (22.9) | 90 (32.1) | 71 (21.8) |
| 45VMF36 | 90 (32.1) | 86 (30.0) | 93 (34.1) | 87 (30.4) | 96 (35.8) | 87 (30.4) | 97 (36.0) | 85 (29.3) | 98 (36.5) | 83 (28.3) | 100 (37.5) | 81 (27.3) | 101 (38.6) | 79 (26.3) |
| 45VMF48 | 109 (42.7) | 104 (39.9) | 114 (45.4) | 105 (40.3) | 117 (47.4) | 104 (39.9) | 118 (48.0) | 102 (38.9) | 120 (48.8) | 100 (37.9) | 122 (49.8) | 96 (35.8) | 124 (51.2) | 95 (34.8) |

**ABBREVIATIONS:**
**TC: Total capacity (kBtu/h)**
**SC: Sensible capacity (kBtu/h)**

**NOTE: Shaded cells indicate rating condition.**

### Table 5 — Heating Capacity Table

| Model | Indoor air temperature (°F DB)(°C DB) | | | | | |
|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 21 | 22 | 24 |
| | SHC | SHC | SHC | SHC | SHC | SHC |
| 45VMF09 | 51 (10.5) | 51 (10.4) | 50 (10.0) | 50 (9.5) | 49 (9.3) | 48 (8.7) |
| 45VMF12 | 58 (14.5) | 58 (14.3) | 56 (13.5) | 56 (13.2) | 55 (12.8) | 53 (11.9) |
| 45VMF15 | 65 (18.1) | 64 (17.9) | 62 (17.0) | 62 (16.5) | 61 (16.0) | 59 (14.8) |
| 45VMF18 | 72 (22.4) | 72 (22.2) | 70 (21.0) | 69 (20.5) | 68 (19.9) | 65 (18.5) |
| 45VMF24 | 83 (28.6) | 83 (28.3) | 82 (27.0) | 79 (26.1) | 78 (25.3) | 74 (23.6) |
| 45VMF30 | 97 (36.2) | 96 (35.8) | 93 (34.0) | 92 (33.1) | 90 (32.1) | 85 (29.7) |
| 45VMF36 | 108 (42.3) | 107 (41.9) | 104 (40.0) | 102 (38.7) | 100 (37.5) | 94 (34.7) |
| 45VMF48 | 135 (57.1) | 134 (56.6) | 129 (54.0) | 126 (52.3) | 123 (50.7) | 116 (46.9) |

**ABBREVIATIONS:**
**SHC: Sensible Heat Capacity (kBtu/h)**

**NOTE: Shaded cells indicate rating condition.**

# ELECTRICAL CHARACTERISTICS

**Table 6 — Electrical Characteristics**

| Model name | Power supply | | | | Indoor fan motors |
|---|---|---|---|---|---|
| | Hz | Volts | MCA | MFA | Rated motor output (W) |
| 45VMF09 | 60 | 208/230 | 0.92 | 15 | 45 |
| 45VMF12 | 60 | 208/230 | 0.92 | 15 | 45 |
| 45VMF15 | 60 | 208/230 | 1.49 | 15 | 125 |
| 45VMF18 | 60 | 208/230 | 1.49 | 15 | 125 |
| 45VMF24 | 60 | 208/230 | 1.49 | 15 | 125 |
| 45VMF30 | 60 | 208/230 | 2.20 | 15 | 125 |
| 45VMF36 | 60 | 208/230 | 2.20 | 15 | 125 |
| 45VMF48 | 60 | 208/230 | 2.20 | 15 | 125 |

# SOUND LEVELS

## OVERALL

**Table 7 — Sound Pressure Levels**

| Model name | Sound pressure levels dB | | | | | | |
|---|---|---|---|---|---|---|---|
| | SSH | SH | H | M | L | SL | SSL |
| 45VMF09 | 36.5 | 35.7 | 34.3 | 33.4 | 32.3 | 31.4 | 30.7 |
| 45VMF12 | 41.4 | 40.7 | 39.3 | 37.6 | 36 | 34.7 | 32 |
| 45VMF15 | 45 | 43.2 | 42.2 | 41 | 40.2 | 38.5 | 36 |
| 45VMF18 | 46 | 45.1 | 44.7 | 42.8 | 41.5 | 40.8 | 40.6 |
| 45VMF24 | 44 | 43.3 | 42.5 | 42 | 41.5 | 41 | 40 |
| 45VMF30 | 49 | 48.1 | 46.6 | 45.6 | 43.2 | 41.5 | 42 |
| 45VMF36 | 53 | 52.6 | 51.8 | 50 | 48.8 | 47.9 | 47 |
| 45VMF48 | 55 | 54.8 | 54.2 | 54 | 52.8 | 51.6 | 50 |

**NOTE: The sound pressure levels are measured 1.5m(59-1/16in.) below the unit in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.**

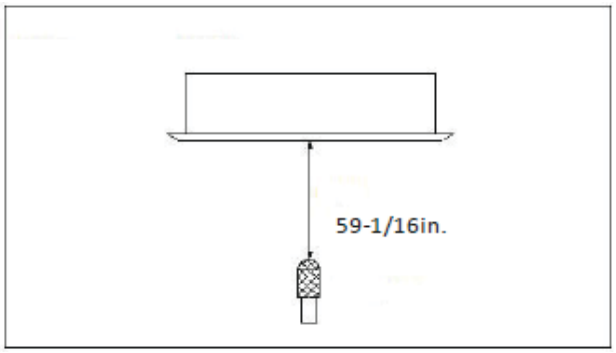



**Fig. 6 —Sound Pressure Level Measurement**

## OCTAVE BAND LEVELS

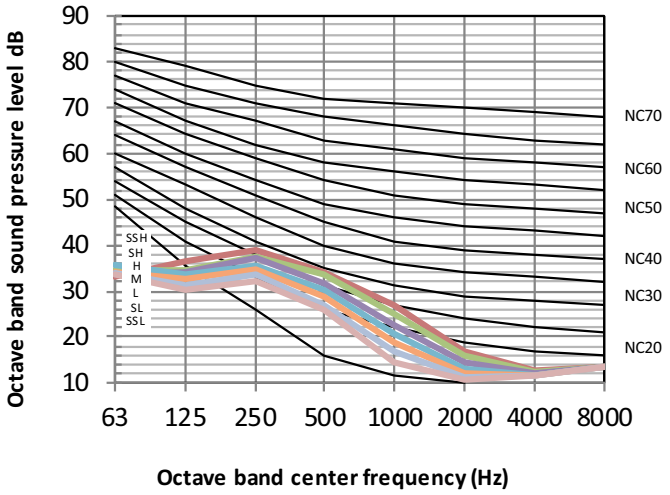



**Fig. 7 —45VMF09**

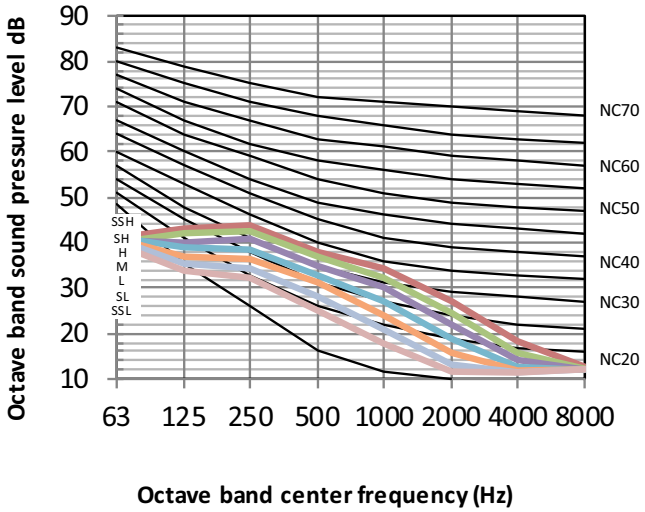



**Fig. 10 —45VMF12**

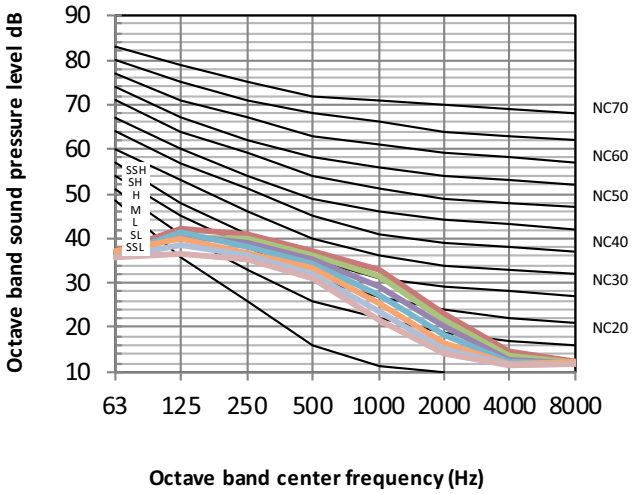



**Fig. 8 —445VMF15**

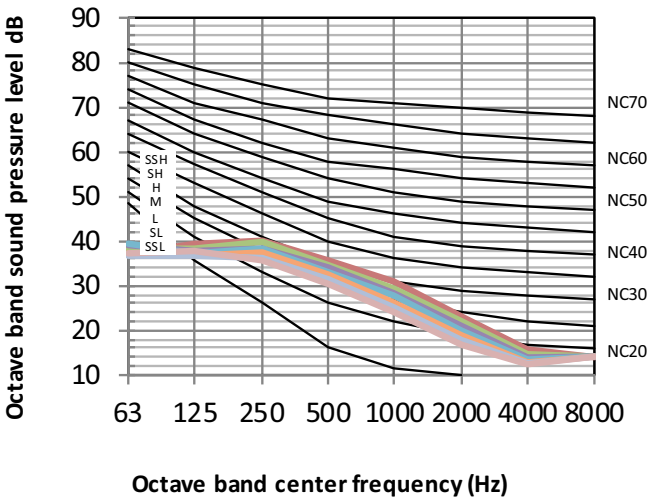



**Fig. 11 —45VMF18**

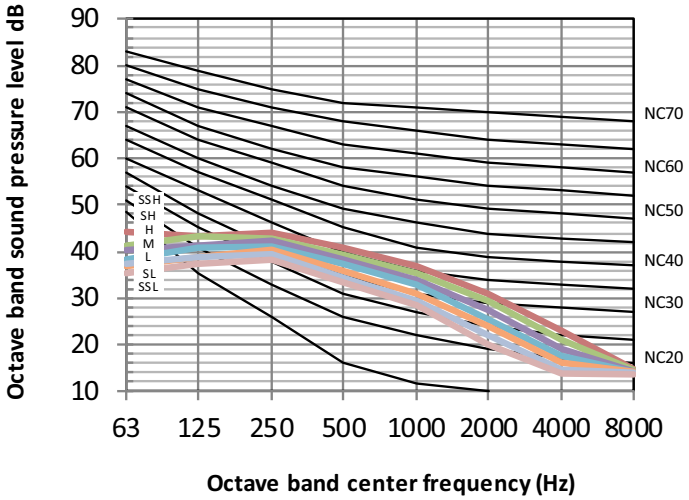



**Fig. 9 —45VMF24**

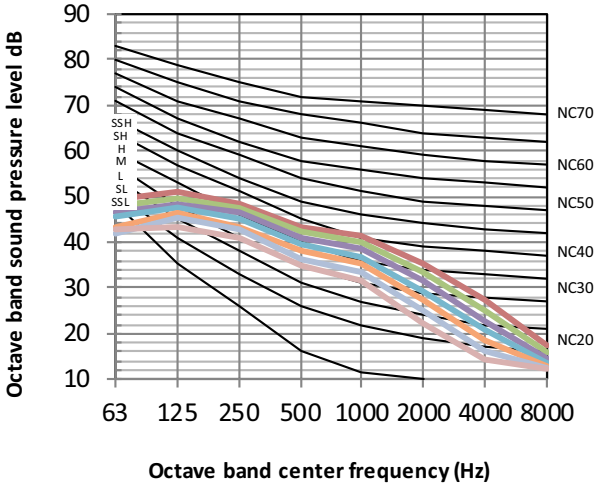



**Fig. 12 —45VMF30**

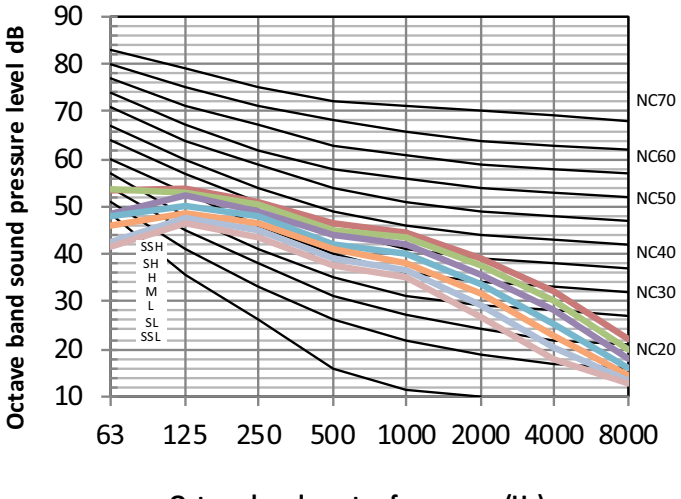



**Fig. 13 —45VMF36---3**

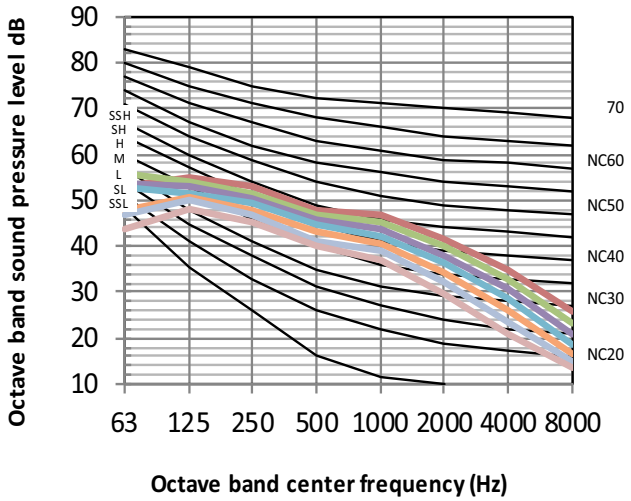



**Fig. 14 —45VMF48---3**

# TEMPERATURE AND AIRFLOW DISTRIBUTION

## SIMULATE CONDITION

**Table 8 — Four-way Cassette Simulate Condition**

| Model name | Room size (in) | Ceiling height (in) | Flow angle (Cooling/Heating) | Placing |
|---|---|---|---|---|
| 45VMF09 | 236-1/4×236-1/4 | 106-5/16 | 30°/65° | Center |
| 45VMF12 | 236-1/4×236-1/4 | 106-5/16 | 30°/65° | Center |
| 45VMF15 | 236-1/4×236-1/4 | 106-5/16 | 30°/65° | Center |
| 45VMF18 | 314-15/16×314-15/16 | 106-5/16 | 30°/65° | Center |
| 45VMF24 | 314-15/16×314-15/16 | 106-5/16 | 30°/65° | Center |
| 45VMF30 | 314-15/16×314-15/16 | 106-5/16 | 30°/65° | Center |
| 45VMF36 | 393-11/16×393-11/16 | 106-5/16 | 30°/65° | Center |
| 45VMF48 | 393-11/16×393-11/16 | 106-5/16 | 30°/65° | Center |

**Note: These figures and videos are based on software simulation. They show typical temperature and airflow distributions in the conditions above. In the actual installation, they may differ from these figures and videos under the influence of air temperature conditions, ceiling height, cooling/heating load, obstacles, etc.**

## AIRFLOW DISTRIBUTIONS (unit: m/s)

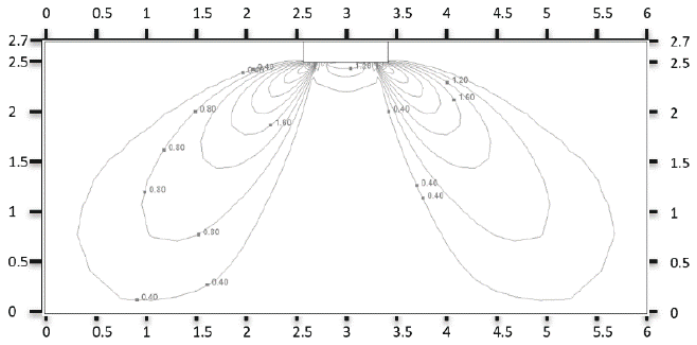


**Fig. 15 —45VMF09 - Cooling at 300s**

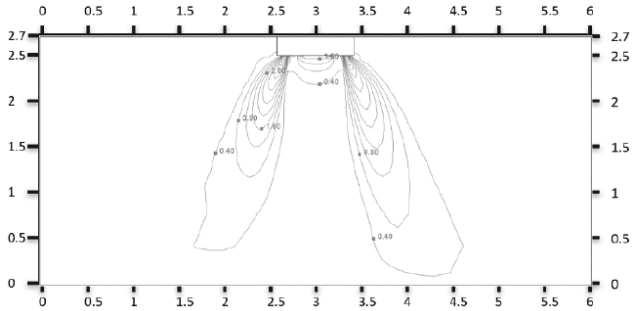


**Fig. 18 —45VMF09 - Heating at 300s**

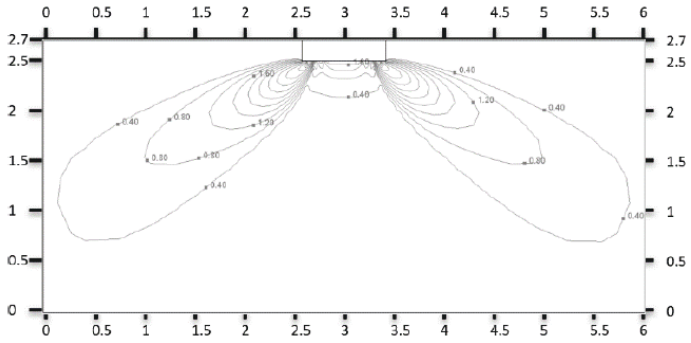


**Fig. 16 —45VMF12 - Cooling at 300s**

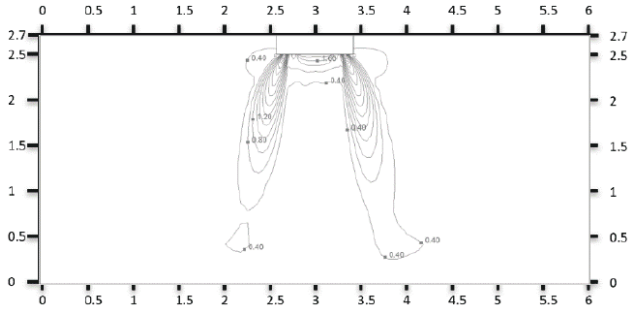


**Fig. 19 —45VMF12 - Heating at 300s**

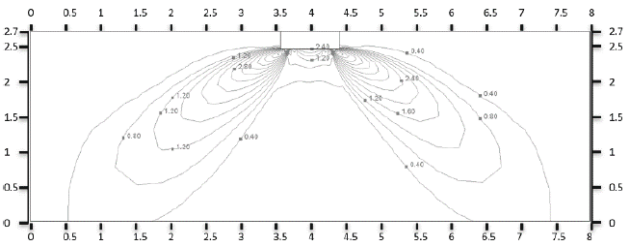


**Fig. 17 —45VMF15 - Cooling at 300s**

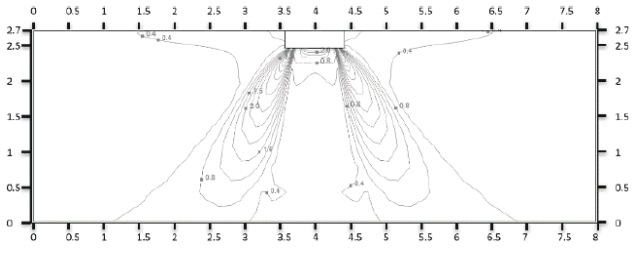


**Fig. 20 —45VMF15 - Heating at 300s**

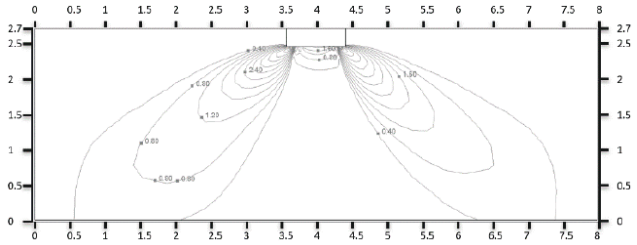


**Fig. 21 —45VMF18 - Cooling at 300s**

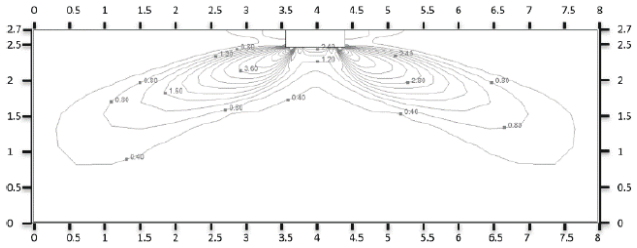


**Fig. 22 —45VMF24 - Cooling at 300s**

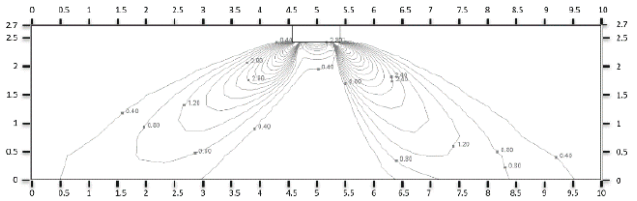


**Fig. 23 —45VMF30 - Cooling at 300s**

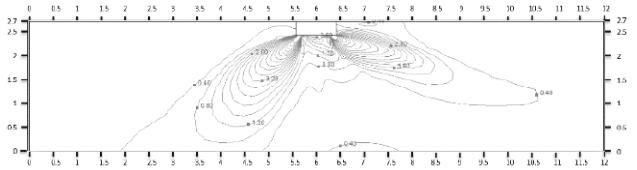


**Fig. 24 —45VMF36 - Cooling at 300s**

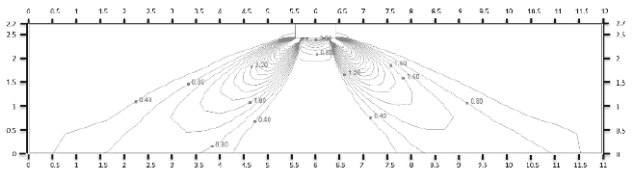


**Fig. 25 —45VMF48 - Cooling at 300s**

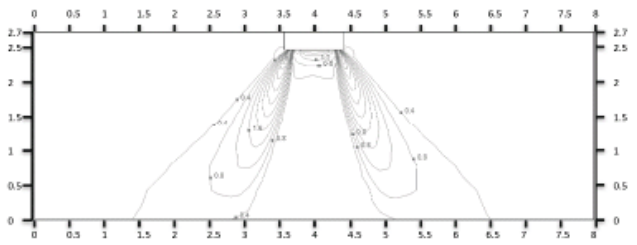


**Fig. 26 —45VMF18 - Heating at 300s**

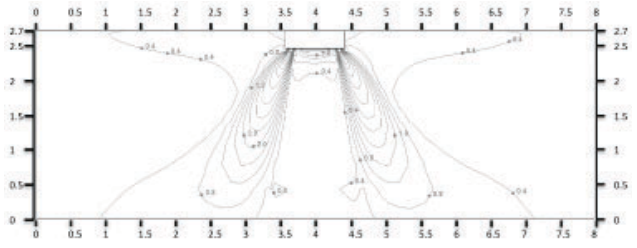


**Fig. 27 —45VMF24 - Heating at 300s**

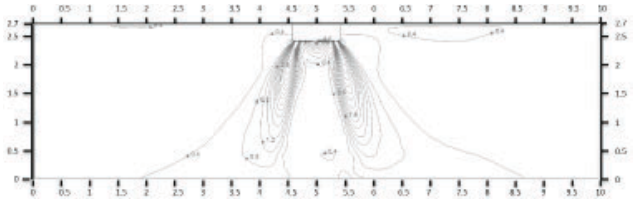


**Fig. 28 —45VMF30 - Heating at 300s**

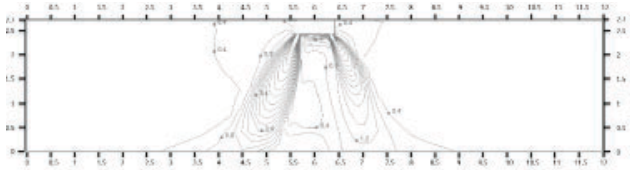


**Fig. 29 —45VMF36 - Heating at 300s**

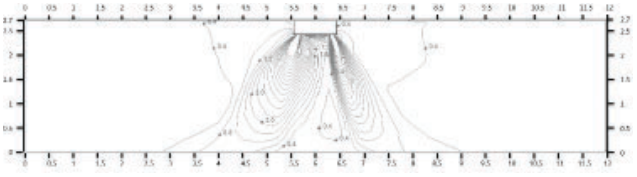


**Fig. 30 —45VMF48 - Heating at 300s**

## TEMPERATURE DISTRIBUTIONS (unit: ℃)

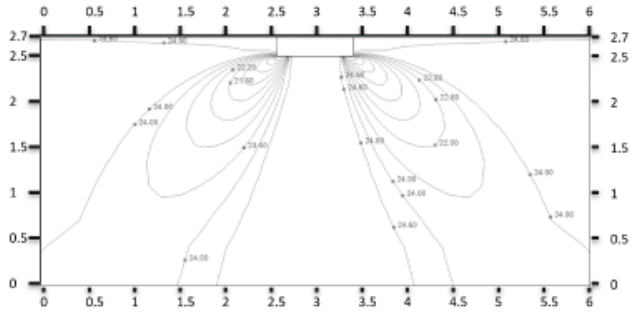


Fig. 31 —45VMF09 - Cooling at 300s

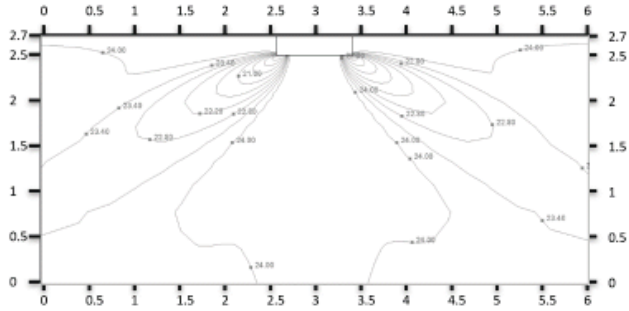


Fig. 32 —45VMF12 - Cooling at 300s

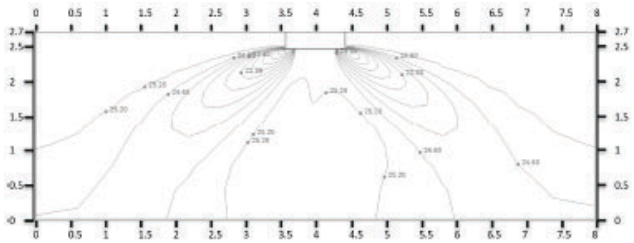


Fig. 33 —45VMF15 - Cooling at 300s

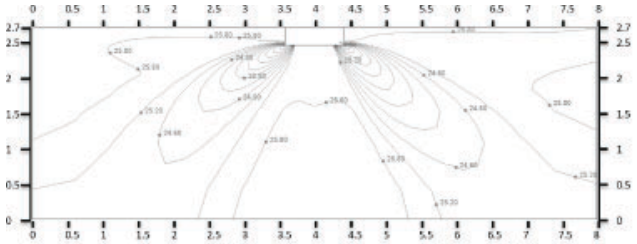


Fig. 34 —45VMF18 - Cooling at 300s

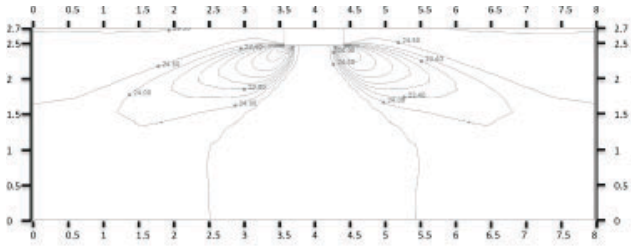


Fig. 35 —45VMF24 - Cooling at 300s

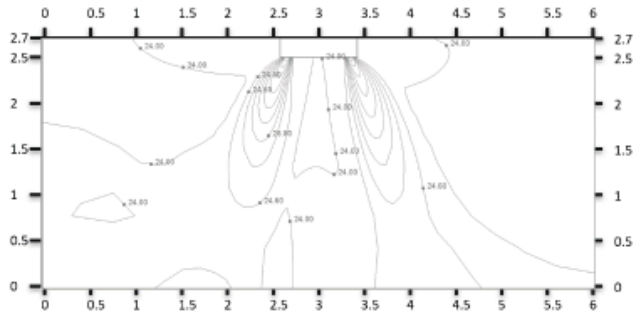


Fig. 36 —45VMF09 - Heating at 300s

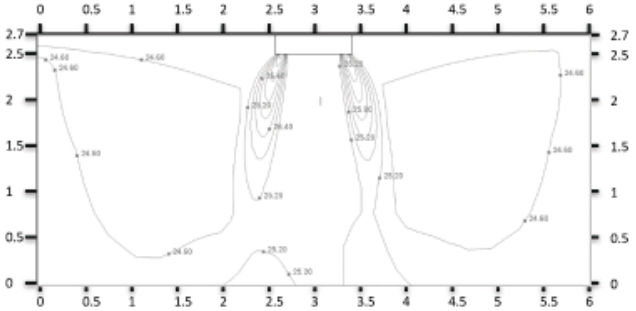


Fig. 37 —45VMF12 - Heating at 300s

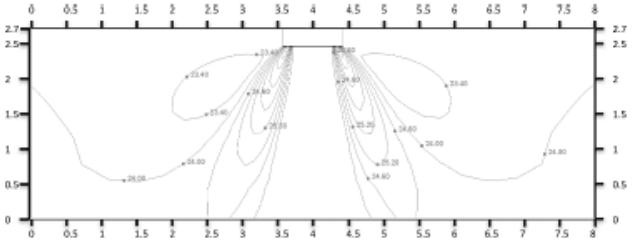


Fig. 38 —45VMF15 - Heating at 300s

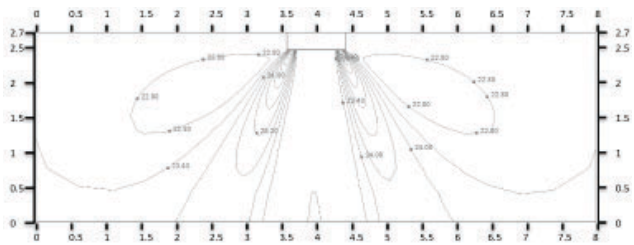


Fig. 39 —45VMF18 - Heating at 300s

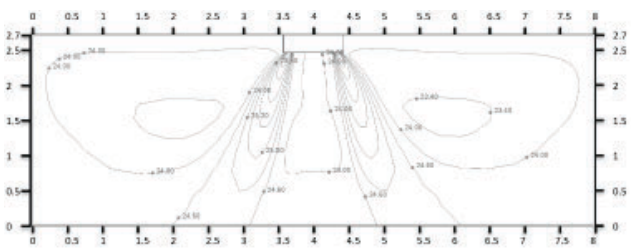


Fig. 40 —45VMF24 - Heating at 300s

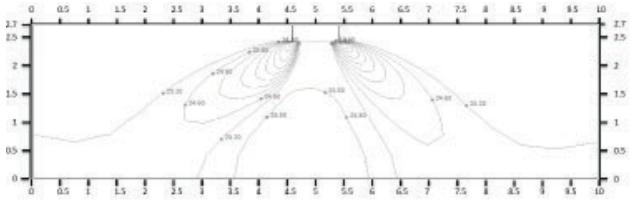


**Fig. 41 —45VMF30 - Cooling at 300s**

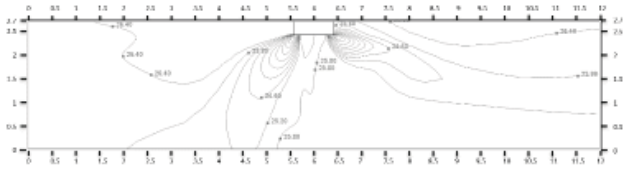


**Fig. 42 —45VMF36 - Cooling at 300s**

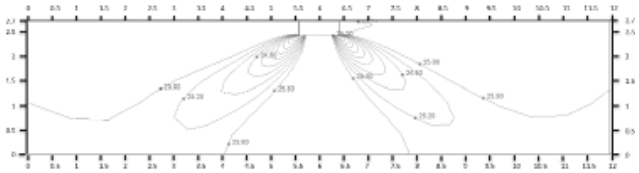


**Fig. 43 —45VMF48 - Cooling at 300s**

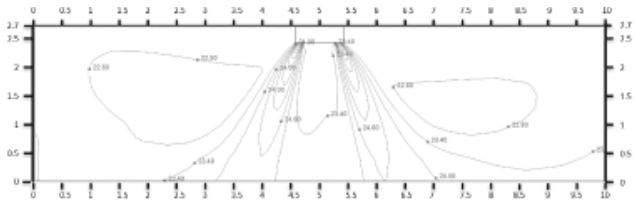


**Fig. 44 —45VMF30 - Heating at 300s**

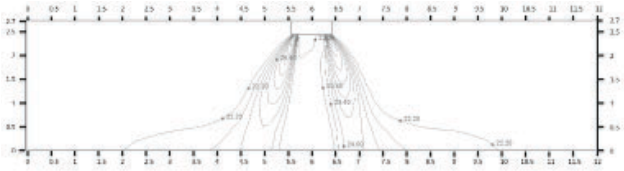


**Fig. 45 —45VMF36 - Heating at 300s**

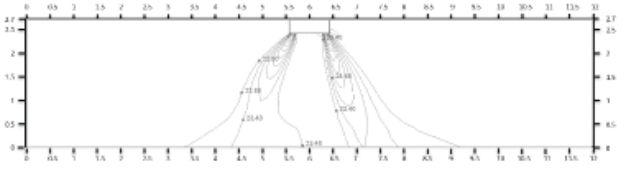


**Fig. 46 —45VMF48 - Heating at 300s**

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