

## Data sheet

# Solenoid valves

## Type EVUL



EVUL solenoid valves are designed to fit into compact refrigeration systems. Available in servo operated versions they can be applied in liquid, suction, and hot gas lines.

EVUL solenoid valves can be used in many different refrigeration systems and are specially designed for:

- Commercial refrigeration systems
- Refrigeration appliances
- Liquid coolers
- Ice cube machines
- Mobile refrigeration systems
- Heat pump systems
- Air conditioning units

### Features

- Compact and light weight.
- Fully hermetic construction in stainless steel.
- Laser welded bimetal connections.
- High vibration resistance
- Excellent leak integrity
- Bimetal connections for fast soldering.
- No need of wet cloth / heat sink by soldering.
- Servo operated mini piston, sturdy and compact solenoid valve.
- Universal application for – liquid, suction, and hot gas applications.
- Minimum power consumption.
- Simple and fast mounting of coil.
- Encapsulated coils provide long life time even under extreme conditions.
- High MOPD capacity – up to 36 bar (522 psi)
- Build in filter in the inlet.

### Approvals

- UL Recognized Component (Canadian and US)
- Pressure Equipment Directive (PED) 2014/68/EU
- Low Voltage Directive (LVD) 2014/35/EU
- RoHS II



## Technical data

### Refrigerants

R744, R22/R407C, R404A/R507, R410A, R134a, R407A, R23, R290, R407F, R448A, R449A, R450A, and R452A.

For complete list of approved refrigerants, visit [www.products.danfoss.com](http://www.products.danfoss.com) and search for individual code numbers, where refrigerants are listed as part of technical data.



### Special note for R290:

The EVUL is validated in accordance to ATEX, ISO 5149, IEC 60335, and UL. Ignition risk is evaluated in accordance to ISO 5149 and IEC 60335.

See safety note at the bottom of this page.

### Max. working pressure

90 bar / 1305 psig

### Media temperature

-40 °C / -40 °F – 105 °C / 221 °F

### Ambient temperature

-40 °C / -40 °F – 50 °C / 122 °F

### MOPD operating range

EVUL 1 – 8: 0.02 – 36 bar / 0.29 – 522 psi

MOPD is measured with highest media and ambient temperature and 15% below nominal voltage.

MOPD (Max. Opening Pressure Differential) for media in gas form is approximately 0.97 bar greater.

$K_v$  value is the water flow in  $m^3$  / hour at a pressure drop across valve  $\Delta p = 1$  bar,  $\rho = 1000 \text{ Kg} / m^3$ .

$C_v$  value is the water flow in [gal / min] at a pressure drop across valve  $\Delta p = 1$  psi,  $\rho = 10 \text{ lbs} / \text{gal}$

### Humidity

0 – 100% R.H. (0-97% R.H. non-condensation condition if IP level is below IPX5).

### Liquid – Rated capacity [Kw]

### SI units

| Type   | R22/R407C | R134a | R404A/R507 | R407A | R410A | R290  | $K_v$ value<br>[m <sup>3</sup> / hour] |
|--------|-----------|-------|------------|-------|-------|-------|----------------------------------------|
| EVUL 1 | 2.01      | 1.65  | 1.38       | 1.85  | 2.02  | 2.24  | 0.10                                   |
| EVUL 2 | 4.02      | 3.31  | 2.76       | 3.70  | 4.04  | 4.48  | 0.20                                   |
| EVUL 3 | 6.03      | 4.96  | 4.14       | 5.55  | 6.06  | 6.72  | 0.30                                   |
| EVUL 4 | 10.05     | 8.27  | 6.91       | 9.25  | 10.10 | 11.20 | 0.50                                   |
| EVUL 5 | 13.06     | 10.75 | 8.98       | 12.02 | 13.13 | 14.55 | 0.65                                   |
| EVUL 6 | 15.07     | 12.40 | 10.36      | 13.87 | 15.15 | 16.79 | 0.75                                   |
| EVUL 8 | 18.09     | 14.88 | 12.43      | 16.65 | 18.18 | 20.15 | 0.90                                   |

### Suction vapor – Rated capacity [Kw]

### SI units

| Type   | R22/R407C | R134a | R404A/R507 | R407A | R410A | R290 | $K_v$ value<br>[m <sup>3</sup> / hour] |
|--------|-----------|-------|------------|-------|-------|------|----------------------------------------|
| EVUL 1 | 0.16      | 0.13  | 0.14       | 0.16  | 0.21  | 0.27 | 0.10                                   |
| EVUL 2 | 0.32      | 0.26  | 0.29       | 0.31  | 0.41  | 0.54 | 0.20                                   |
| EVUL 3 | 0.48      | 0.38  | 0.43       | 0.47  | 0.62  | 0.82 | 0.30                                   |
| EVUL 4 | 0.79      | 0.64  | 0.71       | 0.78  | 1.04  | 1.36 | 0.50                                   |
| EVUL 5 | 1.03      | 0.83  | 0.93       | 1.01  | 1.35  | 1.77 | 0.65                                   |
| EVUL 6 | 1.19      | 0.96  | 1.07       | 1.17  | 1.56  | 2.04 | 0.75                                   |
| EVUL 8 | 1.43      | 1.15  | 1.29       | 1.40  | 1.87  | 2.45 | 0.90                                   |

### Hot gas – Rated capacity [Kw]

### SI units

| Type   | R22/R407C | R134a | R404A/R507 | R407A | R410A | R290 | $K_v$ value<br>[m <sup>3</sup> / hour] |
|--------|-----------|-------|------------|-------|-------|------|----------------------------------------|
| EVUL 1 | 0.42      | 0.32  | 0.34       | 0.41  | 0.49  | 1.02 | 0.10                                   |
| EVUL 2 | 0.85      | 0.64  | 0.67       | 0.82  | 0.98  | 2.05 | 0.20                                   |
| EVUL 3 | 1.27      | 0.96  | 1.01       | 1.22  | 1.46  | 3.07 | 0.30                                   |
| EVUL 4 | 2.11      | 1.60  | 1.69       | 2.04  | 2.44  | 5.12 | 0.50                                   |
| EVUL 5 | 2.75      | 2.08  | 2.19       | 2.65  | 3.17  | 6.67 | 0.65                                   |
| EVUL 6 | 3.17      | 2.40  | 2.53       | 3.06  | 3.66  | 7.78 | 0.75                                   |
| EVUL 8 | 3.80      | 2.88  | 3.03       | 3.67  | 4.39  | 9.21 | 0.90                                   |



The EVUL can be applied on systems with R290 as the working fluid.

For countries where safety standards are not an indispensable part of the safety system Danfoss recommends the installer gets a third party approval of any system containing flammable refrigerant.

**Note:** please follow specific selection criteria stated in the datasheet for this particular refrigerants.

Rated liquid and suction vapor capacity are based on:

- evaporating temperature  $t_e = -10$  °C,
- liquid temperature ahead of the valve  $t_l = 25$  °C,
- pressure drop in valve  $\Delta p = 0.15$  bar.

Rated hot gas capacity is based on:

- condensing temperature  $t_c = 40$  °C,
- hot gas temperature  $t_h = 65$  °C
- subcooling of refrigerant  $\Delta t_{sub} = 4$  K
- Pressure drop across valve  $\Delta p = 0.8$  bar

**Technical data**  
(continued)

*Liquid – Rated capacity<sup>1)</sup> [TR]*
**US units**

| Type   | R22/R407C | R134a | R404A/R507 | R407A | R410A | R290 | C <sub>v</sub> -value<br>[gal / min] |
|--------|-----------|-------|------------|-------|-------|------|--------------------------------------|
| EVUL 1 | 0.58      | 0.47  | 0.39       | 0.53  | 0.57  | 0.68 | 0.12                                 |
| EVUL 2 | 1.15      | 0.93  | 0.79       | 1.06  | 1.15  | 1.37 | 0.23                                 |
| EVUL 3 | 1.73      | 1.40  | 1.18       | 1.59  | 1.72  | 2.05 | 0.35                                 |
| EVUL 4 | 2.88      | 2.33  | 1.97       | 2.65  | 2.87  | 3.42 | 0.58                                 |
| EVUL 5 | 3.74      | 3.02  | 2.57       | 3.44  | 3.73  | 4.44 | 0.75                                 |
| EVUL 6 | 4.32      | 3.49  | 2.96       | 3.97  | 4.31  | 5.13 | 0.87                                 |
| EVUL 8 | 5.18      | 4.19  | 3.55       | 4.77  | 5.17  | 6.15 | 1.04                                 |

<sup>1)</sup> Rated liquid and suction capacity are based on:  
 - evaporating temperature  $t_e = 40\text{ °F}$ ,  
 - liquid temperature ahead of the valve  $t_l = 100\text{ °F}$ ,  
 - pressure drop  $\Delta p$  across valve – with liquid:  
 -  $\Delta p = 2\text{ psi}$  for R134a  
 -  $\Delta p = 3\text{ psi}$  for R22, R404A/R507 – with suction vapor:  $\Delta p = 1\text{ psi}$

*Suction vapor – Rated capacity<sup>1)</sup> [TR]*
**US units**

| Type   | R22/R407C | R134a | R404A/R507 | R407A | R410A | R290 | C <sub>v</sub> -value<br>[gal / min] |
|--------|-----------|-------|------------|-------|-------|------|--------------------------------------|
| EVUL 1 | 0.05      | 0.04  | 0.04       | 0.05  | 0.06  | 0.06 | 0.12                                 |
| EVUL 2 | 0.10      | 0.08  | 0.09       | 0.09  | 0.12  | 0.12 | 0.23                                 |
| EVUL 3 | 0.14      | 0.12  | 0.13       | 0.14  | 0.19  | 0.19 | 0.35                                 |
| EVUL 4 | 0.24      | 0.20  | 0.22       | 0.24  | 0.31  | 0.31 | 0.58                                 |
| EVUL 5 | 0.31      | 0.25  | 0.28       | 0.31  | 0.40  | 0.40 | 0.75                                 |
| EVUL 6 | 0.36      | 0.29  | 0.32       | 0.35  | 0.47  | 0.47 | 0.87                                 |
| EVUL 8 | 0.43      | 0.35  | 0.39       | 0.42  | 0.56  | 0.56 | 1.04                                 |

<sup>1)</sup> Rated liquid and suction capacity are based on:  
 - evaporating temperature  $t_e = 40\text{ °F}$ ,  
 - liquid temperature ahead of the valve  $t_l = 100\text{ °F}$ ,  
 - pressure drop  $\Delta p$  across valve – with liquid:  
 -  $\Delta p = 2\text{ psi}$  for R134a  
 -  $\Delta p = 3\text{ psi}$  for R22, R404A/R507 – with suction vapor:  $\Delta p = 1\text{ psi}$

*Hot gas – Rated capacity<sup>1)</sup> [TR]*
**US units**

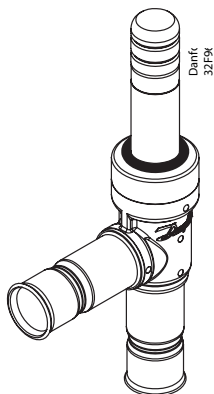
| Type   | R22/R407C | R134a | R404A/<br>R507 | R407A | R410A | R290 | C <sub>v</sub> -value<br>[gal / min] |
|--------|-----------|-------|----------------|-------|-------|------|--------------------------------------|
| EVUL 1 | 0.10      | 0.07  | 0.08           | 0.09  | 0.11  | 0.13 | 0.12                                 |
| EVUL 2 | 0.19      | 0.15  | 0.15           | 0.18  | 0.22  | 0.27 | 0.23                                 |
| EVUL 3 | 0.29      | 0.22  | 0.23           | 0.28  | 0.33  | 0.40 | 0.35                                 |
| EVUL 4 | 0.48      | 0.37  | 0.38           | 0.46  | 0.54  | 0.67 | 0.58                                 |
| EVUL 5 | 0.62      | 0.48  | 0.49           | 0.60  | 0.70  | 0.86 | 0.75                                 |
| EVUL 6 | 0.72      | 0.56  | 0.57           | 0.69  | 0.81  | 1.00 | 0.87                                 |
| EVUL 8 | 0.86      | 0.67  | 0.68           | 0.83  | 0.98  | 1.19 | 1.04                                 |

Rated hot gas capacity is based on:  
 - condensing temperature  $t_c = 100\text{ °F}$ ,  
 - hot gas temperature  $t_h = 140\text{ °F}$ ,  
 - pressure drop across valve  $\Delta p = 2\text{ psi}$

**Capacity R744**

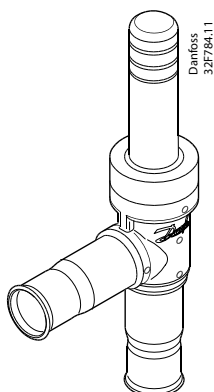
Due to the fact that EVU only can be used for sub critical R744 application, capacity tables are not illustrated in this technical leaflet.

For capacity dimension please refer to Danfoss interactive calculation and selection tool CoolSelector® (DIR Calc).

**Ordering valve**

*Normally closed (NC)*

| Valve type | Connections | Industrial pack |      | Multi pack | Connections | Industrial pack |      | Multi pack |
|------------|-------------|-----------------|------|------------|-------------|-----------------|------|------------|
|            | [in.]       | Code no.        | Pcs. | Code no.   | [mm]        | Code no.        | Pcs. | Code no.   |
| EVUL 1     | 1/4         | 032F8200        | 40   | –          | 6           | 032F8227        | 40   | –          |
|            | 1/4         | –               | –    | 032F9506   | 6           | –               | –    | 032F9508   |
| EVUL 2     | 1/4         | 032F8201        | 40   | 032F9510   | 6           | 032F8228        | 40   | 032F9516   |
| EVUL 3     | 1/4         | 032F8202        | 40   | 032F9511   | 6           | 032F8229        | 40   | 032F9517   |
|            | 3/8         | 032F8203        | 40   | –          | 10          | 032F8230        | 40   | –          |
| EVUL 4     | 1/4         | 032F8204        | 40   | 032F9512   | 6           | 032F8231        | 40   | 032F9518   |
|            | 3/8         | 032F8205        | 40   | –          | 10          | 032F8232        | 40   | –          |
|            | 1/2         | 032F8206        | 40   | –          | 12          | 032F8233        | 40   | –          |
| EVUL 5     | 3/8         | 032F8207        | 40   | 032F9513   | 10          | 032F8234        | 40   | 032F9519   |
|            | 1/2         | 032F8208        | 40   | –          | 12          | 032F8235        | 40   | –          |
| EVUL 6     | 3/8         | 032F8209        | 40   | –          | 10          | 032F8236        | 40   | –          |
|            | 1/2         | 032F8210        | 40   | 032F9514   | 12          | 032F8237        | 40   | 032F9521   |
| EVUL 8     | 1/2         | 032F8211        | 40   | 032F9515   | 12          | 032F8238        | 40   | 032F9522   |

Single pack = 1 product in a box with installation guide  
 Multi pack = box with x pieces single pack (can be split)  
 Industrial pack = x pieces in one box (cannot be split)

*Normally closed (NC) - only works with UL/UR approved coils*


| Valve type | Connections<br>[in.] | Industrial pack |      |
|------------|----------------------|-----------------|------|
|            |                      | Code no.        | Pcs. |
| EVUL 1     | 1/4                  | 032F8245        | 40   |
| EVUL 2     | 1/4                  | 032F8246        | 40   |
| EVUL 3     | 1/4                  | 032F8247        | 40   |
|            | 3/8                  | 032F8248        | 40   |
| EVUL 4     | 1/4                  | 032F8249        | 40   |
|            | 3/8                  | 032F8250        | 40   |
|            | 1/2                  | 032F8251        | 40   |
| EVUL 5     | 3/8                  | 032F8252        | 40   |
|            | 1/2                  | 032F8253        | 40   |
| EVUL 6     | 3/8                  | 032F8254        | 40   |
|            | 1/2                  | 032F8255        | 40   |
| EVUL 8     | 1/2                  | 032F8256        | 40   |

Single pack = 1 product in a box with installation guide  
 Multi pack = box with x pieces single pack (can be split)  
 Industrial pack = x pieces in one box (cannot be split)

## Ordering coils



### Special note for R290:

The EVUL coil (IP65/67) is validated in accordance to ISO 5149, IEC 60335 (ref. IEC/EN 60079-15). Ignition risk is evaluated in accordance to ISO 5149 and IEC 60335 (ref. IEC/EN 60079-15). See safety note at the bottom of this page.

Please make sure that there is no spark, arc on the spade connection during the application.

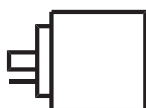
If coils are below IPx5, they must be protected against ultraviolet, moisture and major impact, especially the connection of coils.

Always Install a fuse ahead of the coil:  
rated current: two times of rated current,  
time lag: medium, to avoid short circuit.

The coil used in an area of not more than pollution degree 2.

Follow the installation guide to mount the coil correctly, and apply o-ring for sealing to prevent moisture penetrating inside the coil.

## DIN spade connection



**Single pack**  
1 product in a box with installation guide  
**Multi pack**  
box with x pieces single pack  
(can be split)  
**Industrial pack**  
x pieces in one box (cannot be split)

### Alternating current AC - with DIN plug <sup>1)</sup> - IP65

| Type    | Ambient Temp. [°C] | Supply voltage [V] | Voltage variation | Frequency [Hz] | Power consumption |      | Industrial pack |      | Multi pack |
|---------|--------------------|--------------------|-------------------|----------------|-------------------|------|-----------------|------|------------|
|         |                    |                    |                   |                | [W]               | [VA] | Code no.        | Pcs. | Code no.   |
| AS024CS | -40 – 50           | 24                 | -15% – 10%        | 50             | 9.5               | 18   | –               | –    | 042N7608   |
|         |                    | 24                 | -15% – 10%        | 60             | 7.0               | 14   |                 |      |            |
| AS230CS | -40 – 50           | 230                | -15% – 10%        | 50             | 8.0               | 16   | –               | –    | 042N7601   |
|         |                    | 208 – 240          | -15% – 10%        | 60             | 7.0               | 14   |                 |      |            |
| AS240CS | -40 – 50           | 240                | -15% – 10%        | 50             | 6.5               | 13   | –               | –    | 042N7602   |
|         |                    | 240                | -15% – 10%        | 60             | 5.0               | 10   |                 |      |            |

<sup>1)</sup> The three pins on the coil can be fitted with spade tabs, 6.3 mm wide (to DIN 46247). The two current carrying pins can also be fitted with spade tabs, 4.8 mm wide. Max. lead cross section: 1.5 mm<sup>2</sup>. If DIN plug is used (DIN 43650) the leads must be connected in the socket. The socket is fitted with a Pg 11 screwed entry for 6 – 12 mm.

## Cable connection



**Single pack**  
1 product in a box with installation guide  
**Multi pack**  
box with x pieces single pack  
(can be split)  
**Industrial pack**  
x pieces in one box (cannot be split)

### Alternating current AC with 1 m cable - IP67

| Type    | Ambient Temp. [°C] | Supply voltage [V] | Voltage variation | Frequency [Hz] | Power consumption |      | Industrial pack |      | Multi pack |
|---------|--------------------|--------------------|-------------------|----------------|-------------------|------|-----------------|------|------------|
|         |                    |                    |                   |                | [W]               | [VA] | Code no.        | Pcs. | Code no.   |
| AU115CS | -40 – 50           | 115                | -15% – 10%        | 50             | 7.0               | 14   | –               | –    | 042N7662   |
|         |                    | 115                | -15% – 10%        | 60             | 5.0               | 10   |                 |      |            |
| AU230CS | -40 – 50           | 230                | -15% – 10%        | 50             | 7.0               | 14   | 042N8651        | 20   | 042N7651   |
|         |                    | 230                | -15% – 10%        | 60             | 5.0               | 10   |                 |      |            |
| AU240CS | -40 – 50           | 240                | -15% – 10%        | 50             | 6.5               | 13   | 042N8652        | 20   | –          |
|         |                    | 240                | -15% – 10%        | 60             | 5.0               | 10   |                 |      |            |



The EVUL coil (IP65/67) can be applied on systems with R290 as the working fluid.

For countries where safety standards are not an indispensable part of the safety system Danfoss recommend the installer to get a third party approval of the system containing flammable refrigerant.

**Note:** please follow specific selection criteria stated in the datasheet for these particular refrigerants.

**Note:** The EVUL coil (IP65/67) has NOT been verified ATEX or IECEx or IEC 60079 series zone 2 compliant. This product is only validated for systems in compliance with ISO5149, IEC 60335 (ref. IEC/EN 60079-15). It is the responsibility of the user to verify such compliance. Improper use can cause explosion, fire, leakage potentially causing death, personal injury, or damage to property.

## Data sheet | Solenoid valves, Type EVUL

### Ordering coils (continued)

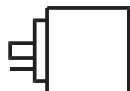
#### Cable connection



#### Direct current DC with 1 m cable IP67

| Type    | Ambient Temp. [°C] | Supply voltage [V] | Voltage variation | Frequency [Hz] | Power consumption |      | Industrial pack |      | Multi pack |
|---------|--------------------|--------------------|-------------------|----------------|-------------------|------|-----------------|------|------------|
|         |                    |                    |                   |                | [W]               | [VA] | Code no.        | Pcs. | Code no.   |
| AU012DS | -40 – 50           | 12                 | ±10%              | DC             | 12                | –    | 042N8696        | 20   | 042N7696   |
| AU024DS | -40 – 50           | 24                 | ±10%              | DC             | 14                | –    | 042N8697        | 20   | 042N7697   |

#### DIN spade connection

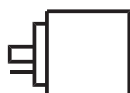


#### Direct current DC with DIN spade IP00

| Type    | Ambient Temp. [°C] | Supply voltage [V] | Voltage variation | Frequency [Hz] | Power consumption |      | Industrial pack |      | Multi pack |
|---------|--------------------|--------------------|-------------------|----------------|-------------------|------|-----------------|------|------------|
|         |                    |                    |                   |                | [W]               | [VA] | Code no.        | Pcs. | Code no.   |
| AS012DS | -40 – 60           | 12                 | ±10%              | DC             | 14                | –    | 042N8686        | 40   | –          |
| AS024D  | -40 – 50           | 24                 | ±10%              | DC             | 14                | –    | 042N8687        | 40   | 042N7687   |

DC coils with 0.25 in. US spade can be supplied on request.

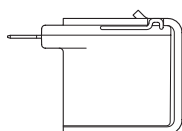
#### DIN spade (UL recognized version) connection



#### Alternating current AC with DIN spade (UL recognized version) IP00

| Type    | Ambient Temp. [°C] | Supply voltage [V] | Voltage variation | Frequency [Hz] | Power consumption |      | Industrial pack |      | Multi pack |
|---------|--------------------|--------------------|-------------------|----------------|-------------------|------|-----------------|------|------------|
|         |                    |                    |                   |                | [W]               | [VA] | Code no.        | Pcs. | Code no.   |
| AZ240CS | -40 – 50           | 230                | -15% – 10%        | 50             | 8.0               | 16   | 042N8201        | 40   | 042N4201   |
|         |                    | 208 – 240          | -15% – 10%        | 60             | 7.0               | 14   |                 |      |            |
| AZ120CS | -40 – 50           | 115                | -15% – 10%        | 50             | 8.5               | 16   | 042N8202        | 40   | 042N4202   |
|         |                    | 110 – 120          | -15% – 10%        | 60             | 7.0               | 14   |                 |      |            |
| AZ024CS | -40 – 50           | 24                 | -15% – 10%        | 50             | 9.5               | 18   | 042N8203        | 40   | 042N4203   |
|         |                    | 24                 | -15% – 10%        | 60             | 7.0               | 14   |                 |      |            |

#### 0.25 in. US spade connections



#### Alternating current AC with US spade IP00

| Type   | Ambient Temp. [°C] | Supply voltage [V] | Voltage variation | Frequency [Hz] | Power consumption |      | Industrial pack |      | Multi pack |
|--------|--------------------|--------------------|-------------------|----------------|-------------------|------|-----------------|------|------------|
|        |                    |                    |                   |                | [W]               | [VA] | Code no.        | Pcs. | Code no.   |
| AY240C | -40 – 50           | 208 – 240          | -15% – 10%        | 50             | 8.0               | 16   | 042N8230        | 40   | 042N4230   |
|        |                    | 208 – 240          | -15% – 10%        | 60             | 8.0               | 16   |                 |      |            |
| AY120C | -40 – 50           | 110 – 120          | -15% – 10%        | 50             | 8.0               | 16   | 042N8233        | 40   | 042N4233   |
|        |                    | 110 – 120          | -15% – 10%        | 60             | 8.0               | 16   |                 |      |            |
| AY024C | -40 – 50           | 24                 | -15% – 10%        | 50             | 8.0               | 16   | 042N8236        | 40   | –          |
|        |                    | 24                 | -15% – 10%        | 60             | 8.0               | 16   |                 |      |            |

#### Single pack

1 product in a box with installation guide

#### Multi pack

box with x pieces single pack  
(can be split)

#### Industrial pack

x pieces in one box (cannot be split)

### Accessories

| Part | Description                                                                                                | Multi pack |      |
|------|------------------------------------------------------------------------------------------------------------|------------|------|
|      |                                                                                                            | Code no.   | Pcs. |
|      | DIN plug                                                                                                   | 042N0156   | 100  |
|      | O-ring for sealing the coil.<br>Industrial pack (50 pcs.)<br><b>NB:</b><br>Valve body supplied with O-ring | 032F6115   | 125  |

# Capacity

## Liquid capacity $Q_e$ [kW]

SI Units

| Type | $K_v$<br>[m <sup>3</sup> / h] | Liquid capacity $Q_e$ [kW]<br>at pressure drop across valve $\Delta p$ [bar] |     |     |     |     |
|------|-------------------------------|------------------------------------------------------------------------------|-----|-----|-----|-----|
|      |                               | 0.1                                                                          | 0.2 | 0.3 | 0.4 | 0.5 |

### R22/R407C

|        |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|
| EVUL 1 | 0.10 | 1.6  | 2.2  | 2.7  | 3.1  | 3.5  |
| EVUL 2 | 0.20 | 3.1  | 4.4  | 5.4  | 6.3  | 7.0  |
| EVUL 3 | 0.30 | 4.7  | 6.7  | 8.1  | 9.4  | 10.5 |
| EVUL 4 | 0.50 | 7.8  | 11.1 | 13.6 | 15.7 | 17.5 |
| EVUL 5 | 0.65 | 10.2 | 14.4 | 17.6 | 20.4 | 22.8 |
| EVUL 6 | 0.75 | 11.8 | 16.6 | 20.4 | 23.5 | 26.3 |
| EVUL 8 | 0.90 | 14.1 | 20.0 | 24.4 | 28.2 | 31.5 |

### R134a

|        |      |       |       |       |       |       |
|--------|------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 1.52  | 2.15  | 2.63  | 3.04  | 3.40  |
| EVUL 2 | 0.20 | 3.04  | 4.30  | 5.27  | 6.08  | 6.80  |
| EVUL 3 | 0.30 | 4.56  | 6.45  | 7.90  | 9.12  | 10.20 |
| EVUL 4 | 0.50 | 7.60  | 10.75 | 13.17 | 15.20 | 17.00 |
| EVUL 5 | 0.65 | 9.88  | 13.98 | 17.12 | 19.76 | 22.10 |
| EVUL 6 | 0.75 | 11.40 | 16.13 | 19.75 | 22.81 | 25.50 |
| EVUL 8 | 0.90 | 13.68 | 19.35 | 23.70 | 27.37 | 30.60 |

### R404A/R507

|        |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|
| EVUL 1 | 0.10 | 1.1  | 1.6  | 1.9  | 2.2  | 2.5  |
| EVUL 2 | 0.20 | 2.2  | 3.1  | 3.9  | 4.5  | 5.0  |
| EVUL 3 | 0.30 | 3.3  | 4.7  | 5.8  | 6.7  | 7.5  |
| EVUL 4 | 0.50 | 5.6  | 7.9  | 9.6  | 11.1 | 12.4 |
| EVUL 5 | 0.65 | 7.2  | 10.2 | 12.5 | 14.5 | 16.2 |
| EVUL 6 | 0.75 | 8.3  | 11.8 | 14.5 | 16.7 | 18.7 |
| EVUL 8 | 0.90 | 10.0 | 14.2 | 17.3 | 20.0 | 22.4 |

### R410A

|        |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|
| EVUL 1 | 0.10 | 1.6  | 2.3  | 2.8  | 3.2  | 3.6  |
| EVUL 2 | 0.20 | 3.2  | 4.6  | 5.6  | 6.4  | 7.2  |
| EVUL 3 | 0.30 | 4.8  | 6.8  | 8.4  | 9.7  | 10.8 |
| EVUL 4 | 0.50 | 8.1  | 11.4 | 14.0 | 16.1 | 18.0 |
| EVUL 5 | 0.65 | 10.5 | 14.8 | 18.1 | 20.9 | 23.4 |
| EVUL 6 | 0.75 | 12.1 | 17.1 | 20.9 | 24.2 | 27.0 |
| EVUL 8 | 0.90 | 14.5 | 20.5 | 25.1 | 29.0 | 32.4 |

### R290

|        |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|
| EVUL 1 | 0.10 | 1.8  | 2.6  | 3.2  | 3.7  | 4.1  |
| EVUL 2 | 0.20 | 3.7  | 5.2  | 6.3  | 7.3  | 8.2  |
| EVUL 3 | 0.30 | 5.5  | 7.8  | 9.5  | 11.0 | 12.3 |
| EVUL 4 | 0.50 | 9.1  | 12.9 | 15.8 | 18.3 | 20.4 |
| EVUL 5 | 0.65 | 11.9 | 16.8 | 20.6 | 23.8 | 26.6 |
| EVUL 6 | 0.75 | 13.7 | 19.4 | 23.7 | 27.4 | 30.7 |
| EVUL 8 | 0.90 | 16.5 | 23.3 | 28.5 | 32.9 | 36.8 |

Capacities are based on:  
- liquid temperature  $t_l = 25$  °C ahead of valve,  
- evaporating temperature  $t_e = -10$  °C,  
- superheat: 0 K.

### Correction factors for liquid temperature $t_l$

| $t_l$ [°C] | -10  | 0    | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   |
|------------|------|------|------|------|------|------|------|------|------|------|------|
| R22/R407C  | 0.76 | 0.82 | 0.88 | 0.92 | 0.96 | 1.00 | 1.05 | 1.10 | 1.16 | 1.22 | 1.30 |
| R134a      | 0.73 | 0.79 | 0.86 | 0.90 | 0.95 | 1.00 | 1.06 | 1.12 | 1.19 | 1.27 | 1.37 |
| R404A/507  | 0.65 | 0.72 | 0.81 | 0.86 | 0.93 | 1.00 | 1.09 | 1.20 | 1.33 | 1.51 | 1.74 |
| R410A      | 0.73 | 0.79 | 0.86 | 0.90 | 0.95 | 1.00 | 1.06 | 1.14 | 1.23 | 1.33 | 1.47 |
| R290       | 0.74 | 0.79 | 0.86 | 0.90 | 0.95 | 1.00 | 1.05 | 1.12 | 1.19 | 1.28 | 1.36 |

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature  $t_l$  ahead of valve / evaporator. When the corrected capacity is known, the selection can be made from the table.

Capacity  
Suction vapour  
capacity  $Q_e$  [kW]

SI Units

| Type | $K_v$<br>[m <sup>3</sup> / h] | Pressure<br>drop $\Delta p$<br>[bar] | Suction vapour capacity $Q_e$ [kW]<br>at Evaporating temperature $t_e$ [°C] |     |     |     |   |    |
|------|-------------------------------|--------------------------------------|-----------------------------------------------------------------------------|-----|-----|-----|---|----|
|      |                               |                                      | -40                                                                         | -30 | -20 | -10 | 0 | 10 |

R22/R407C

|        |      |      |       |       |       |       |       |       |
|--------|------|------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1  | 0.077 | 0.104 | 0.134 | 0.170 | 0.210 | 0.255 |
|        |      | 0.15 | 0.090 | 0.124 | 0.162 | 0.206 | 0.255 | 0.311 |
|        |      | 0.2  | 0.100 | 0.139 | 0.184 | 0.235 | 0.293 | 0.357 |
| EVUL 2 | 0.20 | 0.1  | 0.154 | 0.207 | 0.269 | 0.339 | 0.419 | 0.510 |
|        |      | 0.15 | 0.181 | 0.248 | 0.324 | 0.411 | 0.510 | 0.622 |
|        |      | 0.2  | 0.199 | 0.279 | 0.368 | 0.470 | 0.585 | 0.715 |
| EVUL 3 | 0.30 | 0.1  | 0.231 | 0.311 | 0.403 | 0.509 | 0.629 | 0.765 |
|        |      | 0.15 | 0.271 | 0.372 | 0.486 | 0.617 | 0.765 | 0.933 |
|        |      | 0.2  | 0.299 | 0.418 | 0.553 | 0.705 | 0.878 | 1.072 |
| EVUL 4 | 0.50 | 0.1  | 0.386 | 0.518 | 0.672 | 0.848 | 1.048 | 1.275 |
|        |      | 0.15 | 0.452 | 0.619 | 0.810 | 1.028 | 1.275 | 1.555 |
|        |      | 0.2  | 0.499 | 0.697 | 0.921 | 1.175 | 1.463 | 1.787 |
| EVUL 5 | 0.65 | 0.1  | 0.501 | 0.674 | 0.873 | 1.102 | 1.363 | 1.658 |
|        |      | 0.15 | 0.588 | 0.805 | 1.053 | 1.336 | 1.658 | 2.021 |
|        |      | 0.2  | 0.648 | 0.906 | 1.197 | 1.528 | 1.901 | 2.323 |
| EVUL 6 | 0.75 | 0.1  | 0.579 | 0.778 | 1.008 | 1.272 | 1.573 | 1.913 |
|        |      | 0.15 | 0.679 | 0.929 | 1.215 | 1.542 | 1.913 | 2.332 |
|        |      | 0.2  | 0.748 | 1.045 | 1.381 | 1.763 | 2.194 | 2.680 |
| EVUL 8 | 0.90 | 0.1  | 0.694 | 0.933 | 1.209 | 1.526 | 1.887 | 2.296 |
|        |      | 0.15 | 0.814 | 1.115 | 1.458 | 1.850 | 2.296 | 2.798 |
|        |      | 0.2  | 0.897 | 1.254 | 1.658 | 2.115 | 2.633 | 3.216 |

Capacities are based on dry, saturated vapour ahead of valve.

Capacities are based on:  
- liquid temperature  $t_l = 25$  °C ahead of evaporator.  
The table values refer to the evaporator capacity and are given as a function of:  
- evaporating temperature  $t_e$ ,  
- pressure drop  $\Delta p$  in valve.

Correction factors for liquid temperature  $t_l$

| $t_l$ [°C] | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   |
|------------|------|------|------|------|------|------|------|------|------|
| R22/R407C  | 0.90 | 0.93 | 0.96 | 1.00 | 1.04 | 1.08 | 1.13 | 1.18 | 1.24 |

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature  $t_l$  ahead of valve evaporator. When the corrected capacity is known, the selection can be made from the table.

**Capacity  
Suction vapour  
capacity  $Q_e$  [kW]**  
(continued)

SI Units

| Type | $K_v$<br>[m <sup>3</sup> / h] | Pressure<br>drop $\Delta p$<br>[bar] | Suction vapour capacity $Q_e$ [kW]<br>at Evaporating temperature $t_e$ [°C] |     |     |     |   |    |
|------|-------------------------------|--------------------------------------|-----------------------------------------------------------------------------|-----|-----|-----|---|----|
|      |                               |                                      | -40                                                                         | -30 | -20 | -10 | 0 | 10 |

**R134a**

|        |      |      |       |       |       |       |       |       |
|--------|------|------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1  | 0.056 | 0.078 | 0.104 | 0.134 | 0.169 | 0.208 |
|        |      | 0.15 | 0.062 | 0.091 | 0.124 | 0.162 | 0.204 | 0.253 |
|        |      | 0.2  | 0.065 | 0.100 | 0.139 | 0.183 | 0.233 | 0.290 |
| EVUL 2 | 0.20 | 0.1  | 0.111 | 0.156 | 0.208 | 0.268 | 0.338 | 0.417 |
|        |      | 0.15 | 0.125 | 0.182 | 0.248 | 0.323 | 0.409 | 0.507 |
|        |      | 0.2  | 0.130 | 0.201 | 0.278 | 0.366 | 0.467 | 0.580 |
| EVUL 3 | 0.30 | 0.1  | 0.167 | 0.234 | 0.312 | 0.402 | 0.506 | 0.625 |
|        |      | 0.15 | 0.187 | 0.274 | 0.372 | 0.485 | 0.613 | 0.760 |
|        |      | 0.2  | 0.196 | 0.301 | 0.417 | 0.550 | 0.700 | 0.871 |
| EVUL 4 | 0.50 | 0.1  | 0.278 | 0.390 | 0.520 | 0.671 | 0.844 | 1.042 |
|        |      | 0.15 | 0.312 | 0.456 | 0.620 | 0.808 | 1.022 | 1.267 |
|        |      | 0.2  | 0.326 | 0.501 | 0.696 | 0.916 | 1.167 | 1.451 |
| EVUL 5 | 0.65 | 0.1  | 0.361 | 0.507 | 0.676 | 0.872 | 1.097 | 1.355 |
|        |      | 0.15 | 0.405 | 0.593 | 0.806 | 1.050 | 1.329 | 1.646 |
|        |      | 0.2  | 0.424 | 0.652 | 0.905 | 1.191 | 1.517 | 1.886 |
| EVUL 6 | 0.75 | 0.1  | 0.416 | 0.585 | 0.780 | 1.006 | 1.266 | 1.563 |
|        |      | 0.15 | 0.468 | 0.684 | 0.930 | 1.211 | 1.533 | 1.900 |
|        |      | 0.2  | 0.489 | 0.752 | 1.044 | 1.374 | 1.750 | 2.176 |
| EVUL 8 | 0.90 | 0.1  | 0.500 | 0.702 | 0.936 | 1.207 | 1.519 | 1.876 |
|        |      | 0.15 | 0.561 | 0.821 | 1.116 | 1.454 | 1.840 | 2.280 |
|        |      | 0.2  | 0.587 | 0.902 | 1.252 | 1.649 | 2.100 | 2.612 |

Capacities are based on dry, saturated vapour ahead of valve.

Capacities are based on:  
 - liquid temperature  $t_l = 25$  °C ahead of evaporator.  
 The table values refer to the evaporator capacity and are given as a function of:  
 - evaporating temperature  $t_e$ ,  
 - pressure drop  $\Delta p$  in valve.

**Correction factors for liquid temperature  $t_l$** 

| $t_l$ [°C] | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   |
|------------|------|------|------|------|------|------|------|------|------|
| R134a      | 0.88 | 0.92 | 0.96 | 1.00 | 1.05 | 1.10 | 1.16 | 1.23 | 1.31 |

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature  $t_l$  ahead of valve evaporator. When the corrected capacity is known, the selection can be made from the table.

**Capacity  
Suction vapour  
capacity  $Q_e$  [kW]**  
(continued)

SI Units

| Type | $K_v$<br>[m <sup>3</sup> / h] | Pressure<br>drop $\Delta p$<br>[bar] | Suction vapour capacity $Q_e$ [kW]<br>at Evaporating temperature $t_e$ [°C] |     |     |     |   |    |
|------|-------------------------------|--------------------------------------|-----------------------------------------------------------------------------|-----|-----|-----|---|----|
|      |                               |                                      | -40                                                                         | -30 | -20 | -10 | 0 | 10 |

**R404A/R507**

|        |      |      |       |       |       |       |       |       |
|--------|------|------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1  | 0.075 | 0.099 | 0.127 | 0.159 | 0.196 | 0.239 |
|        |      | 0.15 | 0.089 | 0.119 | 0.154 | 0.194 | 0.239 | 0.291 |
|        |      | 0.2  | 0.100 | 0.135 | 0.176 | 0.222 | 0.275 | 0.335 |
| EVUL 2 | 0.20 | 0.1  | 0.150 | 0.198 | 0.254 | 0.319 | 0.393 | 0.477 |
|        |      | 0.15 | 0.179 | 0.239 | 0.308 | 0.388 | 0.479 | 0.583 |
|        |      | 0.2  | 0.201 | 0.271 | 0.352 | 0.444 | 0.550 | 0.670 |
| EVUL 3 | 0.30 | 0.1  | 0.225 | 0.297 | 0.381 | 0.478 | 0.589 | 0.716 |
|        |      | 0.15 | 0.268 | 0.358 | 0.462 | 0.581 | 0.718 | 0.874 |
|        |      | 0.2  | 0.301 | 0.406 | 0.527 | 0.666 | 0.825 | 1.005 |
| EVUL 4 | 0.50 | 0.1  | 0.375 | 0.495 | 0.635 | 0.797 | 0.982 | 1.194 |
|        |      | 0.15 | 0.447 | 0.596 | 0.769 | 0.969 | 1.197 | 1.457 |
|        |      | 0.2  | 0.502 | 0.677 | 0.879 | 1.110 | 1.375 | 1.676 |
| EVUL 5 | 0.65 | 0.1  | 0.488 | 0.644 | 0.826 | 1.036 | 1.277 | 1.552 |
|        |      | 0.15 | 0.582 | 0.775 | 1.000 | 1.260 | 1.556 | 1.893 |
|        |      | 0.2  | 0.653 | 0.880 | 1.142 | 1.444 | 1.788 | 2.178 |
| EVUL 6 | 0.75 | 0.1  | 0.563 | 0.743 | 0.953 | 1.195 | 1.474 | 1.790 |
|        |      | 0.15 | 0.671 | 0.895 | 1.154 | 1.453 | 1.796 | 2.185 |
|        |      | 0.2  | 0.754 | 1.016 | 1.318 | 1.666 | 2.063 | 2.514 |
| EVUL 8 | 0.90 | 0.1  | 0.675 | 0.891 | 1.143 | 1.434 | 1.768 | 2.148 |
|        |      | 0.15 | 0.805 | 1.074 | 1.385 | 1.744 | 2.155 | 2.622 |
|        |      | 0.2  | 0.904 | 1.219 | 1.582 | 1.999 | 2.475 | 3.016 |

Capacities are based on dry, saturated vapour ahead of valve.

During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Capacities are based on:

 - liquid temperature  $t_l = 25$  °C ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of:

 - evaporating temperature  $t_e$ ,

 - pressure drop  $\Delta p$  in valve.

**Correction factors for liquid temperature  $t_l$** 

| $t_l$ [°C] | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   |
|------------|------|------|------|------|------|------|------|------|------|
| R404A/R507 | 0.84 | 0.89 | 0.94 | 1.00 | 1.07 | 1.16 | 1.26 | 1.40 | 1.57 |

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature  $t_l$  ahead of valve evaporator. When the corrected capacity is known, the selection can be made from the table.

**Capacity  
Suction vapour  
capacity  $Q_e$  [kW]**  
(continued)

SI Units

| Type | $K_v$<br>[m <sup>3</sup> / h] | Pressure<br>drop $\Delta p$<br>[bar] | Suction vapour capacity $Q_e$ [kW]<br>at Evaporating temperature $t_e$ [°C] |     |     |     |   |    |
|------|-------------------------------|--------------------------------------|-----------------------------------------------------------------------------|-----|-----|-----|---|----|
|      |                               |                                      | -40                                                                         | -30 | -20 | -10 | 0 | 10 |

**R410A**

|        |      |      |       |       |       |       |       |       |
|--------|------|------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1  | 0.117 | 0.150 | 0.187 | 0.229 | 0.276 | 0.329 |
|        |      | 0.15 | 0.141 | 0.182 | 0.228 | 0.279 | 0.337 | 0.402 |
|        |      | 0.2  | 0.160 | 0.207 | 0.261 | 0.321 | 0.388 | 0.463 |
| EVUL 2 | 0.20 | 0.1  | 0.235 | 0.300 | 0.375 | 0.459 | 0.553 | 0.657 |
|        |      | 0.15 | 0.282 | 0.363 | 0.455 | 0.559 | 0.674 | 0.803 |
|        |      | 0.2  | 0.320 | 0.415 | 0.522 | 0.642 | 0.776 | 0.925 |
| EVUL 3 | 0.30 | 0.1  | 0.352 | 0.450 | 0.562 | 0.688 | 0.829 | 0.986 |
|        |      | 0.15 | 0.423 | 0.545 | 0.683 | 0.838 | 1.012 | 1.205 |
|        |      | 0.2  | 0.480 | 0.622 | 0.783 | 0.963 | 1.164 | 1.388 |
| EVUL 4 | 0.50 | 0.1  | 0.587 | 0.750 | 0.936 | 1.146 | 1.382 | 1.644 |
|        |      | 0.15 | 0.706 | 0.909 | 1.138 | 1.397 | 1.686 | 2.008 |
|        |      | 0.2  | 0.799 | 1.037 | 1.305 | 1.605 | 1.940 | 2.313 |
| EVUL 5 | 0.65 | 0.1  | 0.763 | 0.976 | 1.217 | 1.490 | 1.796 | 2.137 |
|        |      | 0.15 | 0.917 | 1.181 | 1.480 | 1.816 | 2.192 | 2.610 |
|        |      | 0.2  | 1.039 | 1.348 | 1.696 | 2.086 | 2.522 | 3.007 |
| EVUL 6 | 0.75 | 0.1  | 0.880 | 1.126 | 1.405 | 1.720 | 2.072 | 2.465 |
|        |      | 0.15 | 1.059 | 1.363 | 1.708 | 2.096 | 2.529 | 3.012 |
|        |      | 0.2  | 1.199 | 1.555 | 1.957 | 2.407 | 2.910 | 3.469 |
| EVUL 8 | 0.90 | 0.1  | 1.056 | 1.351 | 1.686 | 2.064 | 2.487 | 2.958 |
|        |      | 0.15 | 1.270 | 1.635 | 2.049 | 2.515 | 3.035 | 3.614 |
|        |      | 0.2  | 1.439 | 1.866 | 2.348 | 2.889 | 3.492 | 4.163 |

Capacities are based on dry, saturated vapour ahead of valve.

During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Capacities are based on:

 - liquid temperature  $t_l = 25$  °C ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of:

 - evaporating temperature  $t_e$ ,

 - pressure drop  $\Delta p$  in valve.

**Correction factors for liquid temperature  $t_l$** 

| $t_l$ [°C] | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   |
|------------|------|------|------|------|------|------|------|------|------|
| R410A      | 0.89 | 0.92 | 0.96 | 1.00 | 1.05 | 1.11 | 1.18 | 1.26 | 1.37 |

 When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature  $t_l$  ahead of valve evaporator. When the corrected capacity is known, the selection can be made from the table.

**Capacity  
Suction vapour  
capacity  $Q_e$  [kW]**  
(continued)

SI Units

| Type | $K_v$<br>[m <sup>3</sup> / h] | Pressure<br>drop $\Delta p$<br>[bar] | Suction vapour capacity $Q_e$ [kW]<br>at Evaporating temperature $t_e$ [°C] |     |     |     |   |    |
|------|-------------------------------|--------------------------------------|-----------------------------------------------------------------------------|-----|-----|-----|---|----|
|      |                               |                                      | -40                                                                         | -30 | -20 | -10 | 0 | 10 |

**R290**

|        |      |      |       |       |       |       |       |       |
|--------|------|------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1  | 0.113 | 0.146 | 0.184 | 0.227 | 0.276 | 0.330 |
|        |      | 0.15 | 0.134 | 0.176 | 0.222 | 0.275 | 0.335 | 0.402 |
|        |      | 0.2  | 0.150 | 0.199 | 0.253 | 0.315 | 0.384 | 0.462 |
| EVUL 2 | 0.20 | 0.1  | 0.226 | 0.292 | 0.368 | 0.454 | 0.551 | 0.660 |
|        |      | 0.15 | 0.269 | 0.351 | 0.445 | 0.551 | 0.670 | 0.804 |
|        |      | 0.2  | 0.301 | 0.397 | 0.507 | 0.630 | 0.769 | 0.924 |
| EVUL 3 | 0.30 | 0.1  | 0.340 | 0.439 | 0.552 | 0.681 | 0.827 | 0.990 |
|        |      | 0.15 | 0.403 | 0.527 | 0.667 | 0.826 | 1.006 | 1.207 |
|        |      | 0.2  | 0.451 | 0.596 | 0.760 | 0.945 | 1.153 | 1.386 |
| EVUL 4 | 0.50 | 0.1  | 0.566 | 0.731 | 0.920 | 1.135 | 1.378 | 1.650 |
|        |      | 0.15 | 0.672 | 0.878 | 1.112 | 1.377 | 1.676 | 2.011 |
|        |      | 0.2  | 0.752 | 0.993 | 1.267 | 1.575 | 1.922 | 2.311 |
| EVUL 5 | 0.65 | 0.1  | 0.736 | 0.950 | 1.196 | 1.476 | 1.791 | 2.145 |
|        |      | 0.15 | 0.874 | 1.141 | 1.446 | 1.790 | 2.179 | 2.614 |
|        |      | 0.2  | 0.978 | 1.291 | 1.647 | 2.048 | 2.499 | 3.004 |
| EVUL 6 | 0.75 | 0.1  | 0.849 | 1.097 | 1.380 | 1.703 | 2.067 | 2.475 |
|        |      | 0.15 | 1.008 | 1.317 | 1.668 | 2.066 | 2.514 | 3.017 |
|        |      | 0.2  | 1.128 | 1.490 | 1.900 | 2.363 | 2.883 | 3.466 |
| EVUL 8 | 0.90 | 0.1  | 1.019 | 1.316 | 1.656 | 2.043 | 2.480 | 2.971 |
|        |      | 0.15 | 1.210 | 1.580 | 2.001 | 2.479 | 3.017 | 3.620 |
|        |      | 0.2  | 1.354 | 1.788 | 2.280 | 2.836 | 3.460 | 4.159 |

Capacities are based on dry, saturated vapour ahead of valve.

During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Capacities are based on:

 - liquid temperature  $t_l = 25$  °C ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of:

 - evaporating temperature  $t_e$ ,

 - pressure drop  $\Delta p$  in valve.

**Correction factors for liquid temperature  $t_l$** 

| $t_l$ [°C] | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   |
|------------|------|------|------|------|------|------|------|------|------|
| R290       | 0.51 | 0.65 | 0.82 | 1.00 | 1.21 | 1.44 | 1.57 | 1.26 | 1.37 |

 When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature  $t_l$  ahead of valve evaporator. When the corrected capacity is known, the selection can be made from the table.

**Capacity**  
**Hot gas capacity  $Q_h$  [kW]**
**SI Units**

| Type | $K_v$<br>[m <sup>3</sup> / h] | Pressure<br>drop<br>across valve<br>$\Delta p$<br>[bar] | Hot gas capacity $Q_h$ [kW]                                                                                                              |    |    |    |    |
|------|-------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
|      |                               |                                                         | Evaporating temp. $t_e = -10^\circ\text{C}$ . Hot gas temp. $t_h = t_c + 25\text{ K}$<br>Subcooling $\Delta t_{\text{sub}} = 4\text{ K}$ |    |    |    |    |
|      |                               |                                                         | 1) Condensing temp. $t_c$ [ $^\circ\text{C}$ ]                                                                                           |    |    |    |    |
|      |                               |                                                         | 20                                                                                                                                       | 30 | 40 | 50 | 60 |

**R22/R407C**

|        |      |     |      |       |       |       |       |
|--------|------|-----|------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1 | 0.29 | 0.31  | 0.33  | 0.34  | 0.34  |
|        |      | 0.2 | 0.41 | 0.44  | 0.46  | 0.48  | 0.48  |
|        |      | 0.4 | 0.57 | 0.61  | 0.65  | 0.67  | 0.68  |
|        |      | 0.8 | 0.79 | 0.85  | 0.90  | 0.94  | 0.95  |
|        |      | 1.6 | 1.05 | 1.15  | 1.23  | 1.29  | 1.32  |
| EVUL 2 | 0.20 | 0.1 | 0.58 | 0.62  | 0.65  | 0.68  | 0.69  |
|        |      | 0.2 | 0.82 | 0.88  | 0.92  | 0.95  | 0.97  |
|        |      | 0.4 | 1.14 | 1.23  | 1.29  | 1.34  | 1.36  |
|        |      | 0.8 | 1.57 | 1.70  | 1.80  | 1.87  | 1.91  |
|        |      | 1.6 | 2.10 | 2.30  | 2.46  | 2.58  | 2.65  |
| EVUL 3 | 0.30 | 0.1 | 0.88 | 0.93  | 0.98  | 1.01  | 1.03  |
|        |      | 0.2 | 1.23 | 1.31  | 1.38  | 1.43  | 1.45  |
|        |      | 0.4 | 1.72 | 1.84  | 1.94  | 2.01  | 2.04  |
|        |      | 0.8 | 2.36 | 2.55  | 2.70  | 2.81  | 2.86  |
|        |      | 1.6 | 3.14 | 3.45  | 3.70  | 3.88  | 3.97  |
| EVUL 4 | 0.50 | 0.1 | 1.46 | 1.56  | 1.63  | 1.69  | 1.71  |
|        |      | 0.2 | 2.05 | 2.19  | 2.30  | 2.38  | 2.42  |
|        |      | 0.4 | 2.86 | 3.07  | 3.23  | 3.35  | 3.40  |
|        |      | 0.8 | 3.94 | 4.25  | 4.50  | 4.68  | 4.77  |
|        |      | 1.6 | 5.24 | 5.75  | 6.16  | 6.46  | 6.62  |
| EVUL 5 | 0.65 | 0.1 | 1.90 | 2.02  | 2.12  | 2.19  | 2.23  |
|        |      | 0.2 | 2.67 | 2.85  | 2.99  | 3.09  | 3.14  |
|        |      | 0.4 | 3.72 | 3.99  | 4.20  | 4.35  | 4.43  |
|        |      | 0.8 | 5.12 | 5.52  | 5.85  | 6.08  | 6.20  |
|        |      | 1.6 | 6.81 | 7.48  | 8.01  | 8.40  | 8.61  |
| EVUL 6 | 0.75 | 0.1 | 2.19 | 2.33  | 2.45  | 2.53  | 2.57  |
|        |      | 0.2 | 3.08 | 3.28  | 3.45  | 3.57  | 3.63  |
|        |      | 0.4 | 4.29 | 4.60  | 4.85  | 5.02  | 5.11  |
|        |      | 0.8 | 5.90 | 6.37  | 6.75  | 7.02  | 7.16  |
|        |      | 1.6 | 7.86 | 8.63  | 9.24  | 9.69  | 9.94  |
| EVUL 8 | 0.90 | 0.1 | 2.63 | 2.80  | 2.94  | 3.04  | 3.08  |
|        |      | 0.2 | 3.69 | 3.94  | 4.14  | 4.29  | 4.35  |
|        |      | 0.4 | 5.15 | 5.52  | 5.82  | 6.03  | 6.13  |
|        |      | 0.8 | 7.08 | 7.65  | 8.10  | 8.42  | 8.59  |
|        |      | 1.6 | 9.43 | 10.35 | 11.09 | 11.63 | 11.92 |

1) Bubble point

Capacities are based on:  
- evaporating temp.  $t_e = -10^\circ\text{C}$ ,  
- hot gas temp.  $t_h = t_c + 25\text{ K}$ ,  
- subcooling  $\Delta t_{\text{sub}} = 4\text{ K}$ .

An increase in hot gas temperature  $t_h$  of 10 K, based on  $t_h = t_c + 25^\circ\text{C}$ , reduces valve capacity approx. 2% and vice versa.  
A change in evaporating temperature  $t_e$  changes valve capacity; see correction factor table.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [ $^\circ\text{C}$ ] | -40  | -30  | -20  | -10  | 0    | 10   |
|----------------------------|------|------|------|------|------|------|
| R22 / R407C                | 0.92 | 0.95 | 0.98 | 1.00 | 1.02 | 1.04 |

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature  $t_e$ .

**Capacity**  
**Hot gas capacity  $Q_h$  [kW]**  
*(continued)*
**SI Units**

| Type | K <sub>v</sub><br>[m <sup>3</sup> / h] | Pressure drop<br>across valve<br>Δp<br>[bar] | Hot gas capacity Q <sub>h</sub> [kW]                                                                                                  |    |    |    |    |
|------|----------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
|      |                                        |                                              | Evaporating temp. t <sub>e</sub> = -10 °C. Hot gas temp. t <sub>h</sub> = t <sub>c</sub> + 25 K<br>Subcooling Δt <sub>sub</sub> = 4 K |    |    |    |    |
|      |                                        |                                              | 1) Condensing temp. t <sub>c</sub> [°C]                                                                                               |    |    |    |    |
|      |                                        |                                              | 20                                                                                                                                    | 30 | 40 | 50 | 60 |

**R134a**

|        |      |     |      |      |      |      |      |
|--------|------|-----|------|------|------|------|------|
| EVUL 1 | 0.10 | 0.1 | 0.23 | 0.25 | 0.26 | 0.26 | 0.26 |
|        |      | 0.2 | 0.32 | 0.34 | 0.36 | 0.37 | 0.37 |
|        |      | 0.4 | 0.45 | 0.48 | 0.50 | 0.52 | 0.51 |
|        |      | 0.8 | 0.60 | 0.65 | 0.69 | 0.71 | 0.72 |
|        |      | 1.6 | 0.76 | 0.85 | 0.93 | 0.97 | 0.98 |
| EVUL 2 | 0.20 | 0.1 | 0.46 | 0.49 | 0.51 | 0.52 | 0.52 |
|        |      | 0.2 | 0.65 | 0.69 | 0.72 | 0.74 | 0.73 |
|        |      | 0.4 | 0.89 | 0.96 | 1.01 | 1.03 | 1.03 |
|        |      | 0.8 | 1.20 | 1.31 | 1.38 | 1.43 | 1.43 |
|        |      | 1.6 | 1.51 | 1.71 | 1.85 | 1.94 | 1.96 |
| EVUL 3 | 0.30 | 0.1 | 0.69 | 0.74 | 0.77 | 0.78 | 0.78 |
|        |      | 0.2 | 0.97 | 1.03 | 1.08 | 1.10 | 1.10 |
|        |      | 0.4 | 1.34 | 1.44 | 1.51 | 1.55 | 1.54 |
|        |      | 0.8 | 1.80 | 1.96 | 2.08 | 2.14 | 2.15 |
|        |      | 1.6 | 2.27 | 2.56 | 2.78 | 2.91 | 2.95 |
| EVUL 4 | 0.50 | 0.1 | 1.16 | 1.23 | 1.28 | 1.31 | 1.30 |
|        |      | 0.2 | 1.62 | 1.72 | 1.80 | 1.84 | 1.83 |
|        |      | 0.4 | 2.23 | 2.40 | 2.51 | 2.58 | 2.57 |
|        |      | 0.8 | 3.00 | 3.27 | 3.46 | 3.57 | 3.58 |
|        |      | 1.6 | 3.78 | 4.27 | 4.63 | 4.85 | 4.91 |
| EVUL 5 | 0.65 | 0.1 | 1.50 | 1.60 | 1.67 | 1.70 | 1.69 |
|        |      | 0.2 | 2.10 | 2.24 | 2.34 | 2.39 | 2.38 |
|        |      | 0.4 | 2.90 | 3.12 | 3.27 | 3.35 | 3.34 |
|        |      | 0.8 | 3.90 | 4.25 | 4.50 | 4.64 | 4.66 |
|        |      | 1.6 | 4.91 | 5.55 | 6.01 | 6.30 | 6.38 |
| EVUL 6 | 0.75 | 0.1 | 1.74 | 1.84 | 1.92 | 1.96 | 1.95 |
|        |      | 0.2 | 2.43 | 2.59 | 2.70 | 2.76 | 2.75 |
|        |      | 0.4 | 3.35 | 3.59 | 3.77 | 3.86 | 3.86 |
|        |      | 0.8 | 4.50 | 4.90 | 5.19 | 5.36 | 5.37 |
|        |      | 1.6 | 5.67 | 6.40 | 6.94 | 7.27 | 7.37 |
| EVUL 8 | 0.90 | 0.1 | 2.08 | 2.21 | 2.31 | 2.35 | 2.34 |
|        |      | 0.2 | 2.91 | 3.10 | 3.24 | 3.31 | 3.30 |
|        |      | 0.4 | 4.02 | 4.31 | 4.52 | 4.64 | 4.63 |
|        |      | 0.8 | 5.40 | 5.88 | 6.23 | 6.43 | 6.45 |
|        |      | 1.6 | 6.80 | 7.69 | 8.33 | 8.72 | 8.84 |

1) Bubble point

Capacities are based on:  
- evaporating temp.  $t_e = -10$  °C,  
- hot gas temp.  $t_h = t_c + 25$  K,  
- subcooling  $\Delta t_{sub} = 4$  K.

An increase in hot gas temperature  $t_h$  of 10 K, based on  $t_h = t_c + 25$  °C, reduces valve capacity approx. 2% and vice versa.  
A change in evaporating temperature  $t_e$  changes valve capacity; see correction factor table.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°C]   | -40  | -30  | -20  | -10  | 0    | 10   |
|--------------|------|------|------|------|------|------|
| <b>R134a</b> | 0.88 | 0.92 | 0.96 | 1.00 | 1.04 | 1.08 |

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature  $t_e$ .

**Capacity**  
**Hot gas capacity  $Q_h$  [kW]**  
*(continued)*
**SI Units**

| Type | $K_v$<br>[m <sup>3</sup> / h] | Pressure<br>drop<br>across valve<br>$\Delta p$<br>[bar] | Hot gas capacity $Q_h$ [kW]                                                                             |    |    |    |    |
|------|-------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----|----|----|----|
|      |                               |                                                         | Evaporating temp. $t_e = -10$ °C. Hot gas temp. $t_h = t_c + 25$ K<br>Subcooling $\Delta t_{sub} = 4$ K |    |    |    |    |
|      |                               |                                                         | 1) Condensing temp. $t_c$ [°C]                                                                          |    |    |    |    |
|      |                               |                                                         | 20                                                                                                      | 30 | 40 | 50 | 60 |

**R404A/R507**

|        |      |     |      |      |      |      |      |
|--------|------|-----|------|------|------|------|------|
| EVUL 1 | 0.10 | 0.1 | 0.26 | 0.27 | 0.27 | 0.26 | 0.23 |
|        |      | 0.2 | 0.37 | 0.38 | 0.38 | 0.36 | 0.32 |
|        |      | 0.4 | 0.52 | 0.53 | 0.53 | 0.51 | 0.46 |
|        |      | 0.8 | 0.72 | 0.74 | 0.74 | 0.71 | 0.64 |
|        |      | 1.6 | 0.96 | 1.01 | 1.02 | 0.98 | 0.89 |
| EVUL 2 | 0.20 | 0.1 | 0.53 | 0.54 | 0.53 | 0.51 | 0.46 |
|        |      | 0.2 | 0.74 | 0.76 | 0.75 | 0.72 | 0.65 |
|        |      | 0.4 | 1.04 | 1.06 | 1.06 | 1.02 | 0.91 |
|        |      | 0.8 | 1.43 | 1.48 | 1.48 | 1.42 | 1.28 |
|        |      | 1.6 | 1.93 | 2.01 | 2.03 | 1.97 | 1.79 |
| EVUL 3 | 0.30 | 0.1 | 0.79 | 0.81 | 0.80 | 0.77 | 0.69 |
|        |      | 0.2 | 1.11 | 1.14 | 1.13 | 1.08 | 0.97 |
|        |      | 0.4 | 1.56 | 1.59 | 1.59 | 1.52 | 1.37 |
|        |      | 0.8 | 2.15 | 2.22 | 2.22 | 2.13 | 1.93 |
|        |      | 1.6 | 2.89 | 3.02 | 3.05 | 2.95 | 2.68 |
| EVUL 4 | 0.50 | 0.1 | 1.32 | 1.35 | 1.34 | 1.28 | 1.15 |
|        |      | 0.2 | 1.85 | 1.90 | 1.88 | 1.80 | 1.62 |
|        |      | 0.4 | 2.59 | 2.66 | 2.65 | 2.54 | 2.29 |
|        |      | 0.8 | 3.58 | 3.69 | 3.69 | 3.55 | 3.21 |
|        |      | 1.6 | 4.81 | 5.03 | 5.08 | 4.92 | 4.47 |
| EVUL 5 | 0.65 | 0.1 | 1.71 | 1.75 | 1.74 | 1.66 | 1.49 |
|        |      | 0.2 | 2.41 | 2.46 | 2.45 | 2.34 | 2.11 |
|        |      | 0.4 | 3.37 | 3.45 | 3.44 | 3.30 | 2.97 |
|        |      | 0.8 | 4.66 | 4.80 | 4.80 | 4.62 | 4.17 |
|        |      | 1.6 | 6.26 | 6.54 | 6.61 | 6.40 | 5.81 |
| EVUL 6 | 0.75 | 0.1 | 1.98 | 2.02 | 2.00 | 1.92 | 1.72 |
|        |      | 0.2 | 2.78 | 2.84 | 2.83 | 2.70 | 2.43 |
|        |      | 0.4 | 3.89 | 3.99 | 3.97 | 3.81 | 3.43 |
|        |      | 0.8 | 5.37 | 5.54 | 5.54 | 5.33 | 4.81 |
|        |      | 1.6 | 7.22 | 7.55 | 7.62 | 7.38 | 6.70 |
| EVUL 8 | 0.90 | 0.1 | 2.37 | 2.42 | 2.41 | 2.30 | 2.07 |
|        |      | 0.2 | 3.34 | 3.41 | 3.39 | 3.25 | 2.92 |
|        |      | 0.4 | 4.67 | 4.78 | 4.76 | 4.57 | 4.12 |
|        |      | 0.8 | 6.45 | 6.65 | 6.65 | 6.40 | 5.78 |
|        |      | 1.6 | 8.67 | 9.06 | 9.15 | 8.86 | 8.04 |

1) Bubble point

Capacities are based on:  
- evaporating temp.  $t_e = -10$  °C,  
- hot gas temp.  $t_h = t_c + 25$  K,  
- subcooling  $\Delta t_{sub} = 4$  K.

An increase in hot gas temperature  $t_h$  of 10 K, based on  $t_h = t_c + 25$  °C, reduces valve capacity approx. 2% and vice versa.  
A change in evaporating temperature  $t_e$  changes valve capacity; see correction factor table.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°C] | -40  | -30  | -20  | -10  | 0    | 10   |
|------------|------|------|------|------|------|------|
| R404A/R507 | 0.85 | 0.90 | 0.95 | 1.00 | 1.05 | 1.09 |

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature  $t_e$ .

**Capacity**  
**Hot gas capacity  $Q_h$  [kW]**  
*(continued)*
**SI Units**

| Type | K <sub>v</sub><br>[m <sup>3</sup> / h] | Pressure drop across valve<br>Δp<br>[bar] | Hot gas capacity Q <sub>h</sub> [kW]                                                                                                  |    |    |    |    |
|------|----------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
|      |                                        |                                           | Evaporating temp. t <sub>e</sub> = -10 °C. Hot gas temp. t <sub>h</sub> = t <sub>c</sub> + 25 K<br>Subcooling Δt <sub>sub</sub> = 4 K |    |    |    |    |
|      |                                        |                                           | 1) Condensing temp. t <sub>c</sub> [°C]                                                                                               |    |    |    |    |
|      |                                        |                                           | 20                                                                                                                                    | 30 | 40 | 50 | 60 |

**R410A**

|        |      |     |       |       |       |       |       |
|--------|------|-----|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1 | 0.37  | 0.39  | 0.40  | 0.40  | 0.39  |
|        |      | 0.2 | 0.52  | 0.54  | 0.56  | 0.56  | 0.54  |
|        |      | 0.4 | 0.73  | 0.76  | 0.79  | 0.79  | 0.77  |
|        |      | 0.8 | 1.01  | 1.07  | 1.11  | 1.12  | 1.08  |
|        |      | 1.6 | 1.38  | 1.47  | 1.54  | 1.56  | 1.51  |
| EVUL 2 | 0.20 | 0.1 | 0.73  | 0.77  | 0.79  | 0.80  | 0.77  |
|        |      | 0.2 | 1.03  | 1.09  | 1.12  | 1.13  | 1.09  |
|        |      | 0.4 | 1.45  | 1.53  | 1.58  | 1.59  | 1.54  |
|        |      | 0.8 | 2.02  | 2.14  | 2.21  | 2.23  | 2.16  |
|        |      | 1.6 | 2.76  | 2.95  | 3.07  | 3.11  | 3.02  |
| EVUL 3 | 0.30 | 0.1 | 1.10  | 1.16  | 1.19  | 1.20  | 1.16  |
|        |      | 0.2 | 1.55  | 1.63  | 1.68  | 1.69  | 1.63  |
|        |      | 0.4 | 2.18  | 2.29  | 2.37  | 2.38  | 2.30  |
|        |      | 0.8 | 3.03  | 3.20  | 3.32  | 3.35  | 3.24  |
|        |      | 1.6 | 4.14  | 4.42  | 4.61  | 4.67  | 4.54  |
| EVUL 4 | 0.50 | 0.1 | 1.84  | 1.93  | 1.99  | 1.99  | 1.93  |
|        |      | 0.2 | 2.59  | 2.72  | 2.80  | 2.82  | 2.72  |
|        |      | 0.4 | 3.63  | 3.82  | 3.94  | 3.97  | 3.84  |
|        |      | 0.8 | 5.05  | 5.34  | 5.53  | 5.58  | 5.40  |
|        |      | 1.6 | 6.90  | 7.37  | 7.68  | 7.78  | 7.56  |
| EVUL 5 | 0.65 | 0.1 | 2.39  | 2.51  | 2.58  | 2.59  | 2.50  |
|        |      | 0.2 | 3.36  | 3.53  | 3.64  | 3.66  | 3.54  |
|        |      | 0.4 | 4.72  | 4.97  | 5.13  | 5.16  | 4.99  |
|        |      | 0.8 | 6.56  | 6.94  | 7.19  | 7.25  | 7.02  |
|        |      | 1.6 | 8.97  | 9.58  | 9.98  | 10.11 | 9.83  |
| EVUL 6 | 0.75 | 0.1 | 2.75  | 2.89  | 2.98  | 2.99  | 2.89  |
|        |      | 0.2 | 3.88  | 4.08  | 4.20  | 4.22  | 4.08  |
|        |      | 0.4 | 5.44  | 5.73  | 5.92  | 5.95  | 5.76  |
|        |      | 0.8 | 7.57  | 8.01  | 8.29  | 8.36  | 8.10  |
|        |      | 1.6 | 10.35 | 11.05 | 11.51 | 11.67 | 11.34 |
| EVUL 8 | 0.90 | 0.1 | 3.31  | 3.47  | 3.57  | 3.59  | 3.47  |
|        |      | 0.2 | 4.66  | 4.89  | 5.04  | 5.07  | 4.90  |
|        |      | 0.4 | 6.53  | 6.88  | 7.10  | 7.14  | 6.91  |
|        |      | 0.8 | 9.09  | 9.61  | 9.95  | 10.04 | 9.72  |
|        |      | 1.6 | 12.42 | 13.26 | 13.82 | 14.00 | 13.61 |

1) Bubble point

Capacities are based on:  
- evaporating temp.  $t_e = -10$  °C,  
- hot gas temp.  $t_h = t_c + 25$  K,  
- subcooling  $\Delta t_{sub} = 4$  K.

An increase in hot gas temperature  $t_h$  of 10 K, based on  $t_h = t_c + 25$  °C, reduces valve capacity approx. 2% and vice versa.  
A change in evaporating temperature  $t_e$  changes valve capacity; see correction factor table.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°C] | -40  | -30  | -20  | -10  | 0    | 10   |
|------------|------|------|------|------|------|------|
| R410A      | 0.92 | 0.95 | 0.98 | 1.00 | 1.02 | 1.03 |

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature  $t_e$ .

**Capacity**  
**Hot gas capacity  $Q_h$  [kW]**  
*(continued)*
**SI Units**

| Type | K <sub>v</sub><br>[m <sup>3</sup> / h] | Pressure drop across valve<br>Δp [bar] | Hot gas capacity Q <sub>h</sub> [kW]                                                                                                  |    |    |    |    |
|------|----------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
|      |                                        |                                        | Evaporating temp. t <sub>e</sub> = -10 °C. Hot gas temp. t <sub>h</sub> = t <sub>c</sub> + 25 K<br>Subcooling Δt <sub>sub</sub> = 4 K |    |    |    |    |
|      |                                        |                                        | 1) Condensing temp. t <sub>c</sub> [°C]                                                                                               |    |    |    |    |
|      |                                        |                                        | 20                                                                                                                                    | 30 | 40 | 50 | 60 |

**R290**

|        |      |     |       |       |       |       |       |
|--------|------|-----|-------|-------|-------|-------|-------|
| EVUL 1 | 0.10 | 0.1 | 0.35  | 0.37  | 0.37  | 0.37  | 0.36  |
|        |      | 0.2 | 0.49  | 0.51  | 0.53  | 0.53  | 0.51  |
|        |      | 0.4 | 0.69  | 0.72  | 0.74  | 0.74  | 0.72  |
|        |      | 0.8 | 0.94  | 0.99  | 1.02  | 1.03  | 1.01  |
|        |      | 1.6 | 1.25  | 1.34  | 1.39  | 1.41  | 1.39  |
| EVUL 2 | 0.20 | 0.1 | 0.70  | 0.73  | 0.75  | 0.75  | 0.73  |
|        |      | 0.2 | 0.99  | 1.03  | 1.05  | 1.05  | 1.03  |
|        |      | 0.4 | 1.37  | 1.44  | 1.48  | 1.48  | 1.45  |
|        |      | 0.8 | 1.88  | 1.99  | 2.05  | 2.06  | 2.02  |
|        |      | 1.6 | 2.49  | 2.67  | 2.78  | 2.83  | 2.79  |
| EVUL 3 | 0.30 | 0.1 | 1.06  | 1.10  | 1.12  | 1.12  | 1.09  |
|        |      | 0.2 | 1.48  | 1.54  | 1.58  | 1.58  | 1.54  |
|        |      | 0.4 | 2.06  | 2.16  | 2.21  | 2.22  | 2.17  |
|        |      | 0.8 | 2.83  | 2.98  | 3.07  | 3.09  | 3.03  |
|        |      | 1.6 | 3.74  | 4.01  | 4.18  | 4.24  | 4.18  |
| EVUL 4 | 0.50 | 0.1 | 1.76  | 1.83  | 1.87  | 1.87  | 1.82  |
|        |      | 0.2 | 2.47  | 2.57  | 2.63  | 2.64  | 2.57  |
|        |      | 0.4 | 3.44  | 3.60  | 3.69  | 3.70  | 3.62  |
|        |      | 0.8 | 4.71  | 4.96  | 5.12  | 5.16  | 5.05  |
|        |      | 1.6 | 6.23  | 6.68  | 6.96  | 7.07  | 6.97  |
| EVUL 5 | 0.65 | 0.1 | 2.29  | 2.38  | 2.43  | 2.43  | 2.37  |
|        |      | 0.2 | 3.21  | 3.34  | 3.42  | 3.43  | 3.34  |
|        |      | 0.4 | 4.47  | 4.67  | 4.79  | 4.81  | 4.70  |
|        |      | 0.8 | 6.12  | 6.45  | 6.65  | 6.70  | 6.57  |
|        |      | 1.6 | 8.10  | 8.68  | 9.05  | 9.19  | 9.06  |
| EVUL 6 | 0.75 | 0.1 | 2.64  | 2.75  | 2.81  | 2.81  | 2.74  |
|        |      | 0.2 | 3.70  | 3.86  | 3.95  | 3.95  | 3.86  |
|        |      | 0.4 | 5.16  | 5.39  | 5.53  | 5.55  | 5.42  |
|        |      | 0.8 | 7.06  | 7.45  | 7.68  | 7.73  | 7.58  |
|        |      | 1.6 | 9.35  | 10.01 | 10.44 | 10.61 | 10.45 |
| EVUL 8 | 0.90 | 0.1 | 3.17  | 3.29  | 3.37  | 3.37  | 3.28  |
|        |      | 0.2 | 4.44  | 4.63  | 4.74  | 4.75  | 4.63  |
|        |      | 0.4 | 6.19  | 6.47  | 6.64  | 6.66  | 6.51  |
|        |      | 0.8 | 8.48  | 8.93  | 9.21  | 9.28  | 9.09  |
|        |      | 1.6 | 11.22 | 12.02 | 12.53 | 12.73 | 12.54 |

1) Bubble point

Capacities are based on:  
- evaporating temp.  $t_e = -10$  °C,  
- hot gas temp.  $t_h = t_c + 25$  K,  
- subcooling  $\Delta t_{sub} = 4$  K.

An increase in hot gas temperature  $t_h$  of 10 K, based on  $t_h = t_c + 25$  °C, reduces valve capacity approx. 2% and vice versa.  
A change in evaporating temperature  $t_e$  changes valve capacity; see correction factor table.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°C] | -40  | -30  | -20  | -10  | 0    | 10   |
|------------|------|------|------|------|------|------|
| R290       | 0.88 | 0.92 | 0.96 | 1.00 | 1.04 | 1.07 |

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature  $t_e$ .

# Capacity

## Liquid capacity $Q_e$ [TR]

US Units

| Type | $C_v$<br>[gal / min] | Liquid capacity $Q_e$ [TR]<br>at pressure drop across valve $\Delta p$ [psi] |   |   |   |   |   |   |
|------|----------------------|------------------------------------------------------------------------------|---|---|---|---|---|---|
|      |                      | 1                                                                            | 2 | 3 | 4 | 5 | 6 | 7 |

## R22/R407C

|        |      |     |     |     |     |     |     |     |
|--------|------|-----|-----|-----|-----|-----|-----|-----|
| EVUL 1 | 0.12 | 0.3 | 0.5 | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 |
| EVUL 2 | 0.23 | 0.7 | 0.9 | 1.2 | 1.3 | 1.5 | 1.6 | 1.8 |
| EVUL 3 | 0.35 | 1.0 | 1.4 | 1.7 | 2.0 | 2.2 | 2.4 | 2.6 |
| EVUL 4 | 0.58 | 1.7 | 2.4 | 2.9 | 3.3 | 3.7 | 4.1 | 4.4 |
| EVUL 5 | 0.75 | 2.2 | 3.1 | 3.7 | 4.3 | 4.8 | 5.3 | 5.7 |
| EVUL 6 | 0.87 | 2.5 | 3.5 | 4.3 | 5.0 | 5.6 | 6.1 | 6.6 |
| EVUL 8 | 1.04 | 3.0 | 4.2 | 5.2 | 6.0 | 6.7 | 7.3 | 7.9 |

## R134a

|        |      |      |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|------|------|
| EVUL 1 | 0.12 | 0.33 | 0.47 | 0.57 | 0.66 | 0.74 | 0.81 | 0.87 |
| EVUL 2 | 0.23 | 0.66 | 0.93 | 1.14 | 1.32 | 1.47 | 1.61 | 1.74 |
| EVUL 3 | 0.35 | 0.99 | 1.40 | 1.71 | 1.97 | 2.21 | 2.42 | 2.61 |
| EVUL 4 | 0.58 | 1.64 | 2.33 | 2.85 | 3.29 | 3.68 | 4.03 | 4.35 |
| EVUL 5 | 0.75 | 2.14 | 3.02 | 3.70 | 4.27 | 4.78 | 5.24 | 5.66 |
| EVUL 6 | 0.87 | 2.47 | 3.49 | 4.27 | 4.93 | 5.51 | 6.04 | 6.53 |
| EVUL 8 | 1.04 | 2.96 | 4.19 | 5.13 | 5.92 | 6.62 | 7.25 | 7.83 |

## R404A/R507

|        |      |     |     |     |     |     |     |     |
|--------|------|-----|-----|-----|-----|-----|-----|-----|
| EVUL 1 | 0.12 | 0.2 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 |
| EVUL 2 | 0.23 | 0.5 | 0.6 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 |
| EVUL 3 | 0.35 | 0.7 | 1.0 | 1.2 | 1.4 | 1.5 | 1.7 | 1.8 |
| EVUL 4 | 0.58 | 1.1 | 1.6 | 2.0 | 2.3 | 2.5 | 2.8 | 3.0 |
| EVUL 5 | 0.75 | 1.5 | 2.1 | 2.6 | 3.0 | 3.3 | 3.6 | 3.9 |
| EVUL 6 | 0.87 | 1.7 | 2.4 | 3.0 | 3.4 | 3.8 | 4.2 | 4.5 |
| EVUL 8 | 1.04 | 2.1 | 2.9 | 3.6 | 4.1 | 4.6 | 5.0 | 5.4 |

## R410A

|        |      |     |     |     |     |     |     |     |
|--------|------|-----|-----|-----|-----|-----|-----|-----|
| EVUL 1 | 0.12 | 0.3 | 0.5 | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 |
| EVUL 2 | 0.23 | 0.7 | 0.9 | 1.1 | 1.3 | 1.5 | 1.6 | 1.8 |
| EVUL 3 | 0.35 | 1.0 | 1.4 | 1.7 | 2.0 | 2.2 | 2.4 | 2.6 |
| EVUL 4 | 0.58 | 1.7 | 2.3 | 2.9 | 3.3 | 3.7 | 4.1 | 4.4 |
| EVUL 5 | 0.75 | 2.2 | 3.0 | 3.7 | 4.3 | 4.8 | 5.3 | 5.7 |
| EVUL 6 | 0.87 | 2.5 | 3.5 | 4.3 | 5.0 | 5.6 | 6.1 | 6.6 |
| EVUL 8 | 1.04 | 3.0 | 4.2 | 5.2 | 6.0 | 6.7 | 7.3 | 7.9 |

## R290

|        |      |     |     |     |     |     |     |     |
|--------|------|-----|-----|-----|-----|-----|-----|-----|
| EVUL 1 | 0.12 | 0.4 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.0 |
| EVUL 2 | 0.23 | 0.8 | 1.1 | 1.4 | 1.6 | 1.8 | 1.9 | 2.1 |
| EVUL 3 | 0.35 | 1.2 | 1.7 | 2.1 | 2.4 | 2.6 | 2.9 | 3.1 |
| EVUL 4 | 0.58 | 2.0 | 2.8 | 3.4 | 3.9 | 4.4 | 4.8 | 5.2 |
| EVUL 5 | 0.75 | 2.6 | 3.6 | 4.4 | 5.1 | 5.7 | 6.3 | 6.8 |
| EVUL 6 | 0.87 | 3.0 | 4.2 | 5.1 | 5.9 | 6.6 | 7.2 | 7.8 |
| EVUL 8 | 1.04 | 3.6 | 5.0 | 6.2 | 7.1 | 7.9 | 8.7 | 9.4 |

Capacities are based on:  
- liquid temperature:  $t_l = 100$  °F ahead of valve,  
- evaporating temperature:  $t_e = 40$  °F,  
- superheat temperature: ( $t_e + 10$  °F) = 50 °F.

## Correction factors for liquid temperature $t_l$

| $t_l$ [°F] | 80   | 90   | 100  | 110  | 120  |
|------------|------|------|------|------|------|
| Factor     | 1.10 | 1.05 | 1.00 | 0.95 | 0.90 |

When liquid temperature  $t_l$  ahead of the expansion valve is other than 100 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

# Data sheet | Solenoid valves, Type EVUL

Capacity  
Suction vapour capacity  
 $Q_e$  [TR]

US Units

| Type | $C_v$<br>[gal / min] | Pressure<br>drop<br>$\Delta p$<br>[psi] | Suction vapour capacity $Q_e$ [TR]<br>at evaporating temperature $t_e$ [°F] |     |   |    |    |    |    |    |
|------|----------------------|-----------------------------------------|-----------------------------------------------------------------------------|-----|---|----|----|----|----|----|
|      |                      |                                         | -40                                                                         | -20 | 0 | 10 | 20 | 30 | 40 | 50 |

R22/R407C

|        |      |   |       |       |       |       |       |       |       |       |
|--------|------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 1 | 0.016 | 0.022 | 0.030 | 0.034 | 0.038 | 0.043 | 0.048 | 0.054 |
|        |      | 2 | 0.022 | 0.031 | 0.041 | 0.047 | 0.053 | 0.060 | 0.067 | 0.075 |
|        |      | 3 | 0.025 | 0.036 | 0.049 | 0.057 | 0.065 | 0.073 | 0.082 | 0.092 |
| EVUL 2 | 0.23 | 1 | 0.032 | 0.045 | 0.059 | 0.067 | 0.076 | 0.086 | 0.096 | 0.107 |
|        |      | 2 | 0.043 | 0.061 | 0.082 | 0.094 | 0.107 | 0.120 | 0.135 | 0.151 |
|        |      | 3 | 0.050 | 0.072 | 0.099 | 0.113 | 0.129 | 0.146 | 0.164 | 0.183 |
| EVUL 3 | 0.35 | 1 | 0.049 | 0.067 | 0.089 | 0.101 | 0.115 | 0.129 | 0.144 | 0.161 |
|        |      | 2 | 0.065 | 0.092 | 0.123 | 0.141 | 0.160 | 0.180 | 0.202 | 0.226 |
|        |      | 3 | 0.075 | 0.109 | 0.148 | 0.170 | 0.194 | 0.219 | 0.246 | 0.275 |
| EVUL 4 | 0.58 | 1 | 0.081 | 0.112 | 0.148 | 0.169 | 0.191 | 0.215 | 0.240 | 0.268 |
|        |      | 2 | 0.108 | 0.153 | 0.206 | 0.235 | 0.267 | 0.301 | 0.337 | 0.376 |
|        |      | 3 | 0.124 | 0.181 | 0.247 | 0.283 | 0.323 | 0.365 | 0.410 | 0.458 |
| EVUL 5 | 0.75 | 1 | 0.105 | 0.145 | 0.193 | 0.219 | 0.248 | 0.279 | 0.313 | 0.348 |
|        |      | 2 | 0.141 | 0.199 | 0.267 | 0.305 | 0.347 | 0.391 | 0.438 | 0.489 |
|        |      | 3 | 0.161 | 0.236 | 0.321 | 0.368 | 0.419 | 0.474 | 0.533 | 0.595 |
| EVUL 6 | 0.87 | 1 | 0.122 | 0.168 | 0.222 | 0.253 | 0.286 | 0.322 | 0.361 | 0.402 |
|        |      | 2 | 0.162 | 0.230 | 0.308 | 0.352 | 0.400 | 0.451 | 0.506 | 0.565 |
|        |      | 3 | 0.186 | 0.272 | 0.370 | 0.425 | 0.484 | 0.547 | 0.615 | 0.687 |
| EVUL 8 | 1.04 | 1 | 0.146 | 0.201 | 0.267 | 0.304 | 0.344 | 0.387 | 0.433 | 0.482 |
|        |      | 2 | 0.195 | 0.275 | 0.370 | 0.423 | 0.480 | 0.541 | 0.607 | 0.678 |
|        |      | 3 | 0.224 | 0.326 | 0.444 | 0.510 | 0.581 | 0.657 | 0.738 | 0.824 |

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature  $t_e$ ,
- pressure drop  $\Delta p$  across the valve.

Capacities are based on:

- liquid temperature  $t_l = 100$  °F ahead of the expansion valve,
- superheat  $t_s = 7$  °F.

For each additional 10 °F of superheat, the table capacities must be reduced by 2%.

Correction factors for liquid temperature  $t_l$

| $t_l$ [°F] | 80   | 90   | 100  | 110  | 120  |
|------------|------|------|------|------|------|
| Factor     | 1.10 | 1.05 | 1.00 | 0.95 | 0.90 |

When liquid temperature  $t_l$  ahead of the expansion valve is other than 100 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity**  
**Suction vapour capacity**  
**Q<sub>e</sub> [TR]**  
(continued)

US Units

| Type | C <sub>v</sub><br>[gal / min] | Pressure<br>drop<br>Δp<br>[psi] | Suction vapour capacity Q <sub>e</sub> [TR]<br>at evaporating temperature t <sub>e</sub> [°F] |     |   |    |    |    |    |    |
|------|-------------------------------|---------------------------------|-----------------------------------------------------------------------------------------------|-----|---|----|----|----|----|----|
|      |                               |                                 | -40                                                                                           | -20 | 0 | 10 | 20 | 30 | 40 | 50 |

R134a

|        |      |   |       |       |       |       |       |       |       |       |
|--------|------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 1 | 0.012 | 0.017 | 0.023 | 0.027 | 0.031 | 0.035 | 0.039 | 0.044 |
|        |      | 2 | 0.015 | 0.023 | 0.032 | 0.037 | 0.042 | 0.048 | 0.055 | 0.062 |
|        |      | 3 | 0.016 | 0.026 | 0.038 | 0.044 | 0.051 | 0.058 | 0.066 | 0.075 |
| EVUL 2 | 0.23 | 1 | 0.024 | 0.034 | 0.046 | 0.053 | 0.061 | 0.069 | 0.078 | 0.088 |
|        |      | 2 | 0.030 | 0.045 | 0.063 | 0.074 | 0.085 | 0.096 | 0.109 | 0.123 |
|        |      | 3 | 0.032 | 0.052 | 0.075 | 0.088 | 0.101 | 0.116 | 0.132 | 0.149 |
| EVUL 3 | 0.35 | 1 | 0.036 | 0.051 | 0.070 | 0.080 | 0.092 | 0.104 | 0.117 | 0.132 |
|        |      | 2 | 0.045 | 0.068 | 0.095 | 0.110 | 0.127 | 0.145 | 0.164 | 0.185 |
|        |      | 3 | 0.048 | 0.078 | 0.113 | 0.132 | 0.152 | 0.174 | 0.198 | 0.224 |
| EVUL 4 | 0.58 | 1 | 0.059 | 0.085 | 0.116 | 0.134 | 0.153 | 0.173 | 0.196 | 0.220 |
|        |      | 2 | 0.075 | 0.114 | 0.159 | 0.184 | 0.211 | 0.241 | 0.273 | 0.308 |
|        |      | 3 | 0.080 | 0.131 | 0.188 | 0.219 | 0.254 | 0.290 | 0.330 | 0.373 |
| EVUL 5 | 0.75 | 1 | 0.077 | 0.111 | 0.151 | 0.174 | 0.198 | 0.225 | 0.254 | 0.286 |
|        |      | 2 | 0.098 | 0.148 | 0.206 | 0.239 | 0.275 | 0.313 | 0.355 | 0.400 |
|        |      | 3 | 0.104 | 0.170 | 0.244 | 0.285 | 0.330 | 0.378 | 0.429 | 0.484 |
| EVUL 6 | 0.87 | 1 | 0.089 | 0.128 | 0.174 | 0.200 | 0.229 | 0.260 | 0.294 | 0.330 |
|        |      | 2 | 0.113 | 0.170 | 0.238 | 0.276 | 0.317 | 0.362 | 0.410 | 0.461 |
|        |      | 3 | 0.120 | 0.196 | 0.281 | 0.329 | 0.380 | 0.436 | 0.495 | 0.559 |
| EVUL 8 | 1.04 | 1 | 0.107 | 0.153 | 0.209 | 0.240 | 0.275 | 0.312 | 0.352 | 0.396 |
|        |      | 2 | 0.135 | 0.205 | 0.286 | 0.331 | 0.381 | 0.434 | 0.492 | 0.554 |
|        |      | 3 | 0.144 | 0.235 | 0.338 | 0.395 | 0.456 | 0.523 | 0.594 | 0.671 |

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature t<sub>e</sub>,
- pressure drop Δp across the valve.

Capacities are based on:

- liquid temperature t<sub>l</sub> = 100 °F ahead of the expansion valve,
- superheat t<sub>s</sub> = 7 °F.

For each additional 10 °F of superheat, the table capacities must be reduced by 2%.

**Correction factors for liquid temperature t<sub>l</sub>**

| t <sub>l</sub> [°F] | 80   | 90   | 100  | 110  | 120  |
|---------------------|------|------|------|------|------|
| Factor              | 1.10 | 1.05 | 1.00 | 0.95 | 0.90 |

When liquid temperature t<sub>l</sub> ahead of the expansion valve is other than 100 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity  
Suction vapour capacity  
 $Q_e$  [TR]  
(continued)**
**US Units**

| Type | $C_v$<br>[gal / min] | Pressure<br>drop<br>$\Delta p$<br>[psi] | Suction vapour capacity $Q_e$ [TR]<br>at evaporating temperature $t_e$ [°F] |     |   |    |    |    |    |    |
|------|----------------------|-----------------------------------------|-----------------------------------------------------------------------------|-----|---|----|----|----|----|----|
|      |                      |                                         | -40                                                                         | -20 | 0 | 10 | 20 | 30 | 40 | 50 |

**R404A/R507**

|        |      |   |       |       |       |       |       |       |       |       |
|--------|------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 1 | 0.015 | 0.020 | 0.026 | 0.030 | 0.034 | 0.038 | 0.043 | 0.048 |
|        |      | 2 | 0.020 | 0.028 | 0.037 | 0.042 | 0.048 | 0.054 | 0.060 | 0.068 |
|        |      | 3 | 0.023 | 0.033 | 0.045 | 0.051 | 0.058 | 0.065 | 0.074 | 0.082 |
| EVUL 2 | 0.23 | 1 | 0.029 | 0.040 | 0.053 | 0.060 | 0.068 | 0.077 | 0.086 | 0.096 |
|        |      | 2 | 0.040 | 0.055 | 0.074 | 0.084 | 0.096 | 0.108 | 0.121 | 0.135 |
|        |      | 3 | 0.047 | 0.066 | 0.089 | 0.102 | 0.116 | 0.131 | 0.147 | 0.165 |
| EVUL 3 | 0.35 | 1 | 0.044 | 0.060 | 0.079 | 0.090 | 0.102 | 0.115 | 0.129 | 0.144 |
|        |      | 2 | 0.060 | 0.083 | 0.111 | 0.126 | 0.143 | 0.162 | 0.181 | 0.203 |
|        |      | 3 | 0.070 | 0.099 | 0.134 | 0.153 | 0.174 | 0.196 | 0.221 | 0.247 |
| EVUL 4 | 0.58 | 1 | 0.073 | 0.100 | 0.132 | 0.151 | 0.170 | 0.192 | 0.215 | 0.240 |
|        |      | 2 | 0.100 | 0.138 | 0.184 | 0.211 | 0.239 | 0.269 | 0.302 | 0.338 |
|        |      | 3 | 0.117 | 0.166 | 0.223 | 0.255 | 0.290 | 0.327 | 0.368 | 0.411 |
| EVUL 5 | 0.75 | 1 | 0.095 | 0.130 | 0.172 | 0.196 | 0.222 | 0.249 | 0.280 | 0.312 |
|        |      | 2 | 0.130 | 0.180 | 0.240 | 0.274 | 0.310 | 0.350 | 0.393 | 0.439 |
|        |      | 3 | 0.153 | 0.215 | 0.290 | 0.332 | 0.377 | 0.426 | 0.478 | 0.535 |
| EVUL 6 | 0.87 | 1 | 0.110 | 0.150 | 0.198 | 0.226 | 0.256 | 0.288 | 0.323 | 0.360 |
|        |      | 2 | 0.149 | 0.207 | 0.277 | 0.316 | 0.358 | 0.404 | 0.453 | 0.506 |
|        |      | 3 | 0.176 | 0.248 | 0.334 | 0.383 | 0.435 | 0.491 | 0.552 | 0.617 |
| EVUL 8 | 1.04 | 1 | 0.132 | 0.180 | 0.238 | 0.271 | 0.307 | 0.345 | 0.387 | 0.432 |
|        |      | 2 | 0.179 | 0.249 | 0.332 | 0.379 | 0.430 | 0.485 | 0.544 | 0.608 |
|        |      | 3 | 0.211 | 0.298 | 0.401 | 0.459 | 0.522 | 0.589 | 0.662 | 0.741 |

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature  $t_e$ ,
- pressure drop  $\Delta p$  across the valve.

Capacities are based on:

- liquid temperature  $t_l = 100$  °F ahead of the expansion valve,
- superheat  $t_s = 7$  °F.

For each additional 10 °F of superheat, the table capacities must be reduced by 2%.

**Correction factors for liquid temperature  $t_l$** 

| $t_l$ [°F] | 80   | 90   | 100  | 110  | 120  |
|------------|------|------|------|------|------|
| Factor     | 1.10 | 1.05 | 1.00 | 0.95 | 0.90 |

When liquid temperature  $t_l$  ahead of the expansion valve is other than 100 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity  
Suction vapour capacity  
Q<sub>e</sub> [TR]  
(continued)**
**US Units**

| Type | C <sub>v</sub><br>[gal / min] | Pressure<br>drop<br>Δp<br>[psi] | Suction vapour capacity Q <sub>e</sub> [TR]<br>at evaporating temperature t <sub>e</sub> [°F] |     |   |    |    |    |    |    |
|------|-------------------------------|---------------------------------|-----------------------------------------------------------------------------------------------|-----|---|----|----|----|----|----|
|      |                               |                                 | -40                                                                                           | -20 | 0 | 10 | 20 | 30 | 40 | 50 |

**R410A**

|               |      |   |       |       |       |       |       |       |       |       |
|---------------|------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>EVUL 1</b> | 0.12 | 1 | 0.024 | 0.032 | 0.041 | 0.046 | 0.051 | 0.056 | 0.062 | 0.068 |
|               |      | 2 | 0.033 | 0.044 | 0.057 | 0.064 | 0.071 | 0.079 | 0.087 | 0.096 |
|               |      | 3 | 0.040 | 0.054 | 0.069 | 0.078 | 0.087 | 0.096 | 0.107 | 0.118 |
| <b>EVUL 2</b> | 0.23 | 1 | 0.049 | 0.064 | 0.081 | 0.091 | 0.101 | 0.112 | 0.124 | 0.137 |
|               |      | 2 | 0.067 | 0.089 | 0.114 | 0.128 | 0.143 | 0.158 | 0.175 | 0.193 |
|               |      | 3 | 0.080 | 0.107 | 0.138 | 0.155 | 0.173 | 0.193 | 0.213 | 0.235 |
| <b>EVUL 3</b> | 0.35 | 1 | 0.073 | 0.096 | 0.122 | 0.137 | 0.152 | 0.169 | 0.186 | 0.205 |
|               |      | 2 | 0.100 | 0.133 | 0.171 | 0.192 | 0.214 | 0.237 | 0.262 | 0.289 |
|               |      | 3 | 0.120 | 0.161 | 0.207 | 0.233 | 0.260 | 0.289 | 0.320 | 0.353 |
| <b>EVUL 4</b> | 0.58 | 1 | 0.121 | 0.159 | 0.203 | 0.228 | 0.254 | 0.281 | 0.311 | 0.342 |
|               |      | 2 | 0.167 | 0.222 | 0.285 | 0.319 | 0.356 | 0.396 | 0.437 | 0.482 |
|               |      | 3 | 0.200 | 0.268 | 0.345 | 0.388 | 0.434 | 0.482 | 0.534 | 0.588 |
| <b>EVUL 5</b> | 0.75 | 1 | 0.158 | 0.207 | 0.264 | 0.296 | 0.330 | 0.366 | 0.404 | 0.444 |
|               |      | 2 | 0.218 | 0.288 | 0.370 | 0.415 | 0.463 | 0.514 | 0.569 | 0.626 |
|               |      | 3 | 0.260 | 0.348 | 0.449 | 0.505 | 0.564 | 0.627 | 0.694 | 0.764 |
| <b>EVUL 6</b> | 0.87 | 1 | 0.182 | 0.239 | 0.305 | 0.341 | 0.380 | 0.422 | 0.466 | 0.513 |
|               |      | 2 | 0.251 | 0.333 | 0.427 | 0.479 | 0.535 | 0.594 | 0.656 | 0.723 |
|               |      | 3 | 0.299 | 0.401 | 0.518 | 0.582 | 0.651 | 0.723 | 0.800 | 0.882 |
| <b>EVUL 8</b> | 1.04 | 1 | 0.218 | 0.287 | 0.366 | 0.410 | 0.456 | 0.506 | 0.559 | 0.615 |
|               |      | 2 | 0.301 | 0.399 | 0.512 | 0.575 | 0.641 | 0.712 | 0.787 | 0.867 |
|               |      | 3 | 0.359 | 0.482 | 0.622 | 0.699 | 0.781 | 0.868 | 0.960 | 1.058 |

The table values refer to evaporator capacity and are given as a function of:  
 - evaporating temperature t<sub>e</sub>,  
 - pressure drop Δp across the valve.

Capacities are based on:  
 - liquid temperature t<sub>l</sub> = 100 °F ahead of the expansion valve,  
 - superheat t<sub>s</sub> = 7 °F.  
 For each additional 10 °F of superheat, the table capacities must be reduced by 2%.

**Correction factors for liquid temperature t<sub>l</sub>**

| t <sub>l</sub> [°F] | 80   | 90   | 100  | 110  | 120  |
|---------------------|------|------|------|------|------|
| <b>Factor</b>       | 1.10 | 1.05 | 1.00 | 0.95 | 0.90 |

When liquid temperature t<sub>l</sub> ahead of the expansion valve is other than 100 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity**  
**Suction vapour capacity**  
**Q<sub>e</sub> [TR]**  
(continued)

US Units

| Type | C <sub>v</sub><br>[gal / min] | Pressure<br>drop<br>Δp<br>[psi] | Suction vapour capacity Q <sub>e</sub><br>[TR] at evaporating temperature t <sub>e</sub> [°F] |     |   |    |    |    |    |    |
|------|-------------------------------|---------------------------------|-----------------------------------------------------------------------------------------------|-----|---|----|----|----|----|----|
|      |                               |                                 | -40                                                                                           | -20 | 0 | 10 | 20 | 30 | 40 | 50 |

R290

|        |      |   |       |       |       |       |       |       |       |       |
|--------|------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 1 | 0.024 | 0.031 | 0.040 | 0.046 | 0.051 | 0.057 | 0.063 | 0.070 |
|        |      | 2 | 0.032 | 0.043 | 0.056 | 0.063 | 0.071 | 0.080 | 0.088 | 0.098 |
|        |      | 3 | 0.038 | 0.052 | 0.068 | 0.077 | 0.086 | 0.096 | 0.107 | 0.119 |
| EVUL 2 | 0.23 | 1 | 0.047 | 0.063 | 0.081 | 0.091 | 0.102 | 0.114 | 0.126 | 0.139 |
|        |      | 2 | 0.064 | 0.086 | 0.112 | 0.127 | 0.142 | 0.159 | 0.177 | 0.196 |
|        |      | 3 | 0.075 | 0.103 | 0.135 | 0.153 | 0.172 | 0.193 | 0.215 | 0.238 |
| EVUL 3 | 0.35 | 1 | 0.071 | 0.094 | 0.121 | 0.137 | 0.153 | 0.170 | 0.189 | 0.209 |
|        |      | 2 | 0.096 | 0.130 | 0.169 | 0.190 | 0.214 | 0.239 | 0.265 | 0.294 |
|        |      | 3 | 0.113 | 0.155 | 0.203 | 0.230 | 0.259 | 0.289 | 0.322 | 0.357 |
| EVUL 4 | 0.58 | 1 | 0.118 | 0.157 | 0.202 | 0.228 | 0.255 | 0.284 | 0.315 | 0.349 |
|        |      | 2 | 0.160 | 0.216 | 0.281 | 0.317 | 0.356 | 0.398 | 0.442 | 0.489 |
|        |      | 3 | 0.188 | 0.258 | 0.338 | 0.383 | 0.431 | 0.482 | 0.537 | 0.595 |
| EVUL 5 | 0.75 | 1 | 0.154 | 0.204 | 0.263 | 0.296 | 0.331 | 0.369 | 0.410 | 0.453 |
|        |      | 2 | 0.208 | 0.281 | 0.365 | 0.413 | 0.463 | 0.517 | 0.575 | 0.636 |
|        |      | 3 | 0.244 | 0.335 | 0.440 | 0.498 | 0.561 | 0.627 | 0.698 | 0.774 |
| EVUL 6 | 0.87 | 1 | 0.177 | 0.235 | 0.303 | 0.341 | 0.382 | 0.426 | 0.473 | 0.523 |
|        |      | 2 | 0.241 | 0.324 | 0.422 | 0.476 | 0.534 | 0.597 | 0.663 | 0.734 |
|        |      | 3 | 0.282 | 0.387 | 0.508 | 0.575 | 0.647 | 0.724 | 0.806 | 0.893 |
| EVUL 8 | 1.04 | 1 | 0.213 | 0.282 | 0.364 | 0.410 | 0.459 | 0.511 | 0.567 | 0.627 |
|        |      | 2 | 0.289 | 0.389 | 0.506 | 0.571 | 0.641 | 0.716 | 0.796 | 0.881 |
|        |      | 3 | 0.338 | 0.464 | 0.609 | 0.690 | 0.776 | 0.868 | 0.967 | 1.072 |

The table values refer to evaporator capacity and are given as a function of:  
- evaporating temperature t<sub>e</sub>,  
- pressure drop Δp across the valve.

Capacities are based on:  
- liquid temperature t<sub>l</sub> = 100 °F ahead of the expansion valve,  
- superheat t<sub>s</sub> = 7 °F.  
For each additional 10 °F of superheat, the table capacities must be reduced by 2%.

**Correction factors for liquid temperature t<sub>l</sub>**

| t <sub>l</sub> [°F] | 80   | 90   | 100  | 110  | 120  |
|---------------------|------|------|------|------|------|
| Factor              | 1.10 | 1.05 | 1.00 | 0.95 | 0.90 |

When liquid temperature t<sub>l</sub> ahead of the expansion valve is other than 100 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity**  
**Hot gas capacity  $Q_h$  [TR]**
**US Units**

| Type | $C_v$<br>[gal / min] | Pressure drop<br>across valve<br>$\Delta p$<br>[bar] | Hot gas capacity $Q_h$ [TR]<br>at condensing temp. $t_c$ [°F] |    |     |     |     |
|------|----------------------|------------------------------------------------------|---------------------------------------------------------------|----|-----|-----|-----|
|      |                      |                                                      | 70                                                            | 90 | 100 | 120 | 140 |

**R22/R407C**

|        |      |    |       |       |       |       |       |
|--------|------|----|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 2  | 0.097 | 0.100 | 0.101 | 0.101 | 0.098 |
|        |      | 5  | 0.151 | 0.157 | 0.159 | 0.159 | 0.154 |
|        |      | 10 | 0.209 | 0.219 | 0.221 | 0.222 | 0.216 |
|        |      | 15 | 0.250 | 0.263 | 0.267 | 0.269 | 0.262 |
|        |      | 20 | 0.282 | 0.299 | 0.304 | 0.308 | 0.300 |
|        |      | 25 | 0.307 | 0.328 | 0.335 | 0.340 | 0.333 |
| EVUL 2 | 0.23 | 2  | 0.193 | 0.201 | 0.202 | 0.202 | 0.195 |
|        |      | 5  | 0.302 | 0.314 | 0.318 | 0.318 | 0.308 |
|        |      | 10 | 0.418 | 0.437 | 0.443 | 0.445 | 0.431 |
|        |      | 15 | 0.500 | 0.527 | 0.535 | 0.539 | 0.524 |
|        |      | 20 | 0.564 | 0.598 | 0.608 | 0.615 | 0.600 |
|        |      | 25 | 0.615 | 0.657 | 0.670 | 0.680 | 0.665 |
| EVUL 3 | 0.35 | 2  | 0.290 | 0.301 | 0.304 | 0.303 | 0.293 |
|        |      | 5  | 0.453 | 0.471 | 0.476 | 0.477 | 0.461 |
|        |      | 10 | 0.626 | 0.656 | 0.664 | 0.667 | 0.647 |
|        |      | 15 | 0.750 | 0.790 | 0.802 | 0.808 | 0.786 |
|        |      | 20 | 0.845 | 0.897 | 0.912 | 0.923 | 0.900 |
|        |      | 25 | 0.922 | 0.985 | 1.005 | 1.020 | 0.998 |
| EVUL 4 | 0.58 | 2  | 0.483 | 0.501 | 0.506 | 0.506 | 0.489 |
|        |      | 5  | 0.755 | 0.785 | 0.794 | 0.794 | 0.769 |
|        |      | 10 | 1.044 | 1.093 | 1.107 | 1.111 | 1.078 |
|        |      | 15 | 1.250 | 1.316 | 1.337 | 1.347 | 1.310 |
|        |      | 20 | 1.409 | 1.494 | 1.521 | 1.538 | 1.500 |
|        |      | 25 | 1.537 | 1.642 | 1.675 | 1.700 | 1.663 |
| EVUL 5 | 0.75 | 2  | 0.628 | 0.652 | 0.658 | 0.657 | 0.635 |
|        |      | 5  | 0.981 | 1.021 | 1.032 | 1.033 | 0.999 |
|        |      | 10 | 1.357 | 1.421 | 1.439 | 1.445 | 1.402 |
|        |      | 15 | 1.624 | 1.711 | 1.737 | 1.751 | 1.703 |
|        |      | 20 | 1.832 | 1.943 | 1.977 | 1.999 | 1.950 |
|        |      | 25 | 1.998 | 2.134 | 2.177 | 2.210 | 2.161 |
| EVUL 6 | 0.87 | 2  | 0.725 | 0.752 | 0.759 | 0.758 | 0.733 |
|        |      | 5  | 1.132 | 1.178 | 1.191 | 1.191 | 1.153 |
|        |      | 10 | 1.566 | 1.639 | 1.660 | 1.667 | 1.618 |
|        |      | 15 | 1.874 | 1.975 | 2.005 | 2.020 | 1.965 |
|        |      | 20 | 2.113 | 2.241 | 2.281 | 2.307 | 2.250 |
|        |      | 25 | 2.305 | 2.462 | 2.512 | 2.550 | 2.494 |
| EVUL 8 | 1.04 | 2  | 0.870 | 0.903 | 0.911 | 0.910 | 0.880 |
|        |      | 5  | 1.358 | 1.414 | 1.429 | 1.430 | 1.384 |
|        |      | 10 | 1.879 | 1.967 | 1.993 | 2.001 | 1.941 |
|        |      | 15 | 2.249 | 2.370 | 2.406 | 2.424 | 2.358 |
|        |      | 20 | 2.536 | 2.690 | 2.737 | 2.768 | 2.700 |
|        |      | 25 | 2.766 | 2.955 | 3.015 | 3.061 | 2.993 |

Capacities are based on:

- Evaporating temperature  $t_e = 40$  °F,
- hot gas temperature  $t_h = t_c + 40$  °F,
- subcooling  $\Delta t_{sc} = 10$  °F.

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature  $t_e$ ,
- pressure drop  $\Delta p$  across the valve.

Capacities are based on a hot gas temperature superheated 40 °F above condensing temperature ( $t_h = t_c + 40$  °F).  
For each additional 10 °F of superheat above 40 °F, the table capacities must be reduced by 1%.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°F] | -40  | -20  | 0    | 20   | 40 | 50   |
|------------|------|------|------|------|----|------|
| Factor     | 1.18 | 1.14 | 1.09 | 1.04 | 1  | 0.97 |

When the valve is used in a hot gas defrost circuit, evaporator temperature affects the capacity.  
When the evaporator temperature differs from 40 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity**  
**Hot gas capacity  $Q_h$  [TR]**  
*(continued)*
**US Units**

| Type | $C_v$<br>[gal / min] | Pressure drop<br>across valve<br>$\Delta p$<br>[bar] | Hot gas capacity $Q_h$ [TR]<br>at condensing temp. $t_c$ [°F] |    |     |     |     |
|------|----------------------|------------------------------------------------------|---------------------------------------------------------------|----|-----|-----|-----|
|      |                      |                                                      | 70                                                            | 90 | 100 | 120 | 140 |

**R134a**

|        |      |    |       |       |       |       |       |
|--------|------|----|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 2  | 0.073 | 0.077 | 0.079 | 0.080 | 0.079 |
|        |      | 5  | 0.113 | 0.120 | 0.122 | 0.125 | 0.123 |
|        |      | 10 | 0.153 | 0.165 | 0.169 | 0.173 | 0.172 |
|        |      | 15 | 0.179 | 0.195 | 0.201 | 0.208 | 0.208 |
|        |      | 20 | 0.196 | 0.218 | 0.226 | 0.236 | 0.236 |
| EVUL 2 | 0.23 | 2  | 0.208 | 0.235 | 0.245 | 0.258 | 0.260 |
|        |      | 5  | 0.306 | 0.329 | 0.338 | 0.347 | 0.344 |
|        |      | 10 | 0.358 | 0.391 | 0.403 | 0.416 | 0.416 |
|        |      | 15 | 0.393 | 0.436 | 0.452 | 0.471 | 0.473 |
|        |      | 20 | 0.416 | 0.471 | 0.491 | 0.516 | 0.521 |
| EVUL 3 | 0.35 | 2  | 0.220 | 0.232 | 0.236 | 0.240 | 0.236 |
|        |      | 5  | 0.339 | 0.360 | 0.367 | 0.375 | 0.370 |
|        |      | 10 | 0.459 | 0.494 | 0.506 | 0.520 | 0.516 |
|        |      | 15 | 0.537 | 0.586 | 0.604 | 0.624 | 0.623 |
|        |      | 20 | 0.589 | 0.655 | 0.678 | 0.707 | 0.709 |
| EVUL 4 | 0.58 | 2  | 0.624 | 0.706 | 0.736 | 0.774 | 0.781 |
|        |      | 5  | 0.366 | 0.386 | 0.393 | 0.399 | 0.394 |
|        |      | 10 | 0.565 | 0.600 | 0.612 | 0.624 | 0.617 |
|        |      | 15 | 0.765 | 0.823 | 0.844 | 0.866 | 0.861 |
|        |      | 20 | 0.894 | 0.977 | 1.006 | 1.041 | 1.039 |
| EVUL 5 | 0.75 | 2  | 0.982 | 1.091 | 1.130 | 1.178 | 1.182 |
|        |      | 5  | 1.040 | 1.177 | 1.227 | 1.290 | 1.302 |
|        |      | 10 | 0.476 | 0.502 | 0.511 | 0.519 | 0.512 |
|        |      | 15 | 0.734 | 0.780 | 0.796 | 0.812 | 0.803 |
|        |      | 20 | 0.994 | 1.071 | 1.097 | 1.126 | 1.119 |
| EVUL 6 | 0.87 | 2  | 1.162 | 1.270 | 1.308 | 1.353 | 1.351 |
|        |      | 5  | 1.277 | 1.418 | 1.469 | 1.531 | 1.537 |
|        |      | 10 | 1.352 | 1.530 | 1.595 | 1.677 | 1.692 |
|        |      | 15 | 0.549 | 0.579 | 0.590 | 0.599 | 0.591 |
|        |      | 20 | 0.847 | 0.900 | 0.919 | 0.937 | 0.926 |
| EVUL 8 | 1.04 | 2  | 1.147 | 1.235 | 1.266 | 1.300 | 1.291 |
|        |      | 5  | 1.341 | 1.465 | 1.510 | 1.561 | 1.559 |
|        |      | 10 | 1.473 | 1.636 | 1.695 | 1.767 | 1.773 |
|        |      | 15 | 1.560 | 1.766 | 1.841 | 1.935 | 1.952 |
|        |      | 20 | 0.659 | 0.695 | 0.708 | 0.719 | 0.709 |
|        |      | 2  | 1.017 | 1.080 | 1.102 | 1.124 | 1.111 |
|        |      | 5  | 1.377 | 1.482 | 1.519 | 1.560 | 1.549 |
|        |      | 10 | 1.610 | 1.758 | 1.812 | 1.873 | 1.870 |
|        |      | 15 | 1.768 | 1.964 | 2.034 | 2.120 | 2.128 |
|        |      | 20 | 1.872 | 2.119 | 2.209 | 2.322 | 2.343 |

Capacities are based on:

- Evaporating temperature  $t_e = 40$  °F,
- hot gas temperature  $t_h = t_c + 40$  °F,
- subcooling  $\Delta t_u = 10$  °F.

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature  $t_e$ ,
- pressure drop  $\Delta p$  across the valve.

Capacities are based on a hot gas temperature superheated 40 °F above condensing temperature ( $t_h = t_c + 40$  °F).  
 For each additional 10 °F of superheat above 40 °F, the table capacities must be reduced by 1%.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°F] | -40  | -20  | 0    | 20   | 40 | 50   |
|------------|------|------|------|------|----|------|
| Factor     | 1.18 | 1.14 | 1.09 | 1.04 | 1  | 0.97 |

When the valve is used in a hot gas defrost circuit, evaporator temperature affects the capacity.  
 When the evaporator temperature differs from 40 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity**  
**Hot gas capacity  $Q_h$  [TR]**  
*(continued)*
**US Units**

| Type | $C_v$<br>[gal / min] | Pressure drop<br>across valve<br>$\Delta p$<br>[bar] | Hot gas capacity $Q_h$ [TR]<br>at condensing temp. $t_c$ [°F] |    |     |     |     |
|------|----------------------|------------------------------------------------------|---------------------------------------------------------------|----|-----|-----|-----|
|      |                      |                                                      | 70                                                            | 90 | 100 | 120 | 140 |

**R404A**

|        |      |    |       |       |       |       |       |
|--------|------|----|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 2  | 0.082 | 0.083 | 0.082 | 0.078 | 0.069 |
|        |      | 5  | 0.128 | 0.129 | 0.128 | 0.122 | 0.109 |
|        |      | 10 | 0.178 | 0.180 | 0.179 | 0.171 | 0.153 |
|        |      | 15 | 0.213 | 0.217 | 0.216 | 0.207 | 0.186 |
|        |      | 20 | 0.241 | 0.247 | 0.246 | 0.237 | 0.213 |
|        |      | 25 | 0.263 | 0.271 | 0.271 | 0.262 | 0.236 |
| EVUL 2 | 0.23 | 2  | 0.164 | 0.165 | 0.164 | 0.155 | 0.139 |
|        |      | 5  | 0.257 | 0.259 | 0.257 | 0.244 | 0.218 |
|        |      | 10 | 0.356 | 0.360 | 0.358 | 0.342 | 0.306 |
|        |      | 15 | 0.426 | 0.434 | 0.432 | 0.414 | 0.372 |
|        |      | 20 | 0.481 | 0.493 | 0.492 | 0.473 | 0.426 |
|        |      | 25 | 0.525 | 0.542 | 0.542 | 0.523 | 0.472 |
| EVUL 3 | 0.35 | 2  | 0.247 | 0.248 | 0.245 | 0.233 | 0.208 |
|        |      | 5  | 0.385 | 0.388 | 0.385 | 0.366 | 0.327 |
|        |      | 10 | 0.533 | 0.541 | 0.537 | 0.512 | 0.459 |
|        |      | 15 | 0.639 | 0.652 | 0.648 | 0.621 | 0.558 |
|        |      | 20 | 0.722 | 0.740 | 0.738 | 0.710 | 0.639 |
|        |      | 25 | 0.788 | 0.814 | 0.814 | 0.785 | 0.708 |
| EVUL 4 | 0.58 | 2  | 0.411 | 0.413 | 0.409 | 0.388 | 0.347 |
|        |      | 5  | 0.642 | 0.647 | 0.641 | 0.610 | 0.546 |
|        |      | 10 | 0.889 | 0.901 | 0.895 | 0.854 | 0.765 |
|        |      | 15 | 1.065 | 1.086 | 1.081 | 1.035 | 0.930 |
|        |      | 20 | 1.203 | 1.233 | 1.231 | 1.183 | 1.065 |
|        |      | 25 | 1.313 | 1.356 | 1.356 | 1.308 | 1.181 |
| EVUL 5 | 0.75 | 2  | 0.535 | 0.537 | 0.532 | 0.505 | 0.451 |
|        |      | 5  | 0.835 | 0.841 | 0.834 | 0.793 | 0.709 |
|        |      | 10 | 1.156 | 1.171 | 1.163 | 1.110 | 0.995 |
|        |      | 15 | 1.385 | 1.412 | 1.405 | 1.346 | 1.209 |
|        |      | 20 | 1.563 | 1.603 | 1.600 | 1.537 | 1.384 |
|        |      | 25 | 1.707 | 1.763 | 1.763 | 1.700 | 1.535 |
| EVUL 6 | 0.87 | 2  | 0.617 | 0.620 | 0.613 | 0.582 | 0.520 |
|        |      | 5  | 0.963 | 0.971 | 0.962 | 0.915 | 0.818 |
|        |      | 10 | 1.334 | 1.351 | 1.342 | 1.281 | 1.148 |
|        |      | 15 | 1.598 | 1.629 | 1.621 | 1.553 | 1.395 |
|        |      | 20 | 1.804 | 1.850 | 1.846 | 1.774 | 1.597 |
|        |      | 25 | 1.970 | 2.034 | 2.034 | 1.962 | 1.771 |
| EVUL 8 | 1.04 | 2  | 0.740 | 0.743 | 0.736 | 0.699 | 0.624 |
|        |      | 5  | 1.156 | 1.165 | 1.154 | 1.098 | 0.982 |
|        |      | 10 | 1.600 | 1.622 | 1.611 | 1.537 | 1.378 |
|        |      | 15 | 1.918 | 1.955 | 1.945 | 1.863 | 1.674 |
|        |      | 20 | 2.165 | 2.220 | 2.215 | 2.129 | 1.917 |
|        |      | 25 | 2.364 | 2.441 | 2.441 | 2.354 | 2.125 |

Capacities are based on:

- Evaporating temperature  $t_e = 40$  °F,
- hot gas temperature  $t_h = t_c + 40$  °F,
- subcooling  $\Delta t_{si} = 10$  °F.

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature  $t_e$ ,
- pressure drop  $\Delta p$  across the valve.

Capacities are based on a hot gas temperature superheated 40 °F above condensing temperature ( $t_h = t_c + 40$  °F).  
For each additional 10 °F of superheat above 40 °F, the table capacities must be reduced by 1%.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°F]    | -40  | -20  | 0    | 20   | 40 | 50   |
|---------------|------|------|------|------|----|------|
| <b>Factor</b> | 1.18 | 1.14 | 1.09 | 1.04 | 1  | 0.97 |

When the valve is used in a hot gas defrost circuit, evaporator temperature affects the capacity.  
When the evaporator temperature differs from 40 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity**  
**Hot gas capacity  $Q_h$  [TR]**  
*(continued)*
**US Units**

| Type | $C_v$<br>[gal / min] | Pressure drop<br>across valve<br>$\Delta p$<br>[bar] | Hot gas capacity $Q_h$ [TR]<br>at condensing temp. $t_c$ [°F] |    |     |     |     |
|------|----------------------|------------------------------------------------------|---------------------------------------------------------------|----|-----|-----|-----|
|      |                      |                                                      | 70                                                            | 90 | 100 | 120 | 140 |

**R410A**

|        |      |    |       |       |       |       |       |
|--------|------|----|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 2  | 0.111 | 0.114 | 0.115 | 0.114 | 0.108 |
|        |      | 5  | 0.174 | 0.180 | 0.181 | 0.179 | 0.170 |
|        |      | 10 | 0.242 | 0.251 | 0.253 | 0.251 | 0.239 |
|        |      | 15 | 0.292 | 0.304 | 0.307 | 0.306 | 0.290 |
|        |      | 20 | 0.332 | 0.347 | 0.351 | 0.350 | 0.333 |
|        |      | 25 | 0.365 | 0.384 | 0.389 | 0.389 | 0.371 |
| EVUL 2 | 0.23 | 2  | 0.222 | 0.229 | 0.230 | 0.228 | 0.215 |
|        |      | 5  | 0.348 | 0.359 | 0.362 | 0.358 | 0.339 |
|        |      | 10 | 0.484 | 0.503 | 0.507 | 0.503 | 0.477 |
|        |      | 15 | 0.584 | 0.609 | 0.615 | 0.611 | 0.581 |
|        |      | 20 | 0.664 | 0.695 | 0.703 | 0.701 | 0.667 |
|        |      | 25 | 0.730 | 0.768 | 0.778 | 0.778 | 0.741 |
| EVUL 3 | 0.35 | 2  | 0.333 | 0.343 | 0.345 | 0.341 | 0.323 |
|        |      | 5  | 0.521 | 0.539 | 0.543 | 0.537 | 0.509 |
|        |      | 10 | 0.726 | 0.754 | 0.760 | 0.754 | 0.716 |
|        |      | 15 | 0.876 | 0.913 | 0.922 | 0.917 | 0.871 |
|        |      | 20 | 0.996 | 1.042 | 1.054 | 1.051 | 1.000 |
|        |      | 25 | 1.095 | 1.152 | 1.167 | 1.166 | 1.112 |
| EVUL 4 | 0.58 | 2  | 0.555 | 0.572 | 0.575 | 0.569 | 0.538 |
|        |      | 5  | 0.869 | 0.899 | 0.905 | 0.896 | 0.848 |
|        |      | 10 | 1.211 | 1.257 | 1.267 | 1.257 | 1.193 |
|        |      | 15 | 1.460 | 1.522 | 1.537 | 1.528 | 1.452 |
|        |      | 20 | 1.659 | 1.737 | 1.757 | 1.752 | 1.667 |
|        |      | 25 | 1.825 | 1.919 | 1.945 | 1.944 | 1.853 |
| EVUL 5 | 0.75 | 2  | 0.721 | 0.744 | 0.748 | 0.740 | 0.700 |
|        |      | 5  | 1.130 | 1.168 | 1.176 | 1.164 | 1.102 |
|        |      | 10 | 1.574 | 1.634 | 1.647 | 1.634 | 1.550 |
|        |      | 15 | 1.898 | 1.978 | 1.998 | 1.987 | 1.888 |
|        |      | 20 | 2.157 | 2.258 | 2.284 | 2.277 | 2.168 |
|        |      | 25 | 2.373 | 2.495 | 2.528 | 2.527 | 2.409 |
| EVUL 6 | 0.87 | 2  | 0.832 | 0.858 | 0.863 | 0.853 | 0.807 |
|        |      | 5  | 1.304 | 1.348 | 1.357 | 1.343 | 1.272 |
|        |      | 10 | 1.816 | 1.885 | 1.901 | 1.886 | 1.789 |
|        |      | 15 | 2.190 | 2.283 | 2.305 | 2.293 | 2.178 |
|        |      | 20 | 2.489 | 2.606 | 2.636 | 2.628 | 2.501 |
|        |      | 25 | 2.738 | 2.879 | 2.917 | 2.916 | 2.780 |
| EVUL 8 | 1.04 | 2  | 0.998 | 1.030 | 1.036 | 1.024 | 0.969 |
|        |      | 5  | 1.564 | 1.617 | 1.628 | 1.612 | 1.526 |
|        |      | 10 | 2.179 | 2.262 | 2.281 | 2.263 | 2.147 |
|        |      | 15 | 2.628 | 2.739 | 2.766 | 2.751 | 2.614 |
|        |      | 20 | 2.987 | 3.127 | 3.163 | 3.153 | 3.001 |
|        |      | 25 | 3.285 | 3.455 | 3.501 | 3.499 | 3.336 |

Capacities are based on:

- Evaporating temperature  $t_e = 40$  °F,
- hot gas temperature  $t_h = t_c + 40$  °F,
- subcooling  $\Delta t_u = 10$  °F.

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature  $t_e$ ,
- pressure drop  $\Delta p$  across the valve.

Capacities are based on a hot gas temperature superheated 40 °F above condensing temperature ( $t_h = t_c + 40$  °F).  
 For each additional 10 °F of superheat above 40 °F, the table capacities must be reduced by 1%.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°F] | -40  | -20  | 0    | 20   | 40 | 50   |
|------------|------|------|------|------|----|------|
| Factor     | 1.18 | 1.14 | 1.09 | 1.04 | 1  | 0.97 |

When the valve is used in a hot gas defrost circuit, evaporator temperature affects the capacity.  
 When the evaporator temperature differs from 40 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

**Capacity**  
**Hot gas capacity  $Q_h$  [TR]**  
*(continued)*
**US Units**

| Type | $C_v$<br>[gal / min] | Pressure drop<br>across valve<br>$\Delta p$<br>[bar] | Hot gas capacity $Q_h$ [TR]<br>at condensing temp. $t_c$ [°F] |    |     |     |     |
|------|----------------------|------------------------------------------------------|---------------------------------------------------------------|----|-----|-----|-----|
|      |                      |                                                      | 70                                                            | 90 | 100 | 120 | 140 |

**R290**

|        |      |    |       |       |       |       |       |
|--------|------|----|-------|-------|-------|-------|-------|
| EVUL 1 | 0.12 | 2  | 0.110 | 0.110 | 0.115 | 0.110 | 0.110 |
|        |      | 5  | 0.172 | 0.172 | 0.179 | 0.173 | 0.173 |
|        |      | 10 | 0.237 | 0.237 | 0.249 | 0.242 | 0.242 |
|        |      | 15 | 0.282 | 0.282 | 0.300 | 0.293 | 0.293 |
|        |      | 20 | 0.317 | 0.317 | 0.340 | 0.334 | 0.334 |
|        |      | 25 | 0.345 | 0.345 | 0.374 | 0.370 | 0.370 |
| EVUL 2 | 0.23 | 2  | 0.221 | 0.221 | 0.229 | 0.220 | 0.220 |
|        |      | 5  | 0.344 | 0.344 | 0.358 | 0.345 | 0.345 |
|        |      | 10 | 0.474 | 0.474 | 0.498 | 0.483 | 0.483 |
|        |      | 15 | 0.565 | 0.565 | 0.600 | 0.585 | 0.585 |
|        |      | 20 | 0.635 | 0.635 | 0.680 | 0.669 | 0.669 |
|        |      | 25 | 0.690 | 0.690 | 0.747 | 0.740 | 0.740 |
| EVUL 3 | 0.35 | 2  | 0.331 | 0.331 | 0.344 | 0.329 | 0.329 |
|        |      | 5  | 0.516 | 0.516 | 0.538 | 0.518 | 0.518 |
|        |      | 10 | 0.711 | 0.711 | 0.748 | 0.725 | 0.725 |
|        |      | 15 | 0.847 | 0.847 | 0.900 | 0.878 | 0.878 |
|        |      | 20 | 0.952 | 0.952 | 1.021 | 1.003 | 1.003 |
|        |      | 25 | 1.034 | 1.034 | 1.121 | 1.110 | 1.110 |
| EVUL 4 | 0.58 | 2  | 0.552 | 0.552 | 0.573 | 0.549 | 0.549 |
|        |      | 5  | 0.860 | 0.860 | 0.896 | 0.863 | 0.863 |
|        |      | 10 | 1.185 | 1.185 | 1.246 | 1.208 | 1.208 |
|        |      | 15 | 1.412 | 1.412 | 1.500 | 1.463 | 1.463 |
|        |      | 20 | 1.586 | 1.586 | 1.701 | 1.672 | 1.672 |
|        |      | 25 | 1.724 | 1.724 | 1.868 | 1.849 | 1.849 |
| EVUL 5 | 0.75 | 2  | 0.718 | 0.718 | 0.744 | 0.714 | 0.714 |
|        |      | 5  | 1.118 | 1.118 | 1.165 | 1.122 | 1.122 |
|        |      | 10 | 1.540 | 1.540 | 1.620 | 1.570 | 1.570 |
|        |      | 15 | 1.836 | 1.836 | 1.949 | 1.903 | 1.903 |
|        |      | 20 | 2.062 | 2.062 | 2.211 | 2.174 | 2.174 |
|        |      | 25 | 2.241 | 2.241 | 2.428 | 2.404 | 2.404 |
| EVUL 6 | 0.87 | 2  | 0.828 | 0.828 | 0.859 | 0.824 | 0.824 |
|        |      | 5  | 1.290 | 1.290 | 1.344 | 1.294 | 1.294 |
|        |      | 10 | 1.777 | 1.777 | 1.869 | 1.811 | 1.811 |
|        |      | 15 | 2.119 | 2.119 | 2.249 | 2.195 | 2.195 |
|        |      | 20 | 2.379 | 2.379 | 2.552 | 2.508 | 2.508 |
|        |      | 25 | 2.586 | 2.586 | 2.802 | 2.774 | 2.774 |
| EVUL 8 | 1.04 | 2  | 0.994 | 0.994 | 1.031 | 0.988 | 0.988 |
|        |      | 5  | 1.548 | 1.548 | 1.613 | 1.553 | 1.553 |
|        |      | 10 | 2.132 | 2.132 | 2.243 | 2.174 | 2.174 |
|        |      | 15 | 2.542 | 2.542 | 2.699 | 2.634 | 2.634 |
|        |      | 20 | 2.855 | 2.855 | 3.062 | 3.010 | 3.010 |
|        |      | 25 | 3.103 | 3.103 | 3.362 | 3.329 | 3.329 |

Capacities are based on:

- Evaporating temperature  $t_e = 40$  °F,
- hot gas temperature  $t_h = t_c + 40$  °F,
- subcooling  $\Delta t_u = 10$  °F.

The table values refer to evaporator capacity and are given as a function of:

- evaporating temperature  $t_e$ ,
- pressure drop  $\Delta p$  across the valve.

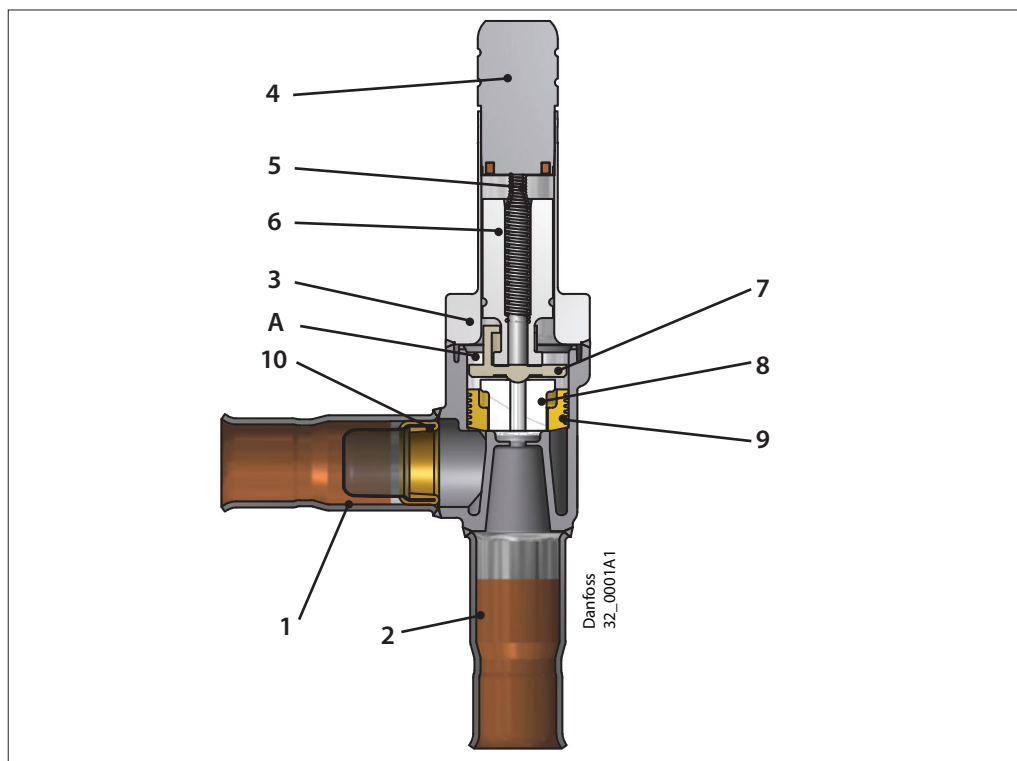
Capacities are based on a hot gas temperature superheated 40 °F above condensing temperature ( $t_h = t_c + 40$  °F).  
 For each additional 10 °F of superheat above 40 °F, the table capacities must be reduced by 1%.

**Correction factors for evaporating temperature  $t_e$** 

| $t_e$ [°F] | -40  | -20  | 0    | 20   | 40 | 50   |
|------------|------|------|------|------|----|------|
| Factor     | 1.18 | 1.14 | 1.09 | 1.04 | 1  | 0.97 |

When the valve is used in a hot gas defrost circuit, evaporator temperature affects the capacity.  
 When the evaporator temperature differs from 40 °F, adjust the table capacities by multiplying them by the appropriate correction factor found in the following table.

## Design and material specifications



| No. | Description      | Material              |
|-----|------------------|-----------------------|
| 1   | Bi-metallic tube | Stainless steel / Cu  |
| 2   | Bi-metallic tube | Stainless steel / Cu  |
| 3   | Flange           | Stainless steel       |
| 4   | Armature tube    | Stainless steel       |
| 5   | Return spring    | Spring wire stainless |

| No. | Description  | Material                |
|-----|--------------|-------------------------|
| 6   | Armature     | Stainless steel         |
| 7   | Pilot plate  | Thermoplast             |
| 8   | Seat plate   | Teflon                  |
| 9   | Piston       | Brass                   |
| 10  | Inlet filter | Stainless steel / brass |

## Function

### Servo operated

EVUL 1 – 8 are servo operated piston solenoid valves. The servo piston principle results in a fast operating and compact valve that is able to open against a high differential pressure. The valve closes rather soft, because the pilot system does not fully close before the main orifice has closed. This minimizes liquid hammer.

When the coil is currentless, the main orifice, seat plate (8) and pilot orifice (on the pilot plate (7)) are closed. The pilot orifice and main orifice are held closed by the armature spring force and the differential pressure between inlet and outlet sides.

When current is applied to the coil, the armature (6) is drawn up into the magnetic field and thus lifts the pilot plate (7) and opens for the pilot orifice so that the de-energising of the servo chamber (A) starts and the pressure is relieved to the level of the outlet side. As the inlet pressure that acts on the bottom of the piston (9) now is higher than the pressure in the servo chamber (A), the piston is moved upwards and lifts both the pilot plate (7) and the seat plate (8).

When the seat plate is lifted, the main orifice opens for full flow. Therefore a minimum differential pressure of 0.02 bar is necessary to open the valve and keep it open.

When the current to the coil is switched off, the spring (5) forces the armature (9) down towards the pilot plate (7). The pressure in the servo chamber (A) increases and the piston will no longer be able to hold the seat plate (8) in lifted position, by which the main orifice closes. The armature (6) continues its downwards movement until the pilot orifice on the pilot plate (7) is fully closed.

### ⚠ Note:

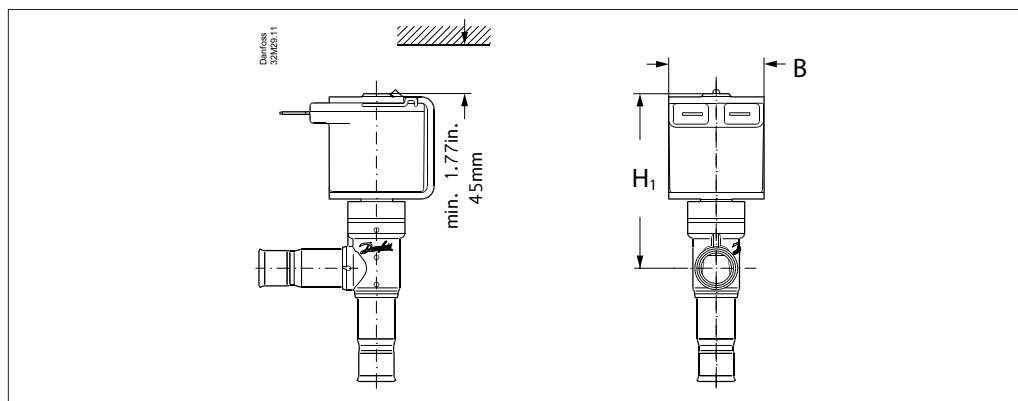
Danfoss recommends that a suitable filter or filter drier (max. size of 40 – 50 µm) is installed ahead of each solenoid valve to keep scale, solder material and other foreign dirt and particles out of the valve.

### ⚠ Note:

By using the valve for oil return application - please contact Danfoss.

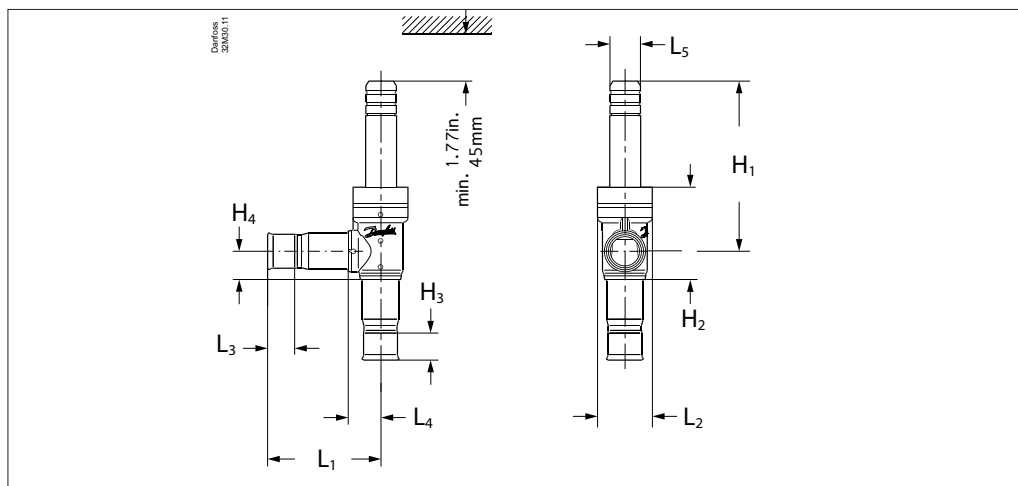
**Dimensions [in.]  
and weights [lbs]**

EVUL 1 – 6 and EVUL 8 mounted with coil with 0.25 in. US spade



**Note:** the drawings are only representative.

EVUL 1 – 6 and EVUL 8



Net weight of coil:  
approx. 0.10 Kg (0.22 lbs)

Net weight of valve:  
approx. 0.05 Kg (0.11 lbs)

**Note:** the drawings are only representative.

SI Units

| Type   | Connection Solder |      | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>4</sub> | L <sub>5</sub> | B    | Net weight with coil [Kg] |
|--------|-------------------|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------|---------------------------|
|        | [in.]             | [mm] | [mm]           | [mm]           | [mm]           | [mm]           | [mm]           | [mm]           | [mm]           | [mm]           | [mm]           | [mm] |                           |
| EVUL 1 | 1/4               | 6    | 55             | 30             | 7              | 8.5            | 37             | 18             | 7              | 9.9            | 10             | 30   | 0.18                      |
| EVUL 2 | 1/4               | 6    | 55             | 30             | 7              | 8.5            | 37             | 18             | 7              | 9.9            | 10             | 30   | 0.18                      |
| EVUL 3 | 1/4               | 6    | 55             | 30             | 7              | 8.5            | 37             | 18             | 7              | 9.9            | 10             | 30   | 0.18                      |
|        | 3/8               | 10   | 55             | 30             | 9              | 8.5            | 37             | 18             | 9              | 9.9            | 10             | 30   | 0.18                      |
| EVUL 4 | 1/4               | 6    | 55             | 30             | 7              | 8.5            | 37             | 18             | 7              | 9.9            | 10             | 30   | 0.18                      |
|        | 3/8               | 10   | 55             | 30             | 9              | 8.5            | 37             | 18             | 9              | 9.9            | 10             | 30   | 0.18                      |
|        | 1/2               | —    | 55             | 30             | 10             | 8.5            | 35             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |
|        | —                 | 12   | 55             | 30             | 10             | 8.5            | 36             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |
| EVUL 5 | 3/8               | 10   | 55             | 30             | 9              | 8.5            | 37             | 18             | 9              | 9.9            | 10             | 30   | 0.18                      |
|        | 1/2               | —    | 55             | 30             | 10             | 8.5            | 35             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |
|        | —                 | 12   | 55             | 30             | 10             | 8.5            | 36             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |
| EVUL 6 | 3/8               | 10   | 55             | 30             | 9              | 8.5            | 37             | 18             | 9              | 9.9            | 10             | 30   | 0.18                      |
|        | 1/2               | —    | 55             | 30             | 10             | 8.5            | 35             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |
|        | —                 | 12   | 55             | 30             | 10             | 8.5            | 36             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |
| EVUL 8 | 1/2               | —    | 55             | 30             | 10             | 8.5            | 35             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |
|        | —                 | 12   | 55             | 30             | 10             | 8.5            | 36             | 18             | 10             | 9.9            | 10             | 30   | 0.18                      |

US Units

| Type   | Connection Solder |      | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>4</sub> | L <sub>5</sub> | B    | Net weight with coil [Lbs] |
|--------|-------------------|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------|----------------------------|
|        | [in]              | [mm] | [in]           | [in]           | [in]           | [in]           | [in]           | [in]           | [in]           | [in]           | [in]           | [in] |                            |
| EVUL 1 | 1/4               | 6    | 2.16           | 1.18           | 0.27           | 0.33           | 1.45           | 0.71           | 0.27           | 0.38           | 0.39           | 1.18 | 0.4                        |
| EVUL 2 | 1/4               | 6    | 2.16           | 1.18           | 0.27           | 0.33           | 1.45           | 0.71           | 0.27           | 0.38           | 0.39           | 1.18 | 0.4                        |
| EVUL 3 | 1/4               | 6    | 2.16           | 1.18           | 0.27           | 0.33           | 1.45           | 0.71           | 0.27           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | 3/8               | 10   | 2.16           | 1.18           | 0.35           | 0.33           | 1.45           | 0.71           | 0.35           | 0.38           | 0.39           | 1.18 | 0.4                        |
| EVUL 4 | 1/4               | 6    | 2.16           | 1.18           | 0.27           | 0.33           | 1.45           | 0.71           | 0.27           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | 3/8               | 10   | 2.16           | 1.18           | 0.35           | 0.33           | 1.45           | 0.71           | 0.35           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | 1/2               | —    | 2.16           | 1.18           | 0.39           | 0.33           | 1.45           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | —                 | 12   | 2.16           | 1.18           | 0.39           | 0.33           | 1.41           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |
| EVUL 5 | 3/8               | 10   | 2.16           | 1.18           | 0.35           | 0.33           | 1.45           | 0.71           | 0.35           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | 1/2               | —    | 2.16           | 1.18           | 0.39           | 0.33           | 1.37           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | —                 | 12   | 2.16           | 1.18           | 0.39           | 0.33           | 1.41           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |
| EVUL 6 | 3/8               | 10   | 2.16           | 1.18           | 0.35           | 0.33           | 1.45           | 0.71           | 0.35           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | 1/2               | —    | 2.16           | 1.18           | 0.39           | 0.33           | 1.37           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | —                 | 12   | 2.16           | 1.18           | 0.39           | 0.33           | 1.41           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |
| EVUL 8 | 1/2               | —    | 2.16           | 1.18           | 0.39           | 0.33           | 1.37           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |
|        | —                 | 12   | 2.16           | 1.18           | 0.39           | 0.33           | 1.41           | 0.71           | 0.39           | 0.38           | 0.39           | 1.18 | 0.4                        |