



Virtual Engineer: Sporlan Division

Distributors

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Refrigerant Distributors

The refrigerant distributor is a device connected to the outlet of an expansion valve. The outlet of the distributor is machined to accept tubing which connects the distributor to each evaporator coil circuit. Pressure drop across the Sporlan distributor creates the high velocity necessary to distribute the two-phase (liquid and vapor) refrigerant flow evenly. Distributor pressure drop does not reduce system capacity.

When selecting a thermostatic expansion valve (TEV) for use with a Sporlan type distributor, an **externally equalized** valve **must** be used to compensate for the distributor pressure drop.

When selecting a distributor tube outside diameter (OD), Virtual Engineer will attempt to select a tube size that provides for a pressure drop of approximately 10 psi.

Copper tubing of the following wall thickness is assumed:

Copper Refrigeration Tubing	
Tube OD (in.)	Wall Thickness (in.)
3/16	0.030
1/4	0.030
5/16	0.032
3/8	0.032

If aluminum tubing is used, 20 gage tubing will provide pressure drops approximate to those calculated for copper tubing. Twenty gage aluminum tube specifications are listed below:

Tube OD (in.)	Wall Thickness (in.)
3/16	0.035
1/4	0.035
5/16	0.035
3/8	0.035

The criteria Virtual Engineer uses in selecting nozzle sizes is to have the pressure drops across the nozzle approximate the values listed below:

Refrigerant	Pressure Drop (psi)
R-134a, R-1234yf, R-1234ze(E), R-450A, R-513A	15
R-22, R-23, R-125, R-290, R-404A, R-407A, R-407C, R-407F, R-407H, R-438A, R-448A, R-449A, R-452A, R-507, R-508B	25
R-32, R-410A, R-452B, R-454B	35

The pressure drop vs. distributor loading table (Tables C and F) in Sporlan's [Bulletin 20-10](#) provides the acceptable range of loading limits for the standard refrigerants.

Distributor Sizing in Virtual Engineer

The pressure drop calculations made by Virtual Engineer may not precisely agree with calculations based on the capacity ratings provided in Bulletin 20-10. Much of reason for any discrepancy to do with the fact that distributor tube pressure drop influences pressure drop across the nozzle. Virtual Engineer takes this into account. Furthermore, a certain amount of averaging was required to make the tables listed in Bulletin 20-10 usable. Virtual Engineer calculations, however, will match up closely with calculations based on [Bulletin 20-10](#) capacities.

Inputting Sizing Information

Refrigerant is the type of refrigerant the system is operating with, by ASHRAE R-number designation.

Liquid Temperature is the liquid refrigerant temperature at the inlet of the expansion valve.

Evaporator Temperature is the saturated temperature at evaporator or suction pressure. Virtual Engineer will allow Liquid Temperature to be less than the Evaporator Temperature.

Evaporator Capacity is the cooling capacity of the evaporator this distributor supplies.

Number of Circuit Tubes is the quantity of evaporator circuits this distributor supplies.

Circuit Tube Length is the length of the circuit tubes.

Enter the required information into the left pane of the sizing tool. As information is entered, Virtual Engineer will filter products meeting that criteria in the right pane. When you have entered the required information, valid products will be available to compare in the right pane. You may uncheck any product you don't wish to compare.

Getting Results and Comparing Choices

Click the "Compare" button at the top of the right pane to be taken to the Compare Table. The Compare Table will display the results of the selection, and the values input. The best selection within each compared product will be highlighted. The Compare Table will also show other selections within the compared products.

Click the "Select Columns" button at the upper left corner of the Compare Table to select what values you would like to appear in the Compare Table. Below is a quick explanation of the columns that can be selected for the distributor tool:

- **Orifice Size:** The inside diameter (ID) of the nozzle
- **Distributor Type:** The series that the selection belongs to
- **Nozzle Percent Loading:** This is an indication of the capacity of the nozzle. This value should be between 50% and 200%.
- **Nozzle Pressure Drop:** Reduction in pressure across the nozzle
- **Distributor Tube Percent Loading:** This is an indication of the capacity of the distributor tubes. This value should be between 50% and 200%.
- **Distributor Tube Pressure Drop:** Reduction in pressure across the distributor tubes
- **Distributor Total Pressure Drop:** Reduction in pressure across the entire distributor
- **Nozzle Size:** The outside diameter (OD) of the nozzle, designated by a letter code. Refer to [Bulletin 20-10](#) for more information on nozzle size.
- **Max Distributor Circuit Count:** The maximum amount of circuits available for this distributor style
- **Distributor Circuit Size:** The size of the circuits on the distributor
- **Min Distributor Tube Length:** The minimum length of the distributor tube
- **Distributor Tube ID:** The inside diameter (ID) of the distributor tube
- **Warnings:** Any warnings associated with the selection, such as a high or low loading condition, will display here.

After selecting columns, you can click and drag the column header to change the order of the columns. You can also click the ▼ in the column headers to further narrow or sort your results.

Click the “Group by Series” button at the top of the Compare Table to group the results by the valve family they belong to. Click the button again to ungroup.

Click the “Close” button below the Compare Table or the X in the upper right corner of the screen to close the Compare Table and return to the input screen.

Configuring a Part and Saving Results

In the second column of the Compare Table, there are two buttons that can appear: “Configure” or “Select.”

Click the “Configure” button next to the desired series to be taken to its eConfigurator. The eConfigurator can be used to configure a part according to your unique system. The eConfigurator will give an item number that can be used to purchase your part. Click the “Save” button to save your configuration and return to Virtual Engineer’s dashboard. The configured part will appear in your system.

If a “Select” button appears next to the desired series, then there is no eConfigurator currently available for that product, and the series will be selected without any configuration.

Click the “Export” button at the upper right corner of the Compare Table to save your results as an Excel spreadsheet.

Click the blue page icon in the “RPT” column of the Compare Table to generate a summary report of your inputs and choices. If the part was configured using an eConfigurator, the item number will also appear in the summary report. This report can be downloaded as a PDF and printed as needed.