FLOW CALCULATION SOFTWARE

Version 4 User's Manual

P/N SH00000001 - JULY 2014

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Software Features

Version 4.00 of this program represents a major upgrade to Version 3. Here is a list of the key features:

- The user interface now uses Microsoft's .NET technology. This insures compatibility with Microsoft operating systems in the years to come.
- The manifold can be entered in branch by branch to provide more detail than ever before.
- A new Segment Information window has been added to the Isometric Drawing that displays information about the pipe type, pipe diameter, length, and elevation change of the highlighted segment. This allows users easy access to information that could previously only be found in the Pipe Network Table. The Segment Information windows can be used to make on-the-fly changes from within the Isometric Drawing.

Getting Started

New Project Agent/Hardware Settings

(located under the File option of the main toolbar)

This screen allows you to set the defaults for **new projects only**. If you need to change the settings for the current project, see Agent/Hardware Settings.

From this screen you can select the hardware you wish to be available when designing new systems. Separate hardware group settings are available for each agent/hardware combination.

For each agent/hardware combination, you can specify your preferences from the following tabs:

- Cylinder
- Pipes
- Nozzles
- Other Objects

To activate or deactivate a particular hardware group, click the left-hand check box in the New Projects column. If the check box is active, the hardware will be available for selection in the appropriate drop down menus. If not, the hardware will be removed.

The Required, UL Listed and FM Approved columns are provided for reference only. You cannot change these settings. If Required is set to Yes for a particular hardware group, then this group cannot be deactivated in the New Projects check box.

It is recommended you only keep hardware groups active for those groups that you intend to use on a regular basis. Hardware groups can be reactivated on a per project basis in the Agent/Hardware Settings screen.

New Project Preferences

(located under the File option of the main toolbar)

This screen allows you to set the defaults for **new projects only**. If you need to change the settings for the current project, see Setup.

With the exception of the Designer Name, the defaults are system specific. To find or change the default values for a particular system, simply select the appropriate system from the 'Agent/System Type' drop down menu.

Designer Name

Changes in this field will be reflected on all printed and screen reports for all future projects.

Unit of Measure

Choose what unit of measure you would like to use when designing your system. Regardless of the unit of measure chosen, you can create reports in either set of units. For example, you can create a project using English units and print reports in metric units.

Default System Pipe Type

The Default System Pipe Type will be used for the section of the pipe network located after the End of Manifold node. The selection made here is used when the Default Pipe Type or Default Type & Diameters options are selected in the Pipe Network Table screen.

The alpha-numeric code of the selected type will be displayed in the Pipe Network Table. These codes are also shown as a prefix to the pipe type descriptions in the pull-down menu.

Default Manifold Pipe Type

The Default Manifold Pipe Type will be used for the section of the pipe network located before the End of Manifold node. The same rules will be followed as with the Default System Pipe Type described above.

Default Nozzle Type

The Default Nozzle Type is used as the default in the Isometric Drawing and Pipe Network Table. You can change the default in the Isometric Drawing by double-clicking the nozzle and changing the selection. You can also change the nozzle type in the Pipe Network Table by clicking in the cell and change the value from the pull-down menu.

Default Adjusted Design Concentration

The Default Adjusted Design Concentration is used to set the initial Adjusted Design Concentration in the Enclosure screen when a new enclosure is added.

Default Minimum Design Concentration

The Default Minimum Design Concentration is used to set the initial Minimum Design Concentration in the Enclosure screen when a new enclosure is added.

Options

(located under the File option of the main toolbar)

These options will set the general preferences for the program.

General Tab

The General Tab provides miscellaneous options for the software program.

Ask for Project Name When Starting a New Project / Wait Until Saving to Ask for the New File's Name

Most programs ask for the name of the new project prior to saving it for the first time (default). If you want, you can change this behavior to require the project name at the start of every new project. To select between the two options, click on the appropriate radio button.

Ask to Save the Project Prior to Performing Calculations (Recommended)

When selected, this option will prompt the user to save the project prior to running a calculation.

Minimize Main Calc DOS window

If you would rather not see the calculations program run, select this option and the DOS window will be minimized (i.e. run in background).

Locations Tab

Default Project Directory

Specify the location where the software will save and open project files.

Default Pipe Section Directory

Specify the location where the software will save and open pipe sections. (Portions of a pipe network can be saved for use on current or new projects.)

Default Manifold Directory

Specify the location where the software will save and open default/saved manifold.

Default Export Directory

The reporting system allows you to export the reports as PDF or RTF files. This is directory is the default location used for these exports.

Reports Tab

Initial Report Zoom (doesn't affect printing or exporting)

Specify the initial zoom at which reports will be viewed on your monitor screen.

Report Properties

Specify the default paper size of the reports. When changing the paper size, the change must be made before generating a report.

Distributor Information

(located under the Help option of the main toolbar)

Optional information about the distributor including name, address and phone number can be entered in the Distributor Information screen. This information will be included in the header of all reports generated.

Inputs

Agent/Hardware Settings

The Agent/Hardware Settings screen serves two purposes. The first is to select the Agent Type and Hardware Group combination for the system you will be designing. Please note that not all versions of the flow calculation software will have multiple options in the Agent Type and Hardware Group drop down box.

With the Agent Type and Hardware Group selected, you can select the hardware you wish to be available in the current project. Separate hardware group settings are available for each Agent Type and Hardware Group combination. To change the defaults for future projects, see the New Agent/Hardware Settings screen.

For each Agent Type and Hardware Group combination, you can specify your preferences from the following tabs:

- Cylinder
- Pipes
- Nozzles
- Other Objects (flex hoses, check valves, etc.)

To activate or deactivate a particular hardware group, click the left-hand check box in the Use column. If the check box is active, the hardware will be available for selection in the appropriate drop down menus. If not, the hardware will be removed.

The Required, UL Listed and FM Approved columns are provided for reference only. You cannot change these settings. If Required is set to 'Yes' for a particular hardware group, then this group cannot be deactivated in the Use check box.


Once you begin designing the system, you will not be able to change the Agent Type and Hardware Group combination that you have selected. However, you can return to the screen to modify the hardware groups that are available.

Setup

This screen allows you to select certain parameters for the current project only. To change the defaults for future projects, see the New Project Preferences screen.

Designer Name

Changes in this field will be reflected on all printed and screen reports for all future projects.

Unit of Measure

Choose what unit of measure you would like to use when designing your system. Regardless of the unit of measure chosen, you can create reports in either set of units. For example, you can create a project using English units and print reports in metric units.

Once you begin designing the system, you will not be able to change the unit of measure.

Default System Pipe Type

The Default System Pipe Type will be used for the section of the pipe network located after the End of Manifold node. The selection made here is used when the Default Pipe Type or Default Type & Diameters options are selected in the Pipe Network Table screen.

The alpha-numeric code of the selected type will be displayed in the Pipe Network Table. These codes are also shown as a prefix to the pipe type descriptions in the pull-down menu.

Default Manifold Pipe Type

The Default Manifold Pipe Type will be used for the section of the pipe network located before the End of Manifold node. The same rules will be followed as with the Default System Pipe Type described above.

Default Nozzle Type

The Default Nozzle Type is used as the default in the Isometric Drawing and Pipe Network Table. You can change the default in the Isometric Drawing using the Segment Information Window. You can also change the nozzle type in the Pipe Network Table by clicking in the cell and change the value from the pull-down menu.

Customer and Project Information

The information entered in the Customer and Project Information screen is optional and does not affect any of the calculations. The information entered can be printed as a report and helps you keep track of jobs and customers.

If a default Designer Name is present in the New Project Preferences screen, it is automatically entered when a new project is created. To change the default Designer Name for this project only, you can overwrite it here.

To change the default for all future projects, use the New Project Preferences screen.

Designer Notes

The Designer Notes screen allows you to enter miscellaneous information about your project. Comments, notes and a history of the project are examples of the types of information that can be stored in this field. Since entries in this field are not printed on the Project Report, it can be used for information that you may not wish your customer to see. Information entered here can be printed as a separate report under the Reports menu.

The Description field on the Customer and Project Information screen can be used for information that you do want the customer to see.

Enclosure Selection

The Enclosures Selection screen is used to add, edit, and delete enclosures for this project. It is also used to enter the Elevation Above Sea Level which, in turn, sets the Atmospheric Correction Factor for this project.

Once an enclosure screen has been completed, the Elevation Above Sea Level field will be disabled. If you wish to edit the Elevation Above Sea Level, you can do so in the Adjust Agent Required screen.

Add

Adds an enclosure to the project.

Edit

Modifies the highlighted enclosure.

Delete

Deletes the highlighted enclosure.

Enclosure Information

Enclosure Information screens are used to calculate the amount of agent required to protect each enclosure and to set the distribution amount between the nozzles in the enclosure (if more than one nozzle is present).

Each enclosure will require at least one nozzle to provide agent. The quantity of agent required will be determined by the information entered in the Enclosure Information screen, using the calculation method outlined in NFPA 2001, "Standard on Clean Agent Fire Extinguishing Systems".

Each time any of the inputs on the Enclosure Information screen are changed, the displayed amount of agent required in the given enclosure and total amount of agent for all enclosures will be updated.

Enclosure Number/Name

Each enclosure will be numbered sequentially. The Name field allows you to enter a brief description of the enclosure to make identification easier.

Enclosure Temperature

The temperatures entered for the enclosure should be the lowest and highest temperatures expected for the enclosure. This information is used along with the enclosure dimensions and Adjusted Design Concentration to calculate the amount of agent to be delivered to the enclosure (i.e. the Adjusted Agent Required).

The Minimum Concentration displayed in the Enclosure Temperature section is based on the Adjusted Agent Required and the Maximum Enclosure Temperature. Please note that the Minimum Enclosure Temperature is used to calculated the Adjusted Agent Required so you will notice that changing the Minimum Enclosure Temperature will also have an effect on the calculated Minimum Concentration.

Design Concentrations

The Minimum Design Concentration is the concentration used by the program as a check to insure that the proper concentration has been delivered to an enclosure. If the Minimum Design Concentration is not met, an error message will be displayed in the System Acceptance Report. The Minimum Agent Required is calculated automatically based on the Minimum Design Concentration.

The Adjusted Design Concentration is used to calculate the target value for the amount of agent delivered to the enclosure. This target value or Adjusted Agent Required is shown in the lower right hand side of the screen. The software will use the Adjusted Agent Required to determine the amount of agent required for the entire system (i.e. the amount of agent in the cylinders).

When comparing the two concentrations, the Minimum Design Concentration should be viewed as a limit. If the limit is not met, then the system is not acceptable. The Adjusted Design Concentration is a target. The Adjusted Design Concentration must be greater than or equal to the Minimum Design Concentration.

Depending on the degree of system imbalance, it may be necessary to use a higher Adjusted Design Concentration for some multi-enclosure systems. The increased amount of agent will allow some enclosures to receive a bit more agent than the Adjusted Agent Required and some to receive a bit less. However since the Adjusted Design Concentration is higher than the Minimum Design

Concentration, this strategy should ensure that all enclosures still meet the Minimum Design Concentrations.

Number of Nozzles

The number of nozzles required in the room (the default is "1"). Each enclosure will require at least one nozzle to provide agent. You must determine the number of nozzles required, based on the area and layout of the enclosure.

By default, the agent required in the enclosure is split equally among all of the nozzles. The Nozzle Table can be used to manually adjust the splits. The redistribution of agent can also be performed later in the Adjust Agent Required screen.

Enclosure Dimensions

These fields allow you to input the width, height, and length of the enclosure. Using these values, the software automatically calculates the volume. You can also directly input the volume, ignoring the specification of individual dimensions. The non-permeable volume in the enclosure can also be entered (the default is zero). This will be subtracted from the total enclosure volume for the calculation of the amount of agent required.

Nozzle Table

The Nozzle Table allows you to adjust the amount of agent required to be distributed to two or more nozzles. The Auto button will distribute the agent evenly between the nozzles. This can be overridden by manually entering the quantity desired for each nozzle. The redistribution of agent can also be performed later in the Adjust Agent Required screen.

Each nozzle is given a unique code. The code consists of the enclosure number and the nozzle number within that enclosure. For example, the code 'E1-N2' refers to the second nozzle (N2) in the first enclosure (E1).

Adjust Agent Required

This screen allows you to adjust agent quantities and/or concentrations for all enclosures. Values can be adjusted in the Enclosure Information table, Nozzle Information table or New Agent Amount field.

Enclosure Information Table

This table can be used to edit the Agent Required and Adjusted Design Concentration for each enclosure. If either value is adjusted, the Agent Required for each nozzle associated with that enclosure and the total amount of agent required will automatically be recalculated. The adjustments to the nozzle agent amounts will be applied proportionally based on the original values.

The individual enclosure method is useful for systems with multiple enclosures where the initial predictions result in an insufficient concentration in one enclosure. If you added agent to the total quantity, the default would be to distribute this agent between all enclosures. The result is that you add agent to enclosures that don't need it. The more efficient use of the additional gas is to add it directly to the problem enclosure by increasing the requirements for that enclosure.

Nozzle Information Table

The Nozzle Information Table can be used to redistribute the amount of Agent Required for each nozzle. Or, additional agent can be added to problem nozzles (i.e. nozzles where the predictions show that the needed amount of agent is not being delivered). If additional agent is added or if agent is removed, the Agent Required and Adjusted Design Concentration for the appropriate enclosure and the total amount of agent required will automatically be updated.

The values in the Nozzle Information Table are used by the calculation to pick pipe diameters and nozzle orifice areas.

New Agent Amount

The New Agent Amount field can be used to adjust the total amount of agent required in the system. If the total agent quantity is adjusted, the software disperses the increase or decrease proportionally across the enclosures and the nozzles.

Because cylinders are required to be filled to the nearest whole pound (or half kilogram for metric units), the cylinder fill amount must be in increments of whole pounds (or half kilograms). Similarly, when designing systems with more than one cylinder, the agent amount divided by the number of cylinders must also be a whole number (or half for metric unit). If this rule is not followed, the system will not calculate. The New Agent Amount field can be used to make the necessary adjustments to the total agent required.

Set to New

Will reset the Original Agent Amount to reflect any change to the New Agent Amount field.

Show Nozzles

Changes how the Nozzle Information section is displayed. You may switch between viewing only the nozzles defined for the highlighted enclosure, or all nozzles defined for the project.

Elevation

The elevation above (or below) sea level is used to look up the Atmospheric Correction Factor.

Atmospheric Correction Factor

The correction factor adjusts the amount of agent required based on the elevation. By default, this value is automatically calculated using the Elevation. A Manual Override is provided if you wish to enter your own value for the Atmospheric Correction Factor.

Reset

Returns all data on this screen to its original settings.

Cylinder Selection

Cylinder Name

The first time the Cylinder Selection screen is entered, the software will automatically select the smallest cylinder for the required quantity of agent. If another size cylinder is desired, a list of available cylinders is available from the drop down menu.

Cylinder Info Button

For more detailed information about the cylinder, click on the Cylinder Info button.

Auto Select Button

If the agent is adjusted or the number of cylinders is modified, you can click the Auto Select button to have the software select the cylinder size.

Number of Cylinders

Enter the number of cylinders desired here.

Main/Reserve

Use these radio buttons to select either a main system with a single cylinder bank or a main/reserve system with a main and reserve cylinder bank.

Floor Loading

Additional information about the cylinder weight, total weight, floor area occupied by the cylinder(s), and floor loading is presented here.

Cylinder Information

(available from Cylinder Selection screen)

The Cylinder Info screen contains detailed information for each available cylinder. The information includes:

- Cylinder Name
- Cylinder Part Number
- Low Fill Range
- High Fill Range
- Cylinder Volume
- Valve Diameter
- Valve Equivalent Length (based on the internal diameter of the valve)
- Cylinder Weight (empty)
- Cylinder Diameter
- Cylinder Height
- Cylinder Length
- Cylinder Elevation

The cylinder height, length and elevation will be identical if the cylinder is stored vertically with the outlet located on top. If the cylinder is allowed to be oriented horizontally or inverted, the height and elevation may differ.

When originally opened, the Cylinder Info window will display information on the cylinder currently selected in the Cylinder Selection screen. If you wish to view information on other available cylinders, you can scroll through the cylinders using the Back or Next buttons. If you decide to change cylinders, you can use the Select button to update your cylinder selection.

Isometric Drawing

About the Isometric Drawing

The Isometric Drawing screen is used to draw the cylinders, pipe, pipe fittings (i.e. elbows, tees, etc.) and nozzles that comprise the agent distribution network. The information entered here is translated to the Pipe Network table. It is recommended that the piping is entered in View #1 (Standard Isometric View) when designing the system.

When the Isometric Drawing screen is opened initially, one cylinder will be located at the center of the NESW (North, East, South and West) coordinate system. From there, the user must first build the manifold pipe network and then the system pipe network. This Starting Cylinder represents the first piece of the system and cannot be deleted.

The pipe system is broken down into branches. A branch represents one segment of the pipe network and can include objects such as a cylinder, Other Objects (flex hose, check valve, etc.), a length of pipe, an elbow or a tee. A branch is bounded on either side by a node. Each node represents a unique position along the pipe system. By default, a node is shown on the Isometric screen as a circle. You can navigate through the pipe system by clicking on a node either to edit the system or to add a new branch to an open node (i.e. a node that has not yet been used to connect two branches). **Once the entire pipe system has been completed, each node will be assigned a number.**

The items available in the Isometric Toolbar are used to draw the various pipe branches.

While working in the Isometric screen, there are several ways to reposition the drawing on the screen including:

- Right-clicking anywhere on the screen and dragging.
- Using the scroll bars located on the right-hand and bottom edges of the isometric screen
- Clicking the  button to center the screen on the active node.

The Segment Information window provides a method of viewing and editing individual branch information from the Isometric Drawing.

There are multiple options to control the information displayed on the isometric screen. More information can be found in the Isometric Views description.

The angle displayed and rotation of the pipe network can be altered using the Angle and Rotate buttons found on the Isometric Toolbar.

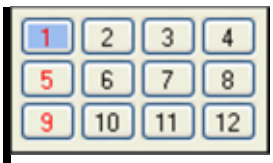
To aid in the system design, several cut, copy and paste options have been developed. More information on these options can be found in the Edit Commands section.

Isometric Toolbar

	**Bull Tee** Attaches a bull tee to the pipe network. The Rotation Direction buttons are then activated to allow for rotation of the tee.
	**Side Tee** Attaches a side tee to the pipe network. The Rotation Direction buttons are then activated to allow for rotation of the tee.
	**Nozzle** Attaches a nozzle to the pipe network. After the nozzle has been attached, a Nozzle Picking screen will open allowing you to pick from the list of nozzles previously setup when defining the enclosure(s).
	**45 Degree Elbow** This button attaches a 45 degree elbow to the pipe network. The rotation buttons are then setup to allow for selection of a legal rotation. • 90 degree elbows are the default and are added to the system automatically if one of the Rotation Direction buttons is selected. The 90 degree elbow button does not need to be selected.
	**Cylinder** Attaches a cylinder to the manifold pipe network.
	**Check Valve (Non-Return Valve)** Attaches a check valve to the manifold pipe network. After the check valve has been attached, a screen will open allowing you to pick from a list of available check valves. These fittings can only be used in the manifold pipe section.
	**End Cap** Attaches an end cap. The end cap is used to terminate a pipe section (i.e. close off one side of the first tee in the manifold). These fittings can only be used in the manifold pipe section.
	**Cylinder and Attachments** In order to minimize the effort when inputting a system with a significant number of cylinders, the Cylinder and Attachments button

	can be used to replicate the cylinder and all pipe and fittings leading to the manifold tee. The button eliminates the need to add the pipe, fittings and cylinder each time a new cylinder is needed. Instead, the button combines the Starting cylinder and all objects (pipe, fittings, etc.)connecting the Starting Cylinder to the first manifold tee into one object. The combined objects are represented on the isometric as a red circle at the tee node. The combined objects are not shown in the pipe network table. This option should only be used if the same pipe and fittings will be used to connect the new cylinder. If not, new pipe, new fittings, and a new cylinder should be added to the network individually.
	**Selector Valve** Attaches a selector valve to the pipe network. A selector valve is always considered open (i.e. agent will flow through the valve).
	**Rotation Direction** These buttons allow you to rotate the pipe object (elbows, tees, etc.). The center image indicates the type of object being rotated. The default is a 90 degree elbow. If an open node at the end of a pipe branch is selected, clicking on any of the directional options will attach a 90 degree elbow. If an object other than a 90 degree elbow is required, first click the appropriate button (located to the left of the Rotation Direction buttons) and then use the Rotation Direction buttons to select the correct direction. The notation is similar to North, West, etc. In addition to N, S, E, and W, the letters U, and D are available. U stands for up, and D stands for down.
	**Flexible (Flex) Hose** Attaches a flex hose to the manifold pipe network. After the flex hose button has been clicked, a screen will open allowing you to pick from a list of available flex hoses. These fittings can only be used in the manifold pipe section.
	**Other Objects** Attaches objects that do not have a specific button associated with them. If no objects fall into this category, then the button is not active.
	**Trash Can**

	Deletes a branch of the system. You can continue deleting branches by repeatedly clicking this button. You must have an open node (i.e. a node that has not yet been used to connect two branches) selected to use this option. For more methods to edit a node that is not open, please use the various Editing Commands.
	**Zoom** Controls how large or small you want the drawing to appear on the screen.
	**Center** Repositions the isometric drawing so that the highlighted node is in the middle of the screen.
	**NESW Rotate** Rotates the NESW lines. Once selected a window will open displaying the possible degrees of rotation.
	**Pipe** In order to attach a section of pipe, enter the desired length in the Pipe Length input box and click this button. The same function can be performed using the Enter key.
	**Pipe Length** Enter the length of pipe you wish to attach and then click the Pipe button (just to the left) or press the Enter key.
	**End of Manifold** Indicates the end of the manifold pipe and the beginning of the system pipe. An end of manifold must be designated for all multiple cylinder systems.
	**Reserve** Indicates the connection point of the Reserve manifold when a Main/Reserve setup is being used. The Reserve button will only be active if the Main/Reserve option was selected in the Cylinder Selection screen.

	**Views** This button allows you to select 1 of 12 possible viewing angles, based on three points of view: • Isometric • Elevation (side) • Plan (top) When you change views, the current view is saved so that you can set up custom views for a particular project. This becomes critical when printing, as you may wish to designate 3 or 4 views specifically for printing while using the others to view and edit.
	**Rotate** This button will rotate your drawing in 45 degree increments. Click on the button until you find your preference. The rotation you select will be saved with the current view.
	**Angle** This button lets you select from three perspectives: • Isometric • Plan • Elevation Click the button until you find your preference. The angle you select will be saved with the current view.
	**View** Opens a window displaying the various options for the display. Each view (1-12) can be individually customized. Initially the options for the current view are displayed. Other views can be selected by using the Back and Next buttons.
 	**Hide Segment Info / Show Segment Info** Used to either display or hide the Segment Information Window. If the window is currently displayed, the Hide Segment Info button is active. If the window is closed, the Show Segment Info button is active.

Segment Information Window

The Segment Information window displays information for the branch between the selected node and the Starting Cylinder. The information includes:

- Segment Type (i.e. pipe, elbow, tee, etc.)
- Pipe Type
- Pipe Diameter
- Length
- Elevation Change
    - Adjusted (see Pipe Elevation Adjustment)
    - Total (calculated elevation change plus adjusted)
- Nozzle Information (only if a nozzle is currently selected)

Some things to consider when working in the Segment Information window:

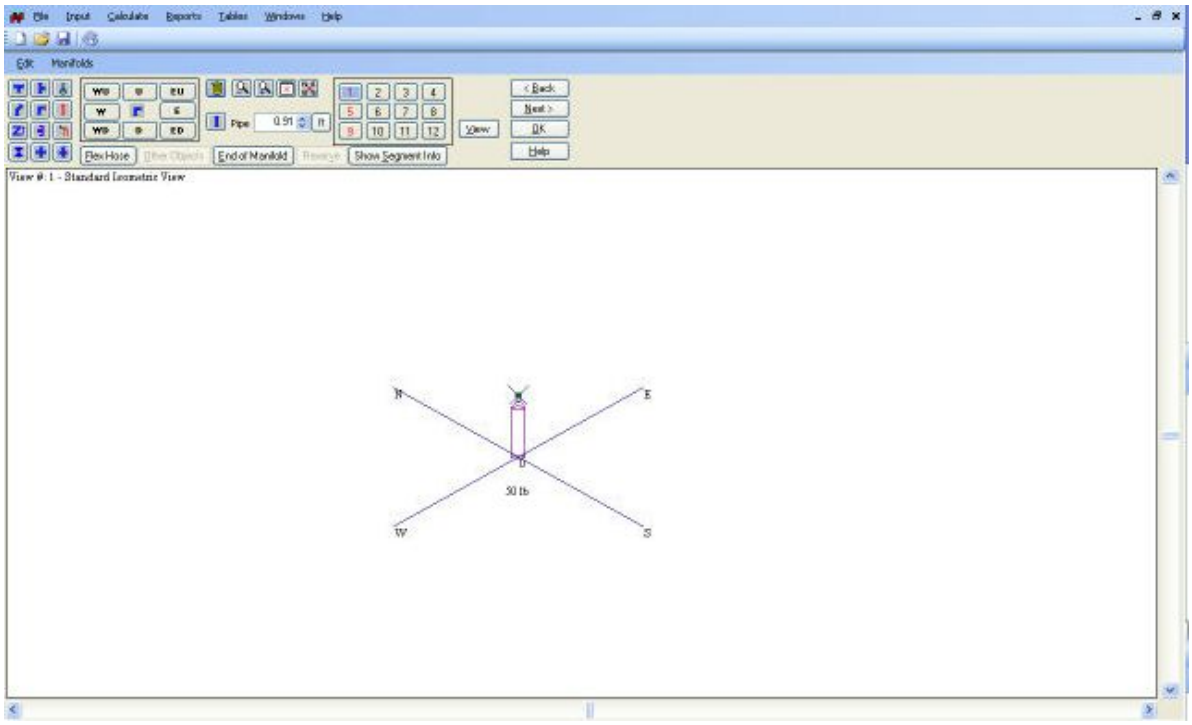
- The values listed in the window can be edited to make adjustments "on-the-fly" from the Isometric Drawing screen.
- If a Pipe Diameter or Pipe Type value is changed in the Segment Information window, you will have the option to "Cascade" this change to the surrounding pipe sections. The change will be applied both upstream and downstream until a tee, nozzle or other object (cylinder, flex hose, check valve, etc.) is reached. This option allows you to make changes to multiple pipe sections in one step.
- The pipe diameter for an elbow or tee is automatically set. You are not allowed to manually adjust the diameter of these objects in either the Isometric Drawing or Pipe Network Table.
- Please note the Pipe Diameter and Pipe Type Indicators are not active if an elbow or tee is selected as these diameters and pipe types are automatically selected.

Manifolds

Building a Manifold

Standard Manifold

The manifold design begins with the Starting Cylinder located in the center of the NESW coordinate system.



The first step is to add the components that connect the cylinder to the manifold. These components can include a flex hose, a check valve, pipe fittings (45 degree or 90 degree elbows), and pipe. The number and type of fittings depends on the design. The various components can be added using the Isometric Toolbar.

To add pipe,

1. Enter the length of pipe you wish to add
2. Click the Pipe button (to the left of the numeric field), or press the Enter key

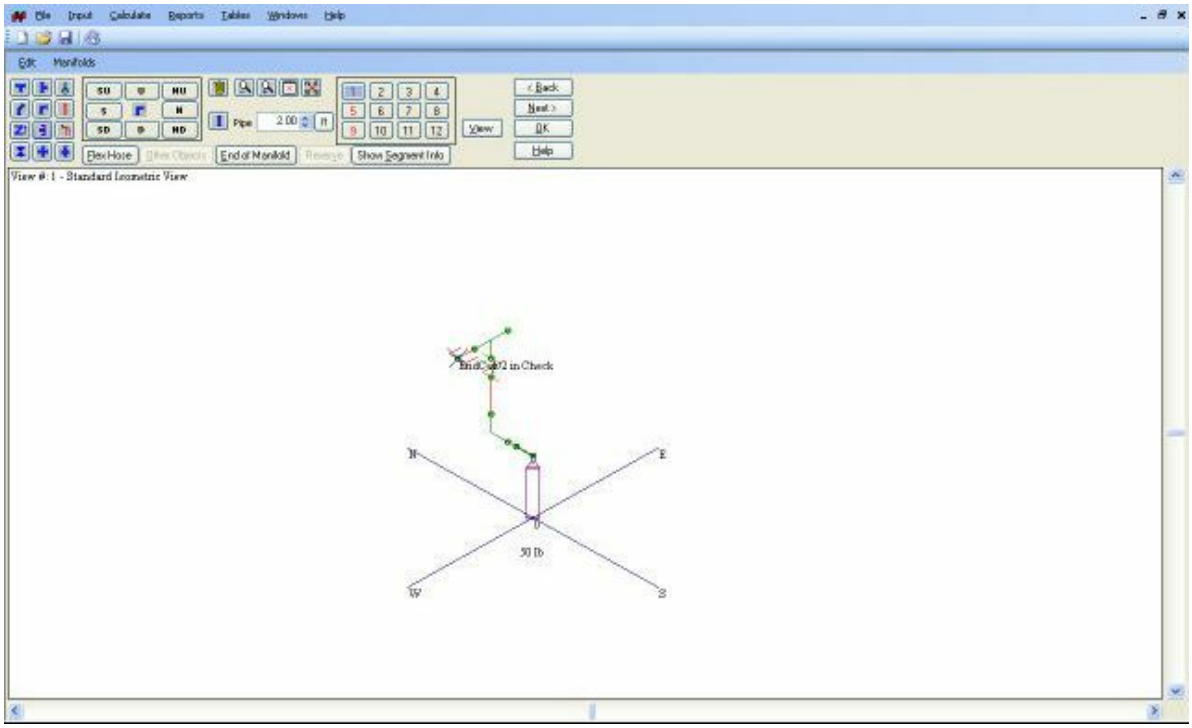
To add a fitting:

1. Select an object to add (for example: a flex hose, check valve or 45 degree elbow)
2. Select its rotation (if applicable) with one of the eight Rotation Direction buttons

Please note: 90 degree elbows are the default and are added to the system automatically if one of the Rotation Direction buttons is selected. To add a 90 degree elbow, step 1 is not necessary.

A tee should be used to tie into the manifold as shown below. All components connecting the Starting Cylinder to the first manifold tee (not including the tee) and the cylinder itself will be copied and applied if the Cylinder and Attachments button is selected later in the design.

If the Starting Cylinder represents the last cylinder (i.e. furthest removed from the system pipe), an end cap can be used to close off the side of the tee not connected to another cylinder.

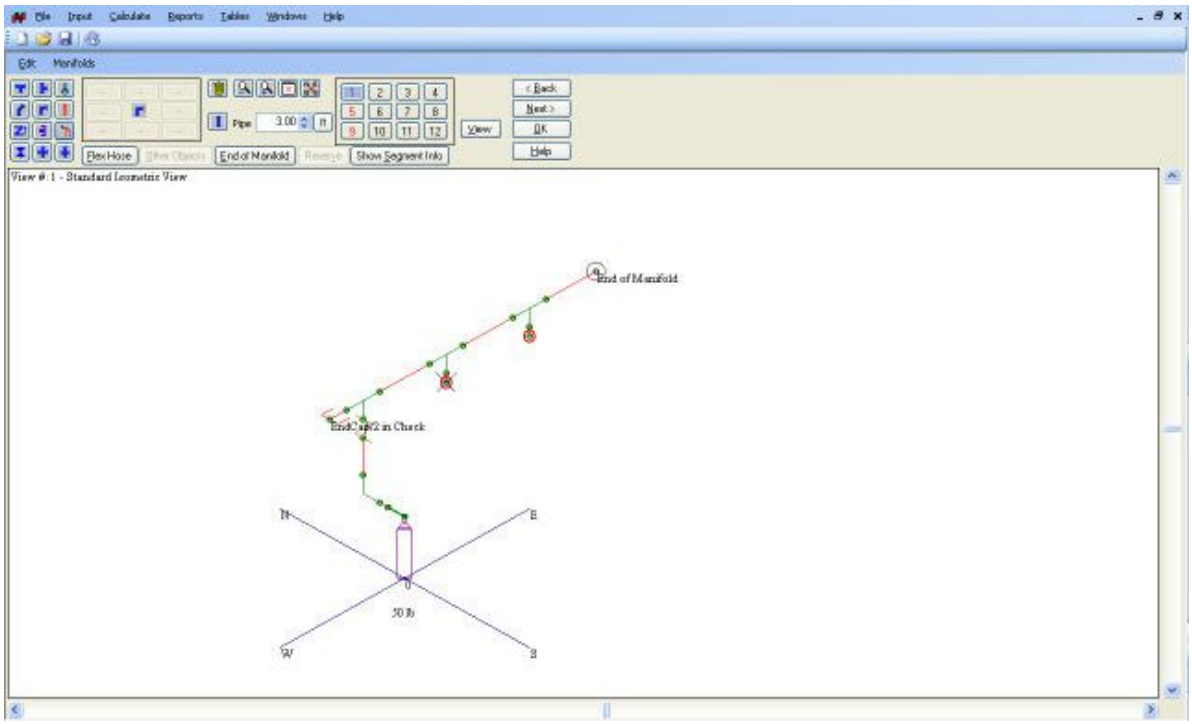


From the tee outlet, pipe and other fittings can be added to construct the manifold. At the end of the manifold pipe, click the End of Manifold button. A circle will be displayed around the final manifold node along with the text "End of Manifold".

With the manifold pipe constructed, there are two options for connecting remaining cylinders. The quickest is to use the Cylinder and Attachments button. If additional detail is preferred or if you will be using different configurations to connect the cylinders, you will need to build each connection separately.

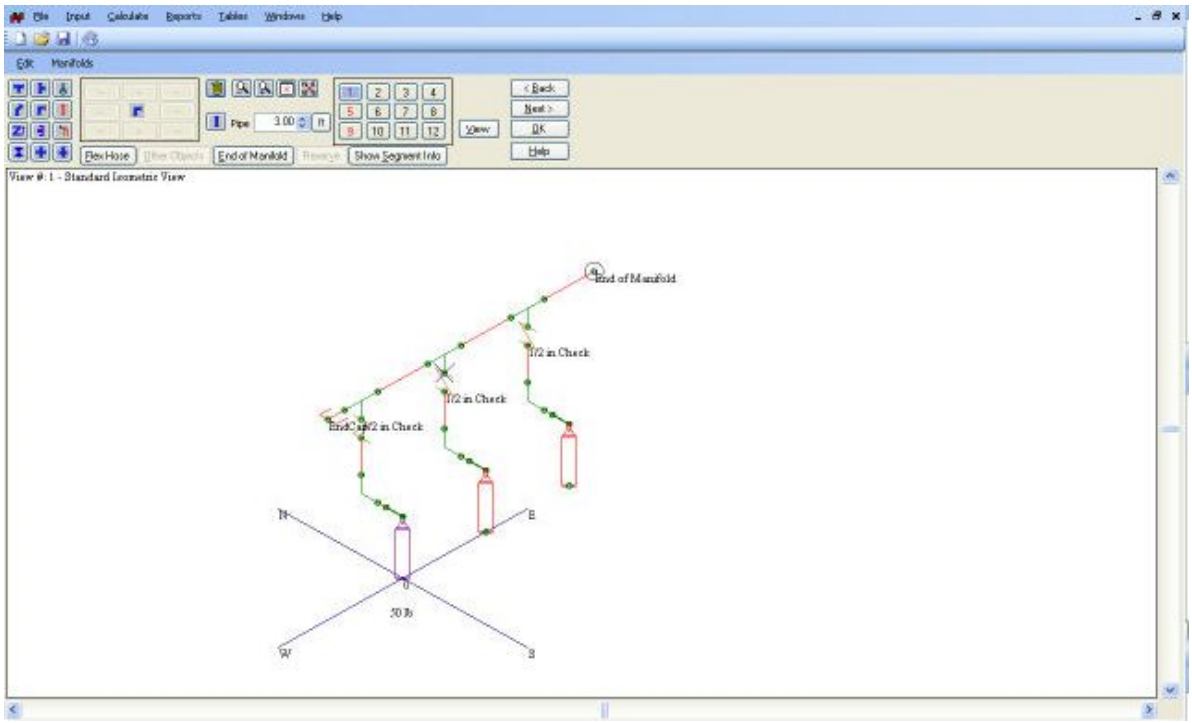
Cylinder and Attachment Button Method:

1. Select the tee node where the new cylinder will be connected through.
2. Click the Cylinder and Attachment button. The new connection will be symbolized with a red circle around the node.



Individual Build Method:

1. Select the tee node where the new cylinder will be connected through.
2. Add each of the components that will connect the new cylinder to the tee. These components can include a flex hose, a check valve, pipe fittings (45 degree or 90 degree elbows), and pipe. The build process will go in reverse of the order used with the Starting Cylinder. In this case, the starting point is the tee and the ending point is the cylinder.



In the examples shown above, the Individual Build method used the same exact pipe and fittings to connect the extra cylinders to the manifold tee. In this case, both methods would produce the same predictions. The predictions would only differ if an alternate pipe and fitting configuration is used to connect the extra cylinders.

With the cylinders accounted for, you are now ready to add the System Pipe

Main/Reserve Manifold

The reserve manifold does not need to be built in the Isometric Drawing. The software assumes the reserve manifold is identical to the main manifold. This assumption means that the main and reserve discharges will yield the same mass splits, pressures and discharge time.

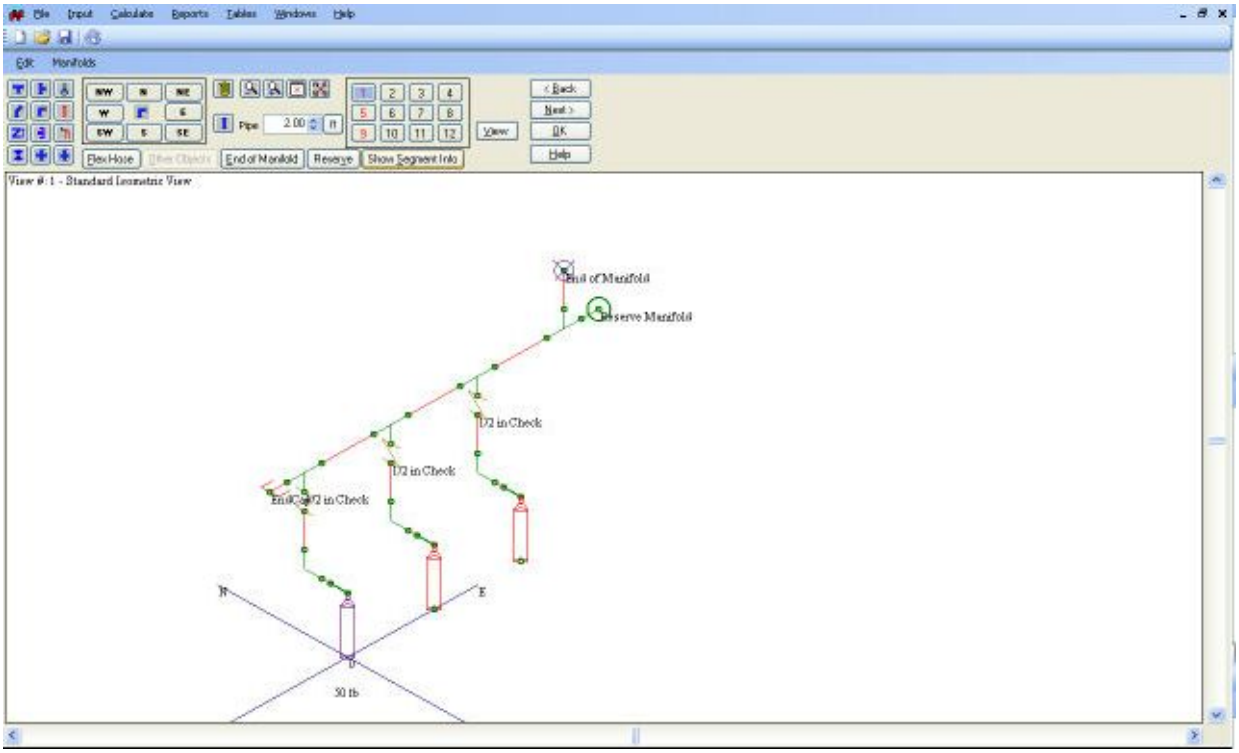
NOTE If the main and reserve manifolds are not identical, a separate project should be setup for each system.

To add the reserve manifold:

- Add a tee at the end of the main manifold. The tee serves as the connection point between the main and reserve manifolds.
- With the tee outlet that will connect to the reserve manifold selected, click the Reserve button in the Isometric Toolbar. A Reserve Manifold icon will be added to the drawing as shown below.

NOTE The Reserve button will only be active if the Main/Reserve option was selected in the Cylinder Selection screen.

- Complete the manifold by adding a length of pipe to the only remaining open tee outlet and clicking the End of Manifold button.
- With the manifold designed, you are now ready to add the System Pipe.



Save This Manifold

Once a manifold design has been completed, which means the End of Manifold has been identified, the manifold can be saved for future use in other projects. The Save This Manifold feature is found under the Manifold option on the Isometric Drawing screen menu.

You will first be prompted to enter the name of the manifold and select the location. The default location is set using the Locations tab of the Options screen.

The next window will allow you to edit the manifold name and enter a short description of the manifold. This information will be used later to identity the new manifold in the list of available manifolds.

Load a Manifold

The Load a Manifold feature is found under the Manifold option on the Isometric Drawing screen menu. This feature will retrieve the pipe information from a previously created manifold and import it into the new design.

When the Load a Manifold feature is selected, the Manifold List screen will open and display all available manifolds stored in the current Manifold Search Directory. To add a manifold, select the desired manifold and click the Load Selected Manifold button.

Browse

The default Manifold Search Directory is set using the Locations tab of the Options screen. If you would like to load a manifold from a different location, you can use the Browse button to change the Manifold Search Directory.

Update the List of Manifolds

To refresh the manifolds displayed, click the Update the List of Manifolds button. This may be useful if you have copied a manifold to the Manifold Search Directory while the Manifold List screen was open.

If you make significant changes to the loaded manifold and plan to use the modified manifold in the future, you may want to save the manifold into the list of available manifolds using the Save This Manifold feature.

Building the System Pipe

The system pipe includes all pipe and fittings used to deliver the agent from the manifold to the enclosure(s). Allowable fittings include tees, elbows and nozzles.

Starting from the End of Manifold, pipe and fittings can be connected as follows to build the network:

To add pipe,

1. Enter the length of pipe you wish to add
2. Click the Pipe button (to the left of the numeric field), or press the Enter key

To add an elbow or tee:

1. Select an object to add
2. Select its rotation with one of the eight Rotation Direction buttons

Please note: 90 degree elbows are the default and are added to the system automatically if one of the Rotation Direction buttons is selected. To add a 90 degree elbow, step 1 is not necessary.

To add a nozzle:

1. Click on the Nozzle button
2. A Nozzle Picking screen will open. Select the appropriate nozzle name and click OK.

Isometric Views

There are twelve (12) views available. You may customize and save the settings for each view using the View button on the Isometric Toolbar. When View window opens, the options for the current view are displayed. Other views can be selected by using the Back and Next buttons. If you decide to change Views, you can use the Select button to update which view will be displayed.

Name (used on reports)

Enter a name that will help you identify this view setting.

Show Check Boxes on 'General', 'Pipe', and 'Calculation Results' Tabs

You can customize the options for this view by selecting/deselecting these options.

Edit Commands

Cut Pipe Heading AWAY from Starting Cylinder

The piping (from the location of the highlighted node to the end of the section heading away from the Starting Cylinder) is deleted and copied to the clipboard. You can use the Paste Pipe Section command to move this section of pipe to another location.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)

You may find this function helpful if you must modify a drawing in the midst of a configuration. You can cut a section of pipe away, make the modifications necessary (such as adding piping to circumvent a beam), and re-attach the cut pipe section as a unit, rather than re-drawing the entire section.

Copy Pipe Heading AWAY from Starting Cylinder

The piping (from the location of the highlighted node to the end of the section heading away from the Starting Cylinder) is copied to the clipboard. Use the Paste Pipe Section command to paste the copied section of pipe to the new location.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)

This feature is useful when branch lines are identical, saving you repetitious drawing commands.

Copy Pipe Heading TOWARDS First Cylinder

The piping (from the location of the highlighted node to the end of the section heading towards the Starting Cylinder) is copied to the clipboard. Use the Paste Pipe Section command to paste the copied section of pipe to the new location.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)

This feature is useful when branch lines are identical, saving you repetitious drawing commands.

Paste Pipe Section

This is only available after cutting or copying a section of pipe. Prior to selecting the Paste option, select an open node (i.e. a node that has not yet been used to connect two branches) on the pipe network.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)

There are some restrictions on where the pipe section can be re-attached. The primary restriction concerns the take-off direction. Specifically, you cannot save a horizontal section of pipe and then attach it in a vertical manner or vice versa.

In some cases where a section would not connect properly (e.g., pasting a section that starts with a fitting on a segment that ends with a fitting), a pipe segment will be inserted automatically so the section can be pasted. The new pipe segment will have a length of 1 foot (or 1 meter, if working in metric units).

Delete Pipe Heading AWAY from First Cylinder

Deletes all the piping and associated hardware from the location of the highlighted node to the end of the section heading away from the first cylinder.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)


Warning: You cannot undo this action once it is completed.

Delete All The Piping

Deletes the entire isometric drawing except the Starting Cylinder. The software will ask you to confirm that you wish to perform this action.

 Warning: You cannot undo this action once it is completed.

Open Pipe Section and Paste It On

Opens a previously saved pipe section file (*.sct) and pastes it onto the drawing at the highlighted node.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)

There are some restrictions on where the pipe section can be re-attached. The primary restriction concerns the take-off direction. Specifically, you cannot save a horizontal section of pipe and then attach it in a vertical manner or vice versa.

In some cases where a section would not connect properly (e.g., pasting a section that starts with a fitting on a segment that ends with a fitting), a pipe segment will be inserted automatically so the section can be pasted. The new pipe segment will have a length of 1 foot (or 1 meter, if working in metric units).

Save Pipe Heading AWAY from First Cylinder

The piping and associated hardware (from the location of the highlighted node to the end of the section heading away from the first cylinder) is saved as a separate file. The software will ask you to name the section before saving and automatically give the file an *.sct file extension.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)

This feature is particularly useful for repeated pipe configurations in multiple projects.

Save Pipe Heading TOWARDS First Cylinder

The piping and associated hardware (from the location of the highlighted node to the end of the section heading towards the first cylinder) is saved as a separate file. The software will ask you to name the section before saving and automatically give the file an *.sct file extension.

Nodes are marked with a small circle. (If you cannot see any small circles on the drawing, click the Views button to make sure Show Node Start Markers is checked.)

This feature is particularly useful for repeated pipe configurations in multiple projects.

Load Pipe Network from Saved Project

This feature will allow you to import an entire pipe network from a previously created project.


Warning: This will erase any pipe currently drawn in the Isometric.


You cannot undo this action once it is completed.

Pipe Network Table

About the Pipe Network Table

This screen allows you to edit the pipe network data created by the Isometric Drawing. Each row of data entry represents branch of the pipe network.

Table Layout

The table is organized in the following manner:

- Segment 0 always represents the Starting Cylinder. The data for a cylinder is contained in a table and is automatically entered.
- The next set of segments represent the pipe, fittings or Other Objects (flex hoses, check valve, etc.) that are used to connect the Starting Cylinder to the End of Manifold. These segments are listed in the order based on the flow path of the agent from the Starting Cylinder to the exit of the manifold.
- System pipe segments are listed next.
- Finally, the additional pieces of the manifold are listed. These segments include the connection of any additional cylinders or pipe branches that tie into the initial manifold segments connecting the Starting Cylinder to the End of Manifold.

To simplify the Pipe Network Table, you can edit what information is displayed. The type of objects displayed can be modified using the Show/Hide Rows feature located in the toolbar of the table. The information listed for each pipe branch can be modified using the Show/Hide Columns feature.

Another option to simplify the Pipe Network Table is to use the Combine Rows feature.

Please note the start and end node number columns are automatically hidden if the system has not been completed.

Editing the System in the Table

Within the Pipe Network Table, you can modify the Pipe Type, Pipe Diameter, Pipe Locking Status, Pipe Length and Pipe Elevation Adjustment for all segments other than Other Objects. You can also add additional equivalent length to these same segments. For nozzle segments, the last three columns provide nozzle information that can be edited including the nozzle identification code (as defined in the Nozzle Table), the nozzle type, and the nozzle orifice area.

Several columns in the Pipe Network table feature pull-down menus. Since these menus contain only legitimate choices, it takes the 'guesswork' out when attempting to change data. This feature is only available in the following columns:

- Pipe Type
- Pipe Diameter
- Nozzle Name

- Nozzle Type
- Nozzle Area

To change data for other cells, type directly into the cell.

There are several things to remember when working in the Pipe Network Table:

- The pipe diameter for an elbow or tee is automatically set. You are not allowed to manually adjust the diameter of these objects in either the Isometric Drawing or Pipe Network Table.
- If the Pipe Diameter or Pipe Type are changed for a given pipe segment, you will have the option to "Cascade" this change to the surrounding pipe sections. The change will be applied both upstream and downstream until a tee, nozzle or other object (cylinder, flex hose, check valve, etc.) is reached. This option allows you to make changes to multiple pipe sections in one step.
- Changes to the pipe network table do not take effect until you click or tab out of the changed cell.
- The Default Options and Duplicate Options features allow you to quickly assign values to the Pipe Type and Pipe Diameter fields.

Test Data Button

Clicking this button will perform a check on the integrity of the pipe network. This procedure verifies that all information necessary to run a calculation has been entered and that the data is valid. Checks are in place to confirm:

- that pipe types for each segment have been set (pipe types do not have to be set for Other Objects like flex hoses and check valves),
- that all pipe diameters are identified and valid for the pipe type selected,
- that an End of Manifold has been set (if multiple cylinders are used),
- that all cylinders have been assigned, and
- that all nozzles have been assigned and the nozzle type defined.

Unlike the Main Calculation, the test data function does not test the limits of the system. The Test Data function is also automatically run at the start of a calculation.

Pipe Locking

The calculation routine includes a pipe picking routine that attempts to optimize the pipe diameters for the **system pipe only**. The pipe picking occurs at the time of the Main Calculations and is independent of the pipe diameters selected if the Default Pipe Diameters option was selected.

The pipe locking options allow the user to set what, if any, pipe branches should be included in the pipe diameter selection process. If you do not want the calculation to select a new pipe diameter for a particular branch, place a check in the Lock Pipe Diameter box for that branch. The calculation will perform pipe picking for all branches with a blank Lock Pipe Diameter box. The pipe locking feature is convenient if you have a section of pipe that cannot be altered (i.e. existing pipe) or if you are trying to force the use of a certain pipe diameter.

Regardless of whether the calculation picks the pipes or not, each segment is required to have a diameter before the calculation can start. This is done by using the Default Pipe Diameters option or by manually entering diameters in the table.

The pipe locking values for each branch can be set individually by clicking on the box in the Lock Pipe Diameter column. Or, the values for all of the system pipe can be changed at once using the Pipe Locking options under the toolbar.

Manifold pipe is automatically locked and will not be selected by the calculation. You must select the pipe diameters manually or use the Default Pipe Diameters option. If the calculation indicates branches in manifold are too small, the pipe diameters should be adjusted. In addition, if the correct pressures or discharge times cannot be achieved by adjusting the system pipe, you should try to modify the manifold pipe. Please note, pipe diameters for Other Objects like cylinders and flex hoses are fixed and cannot not be adjusted.

Pipe Elevation Adjustment

Depending on the orientation of the pipe in the Isometric Drawing, the software will automatically calculate the change in the pipe elevation. This calculation assumes that the pipe is either horizontal (no elevation change), at a 45 degree angle from horizontal (elevation change of .707 times the pipe length), or vertical (elevation change equals the pipe length).

The Pipe Elevation Adjustment can be used to compensate for differences between the calculated value and the actual elevation change. The combined value of the calculated elevation change and the adjusted elevation change is shown in the Pipe Elevation Total.

Default Options

The default features provide a method to quickly set the pipe types and pipe diameters after creating the system in the Isometric Drawing.

Pipe types and pipe diameters will not change for special objects like cylinders, flex hoses, and check valves.

Default Pipe Types

The software will select the pipe types for the manifold and system pipe based on the default pipe types indicated on the Setup screen

Default Pipe Diameters

The software will select the appropriate pipe diameter for each segment. These diameters are determined based on the flow rate of agent required through a given size pipe. The flow criteria used to select the diameters are shown in the corresponding Pipe Type table in the Tables menu. If two pipe diameters are capable of handling a flow rate, the smaller size is selected.

The diameters selected are only to provide an initial point for the system design and are not optimized. You may need to adjust the diameters manually or allow the calculation routine to select pipe diameters for you. More information on using the calculation to select pipe diameters can be found in the Pipe Locking discussion.

Default Pipe Type & Diameters

This feature selects the default pipe types and diameters simultaneously using the methods described above. This option can be selected by either clicking on the Default Type & Diameters button on the toolbar or by going through the Default menu.

Duplicate Options

The duplicate feature can be used to automatically copy the pipe type or pipe diameter from the highlighted row to the rows below it in the Pipe Network Table. Before selecting one of the duplicate options, select the row (or any one of the cells in the row) that contains the information to be copied.

Pipe types and pipe diameters will not change for special objects like cylinders, flex hoses, and check valves.

Duplicate Pipe Types

The pipe type duplication option will copy the pipe type of the selected row down until the end of the table is reached.

Duplicate Pipe Diameters

The pipe diameter duplication option will copy the pipe diameter of the selected row down until a tee, Other Object (check valve, flex hose, etc.), or nozzle is reached. The pipe diameter duplication feature differs from the "Cascading" feature described in the About the Isometric Drawing and About the Pipe Network Table in that it only copies the information to the rows below the selected row. The "Cascading" feature copies the pipe diameter to branches upstream and downstream of the selected branch.

The pipe type should be selected before using the pipe diameter duplication.

Show/Hide Rows

Rows of the Pipe Network Table can be shown to increase the level of detail or hidden simply the view. The show/hide feature is broken down into several categories including:

- Show Manifold Pipe,
- Show System Pipe,
- Show Cylinders,
- Show Cylinder + (see Cylinders Plus Attachments description in Isometric Toolbar section),
- Show Pipes,
- Show Elbows,
- Show Tees, and
- Show Nozzles.

Categories shown with a check will be displayed in the pipe network table. Categories shown without a check will be hidden. To toggle between the two options, simply click the appropriate category with the mouse. By default, all but the Cylinder + category are shown.

Show/Hide Columns

Columns of the Pipe Network Table can be shown to increase the level of detail or hidden simply the view. The show/hide feature is broken down into several categories including:

- Segment Number,
- Manifold/System (indicates whether a segment is part of the manifold or system pipe),
- Segment Type (cylinder, flex hose, check valve, pipe, tee, elbow, etc.),
- Start Node (only displayed if system is complete),
- End Node (only displayed if system is complete),
- Pipe Type,
- Pipe Diameter (nominal),
- Lock Pipe Diameter (see Pipe Locking)
- Pipe Length,
- Pipe Elevation,
- Union,
- Other Objects (indicates which flex hose, check valve, etc. is used),
- Equivalent Length Added (can be used to add equivalent length to account for a known pressure loss),
- Equivalent Length Total (combined equivalent including Added Equivalent Length),
- Flow (total flow through the pipe segment),
- Nozzle Name,
- Nozzle Type (360 degree, 180 degree, etc.), and
- Nozzle Orifice Area (total area of all orifices that control the flow).

Categories shown with a check will be displayed in the pipe network table. Categories shown without a check will be hidden. To toggle between the two options, simply click the check box next to the appropriate category with the mouse.

Combine Rows

An option is provided to compress or expand the number of branches shown in the table in order to simply the view or show added detail. The level of detail is controlled by the button between the 'Default Type & Diameters' and 'Test the Data' buttons.

The Combine Rows features differs from the Show/Hide Rows option in that it is actually combining multiple branches into one and not just hiding certain types from view.

The button text and color will vary as follows:

If the Combine Pipe/Elbows button is shown, the Pipe Network Table is showing maximum detail with all branches displayed. This is the default setting for new projects.

If the Combine Pipe/Elbows is clicked, all elbows that are followed by a pipe branch will be combined into one branch. When combined, the Segment Key column will indicate the branch numbers combined, and the Segment Type will read Pipe/Elbow.

After Combine Pipe/Elbow has been clicked, the button will take on the following form:

If the Combine Branches button is shown, the Pipe Network Table is displaying combined pipe/elbow segments.

The Combine Branches button provides another method to simplify the Pipe Network Table. When selected, this feature will combine multiple sets of elbows and pipe branches into one branch. Tees, nozzles and Other objects will not be combined. As an example, consider a system that has six pieces of pipe and five elbows between the cylinder and the first tee. The Combine Branches feature will reduce the number of branches down to three. This will include one for the cylinder, one for the tee, and one for the combined pipe pieces and elbows.

When combined, the Segment Key column will indicate the branch numbers combined, and the Segment Type will read Combined. If the pipe type or diameter of the segments vary (i.e. if a 1/2 inch length of pipe is combined with a 3/4 inch elbow), the pipe type or pipe diameter box will be left blank.

After Combine Branches has been clicked, the button will take on the following form:

If the Show Expanded button is shown, the Pipe Network Table is displaying combined branches. To expand the Pipe Network Table to show the maximum detail, click the Show Expanded button.

Calculate

About Calculate

With the information entered properly in each of the input sections, the flow calculations can be performed. To begin a calculation, select the Perform Main Calculation option under Calculate on the main toolbar.

The DOS calculation routine will run in the background by default. To view the routine, deselect the Minimize Main Calc DOS window in the Options screen.

Pipe and Nozzle Picking

The calculation routine has the ability to pick pipe diameters and nozzle orifice sizes in an attempt to meet the required agent distribution within the discharge time and minimum nozzle pressure limits. The system returned by the calculation may still have to be fine tuned manually. Prior to the start of the calculation, you will be prompted to select your calculation option. Three options are offered:

- Select Nozzles and Unlocked Pipe
    - The calculation will pick pipe diameters for all unlocked system pipe branches (see Pipe Locking for more information on locking/unlocking pipe branches). The pipe diameters for locked branches will not be affected.
- Select Nozzle Only
    - The calculation will pick nozzle orifice sizes only. The pipe diameters of the pipe will not be affected regardless of whether or not they have been identified as locked or unlocked.
- Use the Current Nozzles and Pipe
    - The calculation will not attempt to pick pipe diameters or nozzles. The current values will be used.
    - This option is not available if any of the nozzle fields are blank.

Some Things to Consider:

- All Error Messages must be corrected before running the Main Calculations. You may be returned to the software window if the calculation program detects input parameters which are outside of the design limitations of the software. For example, selecting a nozzle orifice area too large for one of the nozzles would automatically stop the calculation and return you to software.
- The calculation can be used to pick nozzles only or nozzles and pipe diameters. The calculation cannot pick just pipes.
- Regardless of whether the calculation will be used to pick the pipe diameters, each segment is required to have a starting diameter. This can be done by selecting either the Default Pipe Diameter or Default Pipe Type and Diameter option or by manually entering diameters in

the Pipe Network Table. Segments that you do not want changed must be locked prior to running the calculation.

- If pipe picking is used, the diameters of Other Objects (flex hoses, check valves, etc.) will not be changed.
- The calculation will take a varying amount of time, depending on the type and size of system. In general, more complicated systems with a larger number of nozzles and branches will take longer than smaller, simpler ones. Using the pipe or nozzle picking features will increase the calculation time.

Results

The report produced by the calculation includes a report of system limits so you can see if a system is approaching a limit. The report also provides some design suggestions to help make failing systems pass. The report is automatically displayed at the end of the calculation. It can also be accessed by selecting the View Most Recent Results option under Calculate on the main toolbar.

Error messages may be displayed when the calculation results are returned that will require you to redesigned your system. A list of messages are displayed and explained in the Error Messages section.

Two Results Reports can be generated. The standard Report only displays information on the calculation results. The Reports with Help option includes information on the calculation results, system limits and design help. The Results Reports can be printed or saved as a PDF or RTF file. Clicking on the Report or Report with Help buttons will bring up a Print Preview window. From within this window, the report can be printed or saved.

Recalculate

If the option to have the calculation pick pipe or nozzle sizes is selected at the time the calculation is run, the Recalculate option will be activated when the Calculation Results are displayed. The Recalculation option will rerun the calculation a second time to attempt to improve the system design.

If the Recalculate option is activated the following button will be displayed in the upper right hand side of the Calculation Results window:

The Recalculate option is only available immediately after the first calculation is run and can only be performed one time.

Error Messages

Error Messages will appear when system input is found to be outside the bounds of the acceptable limits of the program.

Maximum percent agent in pipe is exceeded

The ratio of the amount of agent in the pipe when full to the initial agent liquid volume in the cylinder(s) has exceeded the allowable limit.

Minimum orifice area to pipe area ratio not exceeded

The ratio between the nozzle orifice area for a nozzle at the given node and the pipe cross-sectional area is less than the allowed limit.

Maximum orifice area to pipe area ratio exceeded

The ratio between the nozzle orifice area for a nozzle at the given node and the pipe cross-sectional area has exceeded the allowable limit.

Maximum discharge time exceeded

The maximum discharge time for the system was exceeded.

Minimum discharge time not exceeded

The minimum discharge time for the system was not exceeded.

Predicted agent concentration is below minimum design concentration

The quantity of agent must be at least 100% of the minimum design concentration required to ensure effective fire extinguishment.

Cylinder vapor runout prior to nozzle liquid runout

This may occur when a nozzle in the system is placed hydraulically closer to the cylinder than other nozzles. When one nozzle clears of liquid substantially sooner than another, that nozzle may deplete system pressure before liquid in another branch clears, leaving agent in the pipe.

Minimum average nozzle pressure violation at nozzle X

The predicted nozzle pressure must be above the preset minimum nozzle pressure for the nozzle to effectively disperse the agent and mix the agent into the air in the target enclosure.

Flow split at bull tee out of range

The flow split for the bull tee at the given node exceeds the allowable split.

Flow split at side tee out of range

The flow split for the side tee at the given node exceeds the maximum split allowed out the side outlet or does not exceed the minimum split..

Minimum flow rate not exceeded

The minimum flow rate for the pipe size of the given branch is not exceeded.

Maximum arrival time imbalance exceeded between nozzles X and Y

The difference between liquid arrival times at two of the nozzles exceeds the allowed maximum.

Maximum runout time imbalance exceeded between nozzles X and Y

The difference between nozzle liquid runout times at two of the nozzles exceeds the allowed maximum.

Choked flow feeding nozzle X

If the piping leading to a nozzle is too small, relative to the nozzle orifice area, choked flow may occur in that branch. The nozzle is not controlling the flow in this branch and the calculated system data may be unreliable. The pipe network should be adjusted. The piping in the branch preceding the nozzle can be made larger, or the nozzle orifice area can be made smaller. Excessive pipe lengths may also be prone to choked flow.

Reports

About Reports

Several different report options are available under the Reports option on the main toolbar. The reports can be printed or saved as a PDF or RTF file. Clicking on the desired report will bring up a Print Preview window. From within this window, the report can be printed or saved.

Project Report

Contains the information as entered in the Customer and Project Information screen.

Designer Notes Report

Contains the information as entered in the Designer Notes screen.

Enclosure Report

Contains the information as entered in the Enclosure screens.

Agent Source Report

Contains the information as entered in the Agent Source screen.

Print Isometric Drawing

Brings up a submenu of the twelve (12) isometric views. Highlight any selection to bring up the Print Preview window.

Pipe Network Report

Contains the information as it appears in the Pipe Network Table with all branches displayed.

Pipe Network Report, Combined Pipe and Elbows

Contains the information as it appears in the Pipe Network Table with pipe and elbow branches combined. The branches will appear in the same manner as if the Combine Pipe/Elbows button was used in the Pipe Network Table screen.

Parts List Report

Lists all the pipe, fittings, cylinders, nozzles, agent, and other hardware components that were called out in the Pipe Network table. It will not include any valves or fittings that were entered in the Pipe Network as added equivalent length.

System Acceptance Report

Contains information including the discharge times, quantity of agent delivered to each enclosure, nozzle pressures, and any error messages that occurred during the calculation. This data must be compared to the system requirements to insure the system has been designed properly.

If you make changes to your project, you must re-open each report to view the reflected changes.

Multiple Reports

The Multiple Reports option makes it easier to print specific sections with one command. Simply select Multiple Reports under Reports on the main toolbar. Then select the reports that you would like to have combined into one consolidated report. With your selection complete, click the Show button to launch the Print Preview window. From within this window, the report can be printed or saved as a PDF or RTF.

Tables

About Tables

Contains information on the hardware available for use in the system design. There is no need to add or change the data in these tables; they are provided for information only.

Cylinders

Information about the cylinders available for use in your system is displayed in the Cylinders Table.

Pipe Types

A list of the available pipe types for use in your pipe network can be viewed from the Tables pull-down menu. Specific information about a particular pipe type can be viewed by selecting the pipe type from this menu.

Nozzles

A list of the available nozzle types for use in your pipe network can be viewed from the Tables pull-down menu. Specific information about the nozzles included in a particular nozzle type can be viewed by selecting the nozzle type from this menu.

Other Pipe Objects

Information about Other Objects (flex hoses, check valves, etc.) that can be used in the pipe network is included in the Other Pipe Objects Table.

Atmospheric Correction Factors

Adjustments used when calculating agent flow for enclosures at elevations above sea level.

Windows

About Windows

Multiple windows can be displayed on screen at the same time. The Windows options provide a method to organize the open windows including Cascade, Tile Vertical and Tile Horizontal.

Resources

Web Support

For further assistance, including tips and updated drivers, visit us on the web at http://www.haifire.com/FlowCalc/techsupport.htm.