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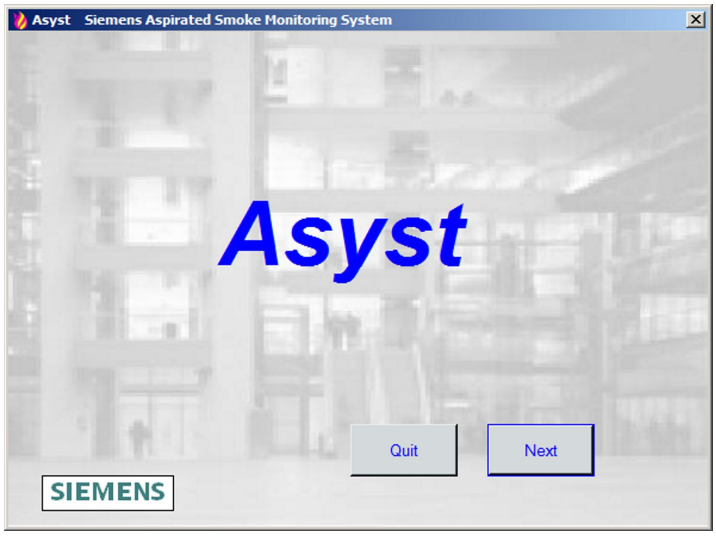

FXS2055

Asyst Tool

User Guide

A6V10340094_b_en_--
2014-01-31

Building Technologies
Control Products and Systems

Legal notice

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1 Introduction

1.1 General

When a fire is detected in your facility nothing protects your people and property like a Siemens Fire Safety system solution.

The detection of smoke is an essential part of any fire safety system. If by-products of the early stages of fire are detected, this provides an early warning long before smoke arises

and thus creates time for actions that are designed to protect people and property before loss is inevitable.

Siemens aspirated smoke detectors give you this early protection.

The ASD Asyst Tool is an integral part of the design and installation of an aspirated smoke detector (ASD) system.

1.2 ASD Asyst tool

The Asyst Tool assists in the design of pipe layouts well before construction of an actual pipe system is commenced and can also be used prior to any upgrade of an existing ASD system.

The Asyst Tool allows the operating conditions and requirements to be entered, and then simulates the flow of air and smoke through a pipe system connected to an ASD system. This enables any number of provisional pipe layouts to be tested for compliance with local regulations prior to any construction commencing.

The Asyst Tool treats each aspirated smoke detector and the piping connected to it as a project. Each project can be saved to a file and printed at any time.

Project files can be stored on any storage medium and can be emailed, allowing them to be opened by the Asyst Tool on other computers.

The Asyst Tool does not replace the need to compliance-test the completed installation.

1.3 Use of the ASD Asyst Tool

To use the Asyst Tool with a project, enter the details of the project, select the detector and fire standard, and enter the proposed design of the pipe layout connected to the detector and the environmental conditions at the project site.

You can calculate or combine the flow through each pipe, or use the Asyst Tool to propose a solution.

Compare the results with the requirements of the selected fire standard. If the results do not comply with the fire standard then modify the proposed design and re-evaluate the results. Repeat this process until a satisfactory result is obtained.

The Asyst Tool permits a number of designs to be tested and compared, resulting in the most suitable installation layout being established.

Select the Asyst Tool user language with menu function 'Configuration' → 'Language'.

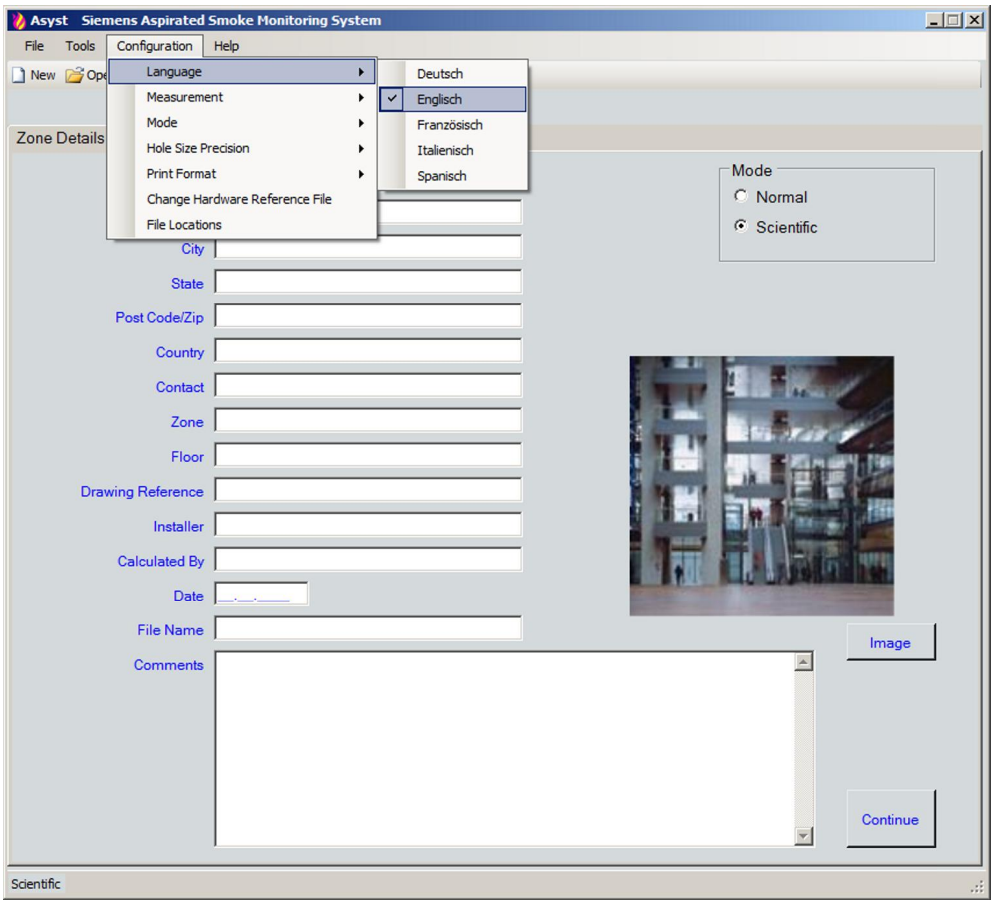

Figure 1 Selecting the user language

2 Fire Simulation

2.1 Start Screen

Figure 2 shows the start screen:

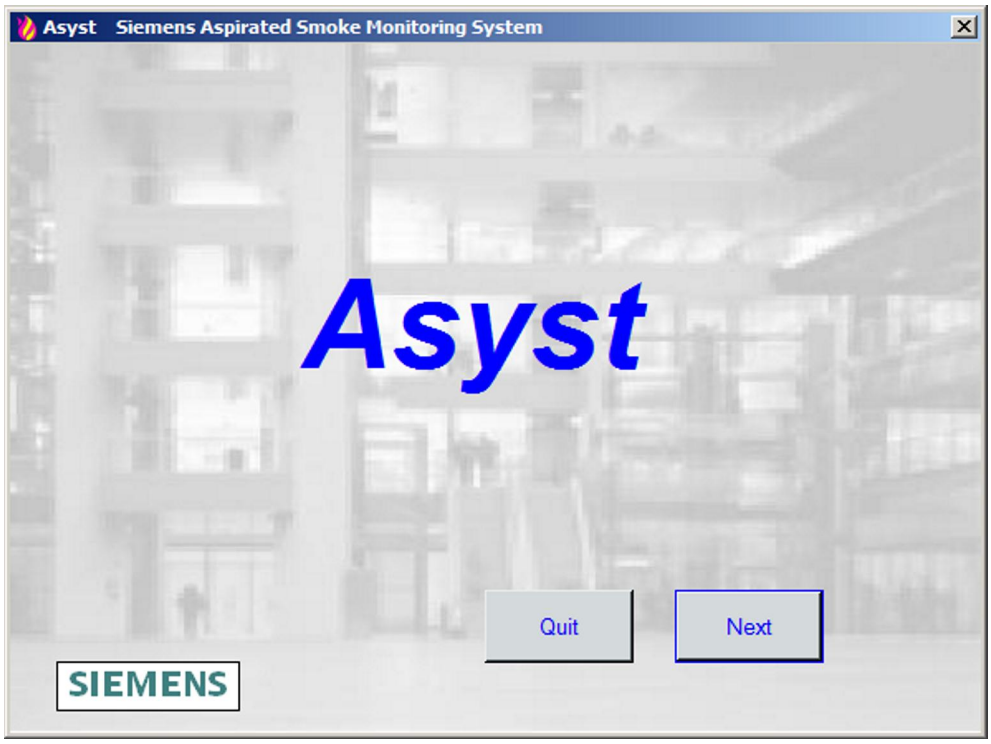

*Figure **2** ASD Asyst Tool start screen*

- Click on the 'Next' button to continue or the 'Quit' button to exit the Asyst Tool.

2.2 Disclaimer

Figure 3 shows the disclaimer.

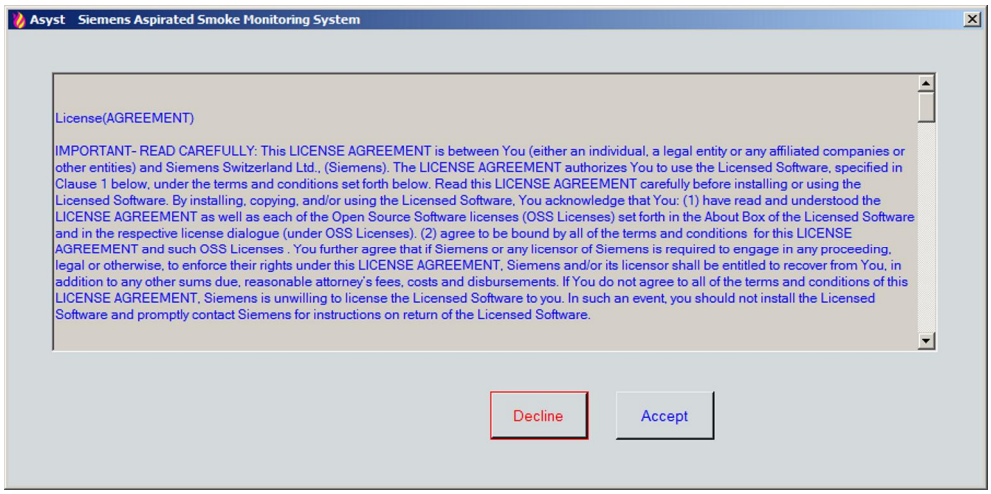

*Figure **3** Disclaimer*

- Read the disclaimer and click on the 'Accept' button to continue or the 'Decline' button to return to the start screen.

2.3 Main Screen – Menu Functions and 'Zone Details' Screen

Figure 4 shows the main screen of the Asyst Tool before creating a project.

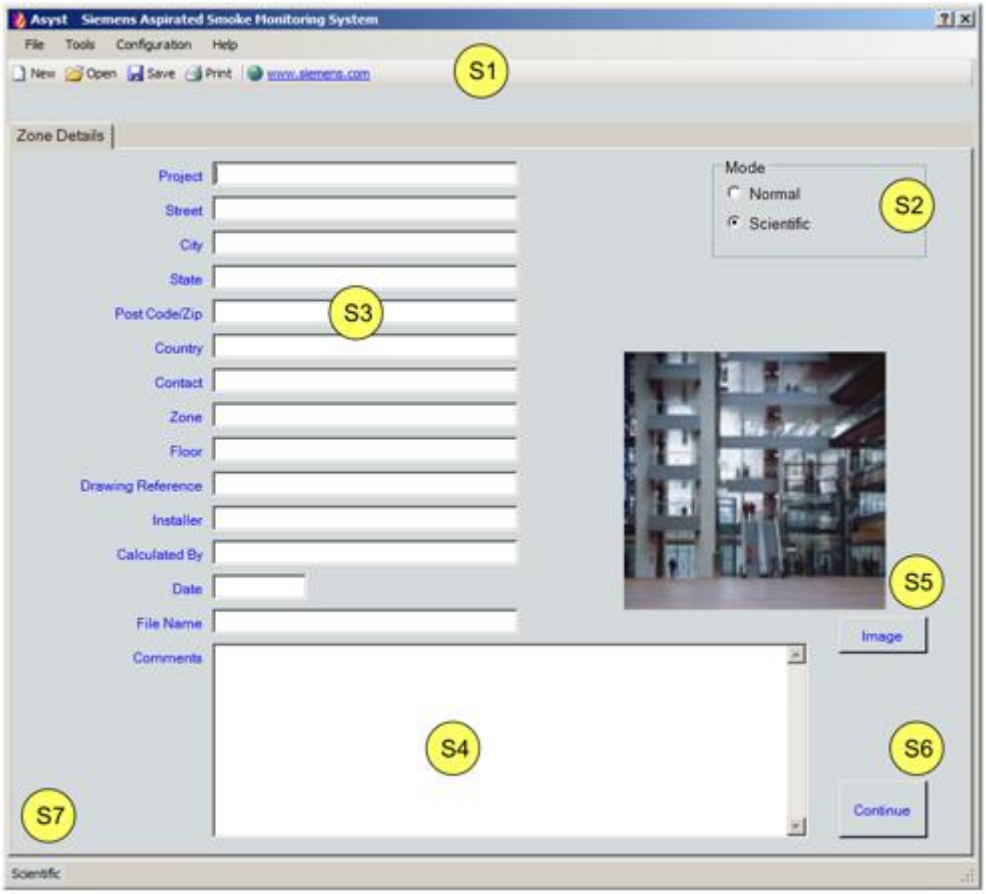

Figure 4 'Zone Details' screen

2.3.1 Menu Functions

Area 'S1' contains the menu functions.

2.3.1.1 File

Under the 'File' menu function ('S1'), it is possible to create new projects, call up stored projects, save an open project at any time, save a previously stored project with a new name, preview a project before printing it, and print the project.

Up to the last five opened projects are listed here; any one of these can be called up with a single click of the mouse.

It is also possible for the Asyst Tool to be shut down here.

2.3.1.2 Tools

Under the 'Tools' menu function ('S1'), it is possible to open legacy projects created by previous versions of the Asyst Tool, set the 'Data Backup Period' for open projects, and select your Internet browser.

2.3.1.3 Configuration

Under the 'Configuration' menu function ('S1'), it is possible to select a language other than the default language English, select the metric or imperial measurement system, and select 'Normal' or 'Scientific' mode.

The hole size precision can be selected to match the settings used by the installers of the project (medium or fine).

Fine precision can only be used in 'Scientific' mode. This sets the hole sizes to steps of 0.2 mm instead of 0.5 mm.

The print format can be set to either the fully configured comprehensive format or the cut-down summary format.

The Hardware Reference File to be used can be selected and the default locations for the storage of specific system and project files can be set.

2.3.1.4 Help

The 'Help' menu function ('S1') provides help information relating to the use of the Asyst Tool or the design of an ASD project. The help information is displayed and can also be printed.

You will find more information on the Asyst Tool under the 'Help' menu function.

2.3.1.5 Icons

The icons 'New', 'Open ', 'Save ', and 'Print ' provide one-click shortcuts to the equivalent file menu functions.

The icon 'www.siemens.com' provides a one-click shortcut to open the Siemens home page.

This icon is not available until a Hardware Reference File has been selected. (See Figure 5.)

Area 'S2' provides a shortcut to the 'Configuration' menu function to select from the cut-down 'Normal' mode or the fully configured 'Scientific' mode.

2.3.2 Zone Details

At 'S3' it is possible to store the details required to define the project. Each aspirated smoke detector and the piping connected to it are treated as a project. This allows each aspirated smoke detector installed at a large site to be individually identified.

The file name of the project can be entered here or can be entered when the project file is first saved.

The file name for an existing project can be changed either here or by using the 'Save As' menu function. This allows multiple similar ASD projects to be loaded easily; for example, a large warehouse containing many fire zones, with each zone protected by one aspirated smoke detector.

At 'S4' it is possible to save many lines of comments. This field could be used to keep a record of changes for a project.

At 'S5' it is possible to load a photograph or some other image representing the project. Any photo or image loaded here is stored in the project file allowing complete portability of the project file either by disk or other storage media, or by email.

Once all of the zone details have been entered, clicking on the 'Forward' button ('S6') allows the Hardware Reference File to be selected. Once this has been selected, the remaining input and result pages are made available for use.

At 'S7', the current operating mode – 'Normal' or 'Scientific' – is displayed.

2.4 Main Screen – 'System Details' Screen (Scientific Mode)

Figure 5 shows the main screen of the Asyst Tool after selecting a Hardware Reference File.

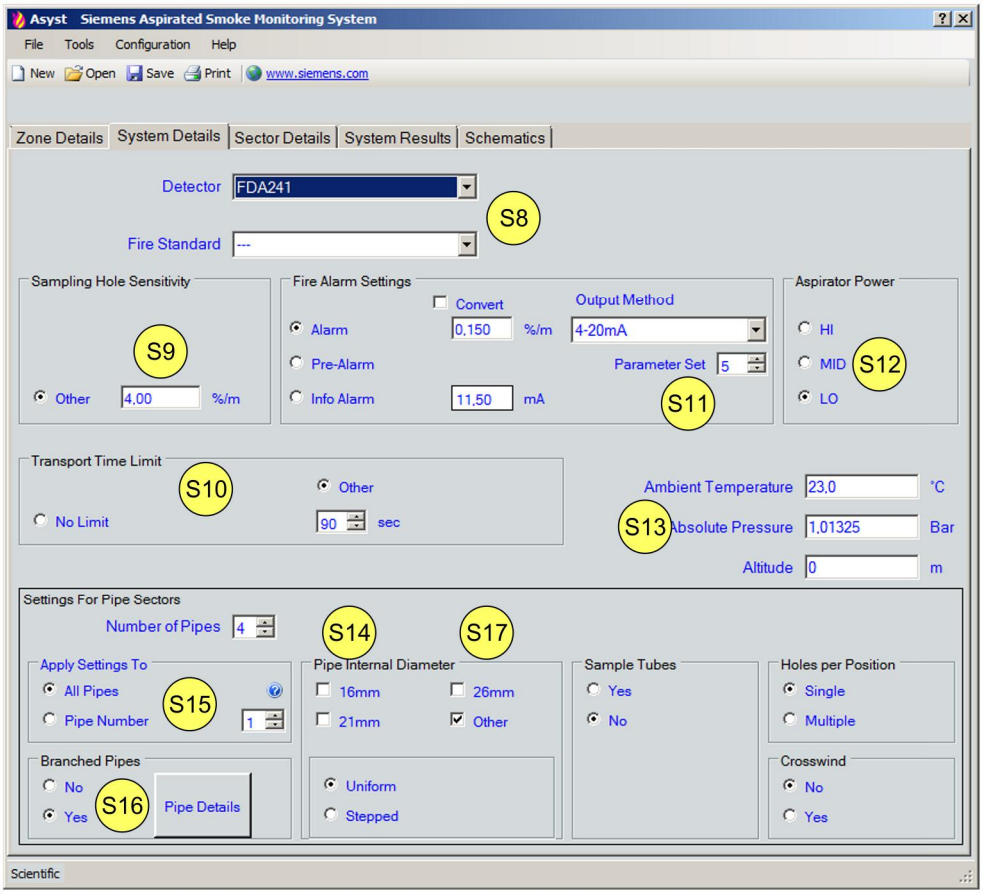

*Figure **5** 'System Details' screen in 'Scientific' mode*

2.4.1 Elements on the 'System Details' Screen (Scientific Mode)

At 'S8', the detector used in the project and the applicable local fire standards can be selected from the drop-down list of available detectors and standards.

At 'S9' the target sampling hole sensitivity as set in the fire standard can be selected or another target can be entered.

At 'S10' the target smoke transport time as set in the fire standard can be selected or another target can be entered.

At 'S11', it is possible to display and or set the fire alarm settings and to select the output method used by the detector to report alarms.

At 'S12', the 'Aspirator Power ' (speed of the detector) is set or displayed. If the detector aspirator has only one setting then this input box is hidden.

Section 'S13' allows other system details to be entered. These include the 'Ambient Temperature', the 'Absolute Pressure'at the installation site and the 'Altitude' of the installation site.

The number of pipes in the project is selected at 'S14'. (Default is '2')

Section 'S17' is used to define the overall design of the pipe-work system. The options available here include:

- The 'Pipe Internal Diameter' of the piping
- Option of reducing pipe diameters in the pipe route
- The use of sample tubes (capillary tubes)
- The type of sample tubes (capillary tubes) - coiled or straight - at each sampling hole position (up to 4 sampling holes around the circumference of the tube)
- Potential crosswind (cross airflow) at each sampling hole position

Input 'S15' allows the same 'S17' options to be applied to all of the pipes in the project or for different 'S17' options to be applied to each pipe in the project.

Input 'S16' is used to identify that the project uses branched pipe-work. If you select the 'Yes' option, the Asyst Tool displays the screen for entering the pipe branches.

2.4.2 Specific System Inputs

The items that may be selected and the values that may be entered often depend on the mode of operation, specific detector and fire standard selected.

2.4.2.1 Sampling Hole Sensitivity

Fire standards set targets for the smoke concentration at and around a single sampling hole that will trigger an alarm.

Once this smoke has been drawn into the ASD pipe work and diluted with fresh air drawn into the pipe work at all of the other sampling holes, the smoke concentration is lower. This lower concentration becomes the fire alarm sensitivity setting at which the aspirated smoke detector will activate an alarm.

Select to comply with the fire standard targets or enter your own target for the smoke concentration at the sampling hole.

Example:

European standard EN 54-20 refers to the sensitivity levels of an aspirated smoke detector as: Class A, Class B, and Class C

Class	Description	Example
A	Aspirated smoke detector with very high sensitivity	Very early detection: to be able to detect very diluted smoke as found in air-conditioning ducts, or environmentally controlled areas such as clean rooms
B	Aspirated smoke detector with enhanced sensitivity	Early detection: to be able to detect special fire conditions, nearby or close to valuable and critical equipment such as computers or electronic cabinets
C	Aspirated smoke detector with normal sensitivity	Standard detection: to be able to detect general fires in standard rooms or spaces. Offers at least an equivalent level of detection as a point-type or beam-type detection system

The different levels of sensitivity can be set using the Asyst Tool.

Class A

Set the Fire alarm setting to 1.5 %/m

To reach the Class A level, all the hole sensitivities must be 1.5 %/m or less.

Class B

Set the Fire alarm level to 4.5 %m

To reach the Class B level, all the hole sensitivities must be 4.5 %/m or less.

Class C

Set the Fire alarm level to 10.0 %m

To reach the Class C level, all the hole sensitivities must be 10.0 %/m or less.

2.4.2.2 Alarm Settings

This section allows you to set the alarm values to be used in the detector or display the optimum values calculated by the Asyst Tool.

Generally the alarm actions will be defined in your fire detection system protocol or specification. The Asyst Tool allows you to examine and work with three alarm levels called 'Alarm', 'Pre-Alarm', and 'Info Alarm'. It is outside of the scope of this document to define how these alarm levels are used by a fire safety system.

2.4.2.3 Alarm

Select the 'Alarm' option to view or set the sensitivity value at which the detector will activate an alarm output.

2.4.2.4 Pre-alarm

Select the 'Pre-Alarm' option to view or set the sensitivity value at which the detector will activate a pre-alarm output.

2.4.2.5 Info Alarm

Select the 'Info Alarm' option to view or set the sensitivity value at which the detector will activate an alert output.

2.4.2.6 External Filtration

Not available in this software version.

2.4.2.7 External Aspiration

Not available in this software version.

2.4.2.8 Output Method

If your detector is fitted with a 4…20 mA output for use on peripheral equipment, the equivalent value will be displayed here.

2.4.2.9 Parameter Set

Parameter sets are used to define a range of sensitivity levels for activating an alarm.

2.4.2.10 Aspirator Power

The aspirator power setting of the detector can be changed. The setting affects the response time and can be selected manually. If 'Propose Solution' is selected on the 'Sector Details' screen, a value will be set automatically.

Higher settings result in shorter response times while lower settings are more energy efficient.

2.4.2.11 Transport Time Limit

Select whether this should comply with the fire standard limit values, or enter different values.

If no limit is selected, the Asyst Tool will still calculate and report the transport time but will not report if that time exceeds the value.

2.4.2.12 Ambient temperature

Enter the typical value for the ambient temperature around the aspirated smoke detector and the piping connected to it.

2.4.2.13 Absolute Pressure

Enter the typical absolute pressure at the installation site. The Asyst Tool will then calculate and display the altitude of the installation site. If you are unsure of the 'Absolute Pressure', enter the 'Altitude' in the next input box.

2.4.2.14 Altitude

Once you enter an altitude value, the Asyst Tool calculates the absolute 'Absolute Pressure'.

2.4.2.15 Pipe Internal Diameter

The internal diameter of the pipe must be known so that air velocities can be calculated. The external diameter is not significant, except from the perspective of load intensity.

Select from one of the standard values or enter the internal diameter of the pipe.

2.4.2.16 Bend Radius

Enter the bend radius used in the piping at the middle of the pipes. When operating in 'Normal' mode, the Asyst Tool assumes that all bends along the piping have the same radius.

Large bend radii do not affect the airflow or the transport time as much as small bend radii.

2.4.3 Branched Pipe Details Screen

Figures 6 and 7 show the input screens for branched pipes.

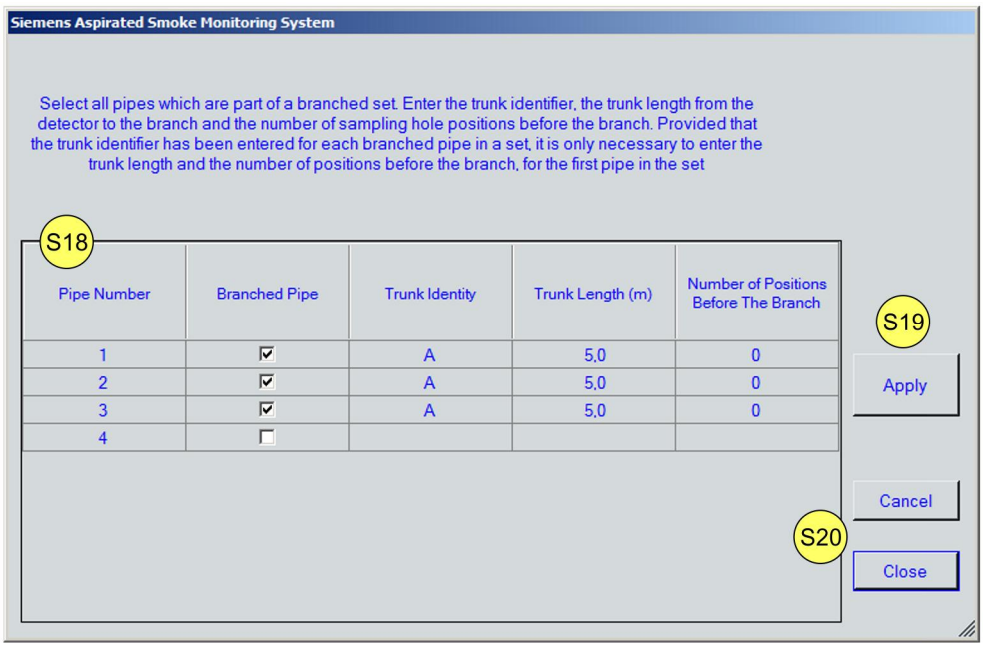

*Figure **6** Input screen for branched pipes, **option 1***

Option 1

The table at 'S18' allows the details of the branched pipes to be entered.

In this example, the project contains four pipes. Pipes 1, 2, and 3 all join onto one trunk and are identified as 'Trunk Identity A'. The length of this trunk is 5 m.

Pipe 4 is a single pipe, not part of a branched set of pipes.

Once you click on the **'Apply'** button ('S19'), the Asyst Tool checks the entered values and warns if the trunk lengths and number of sampling hole positions conflict with the values entered for each pipe on the 'Sector Details' screen.

Clicking on the **'Cancel'** button ('S20') clears the entered data, returning it to the previous values; clicking on the **'Close'** button ('S20') takes you back to the main screen.

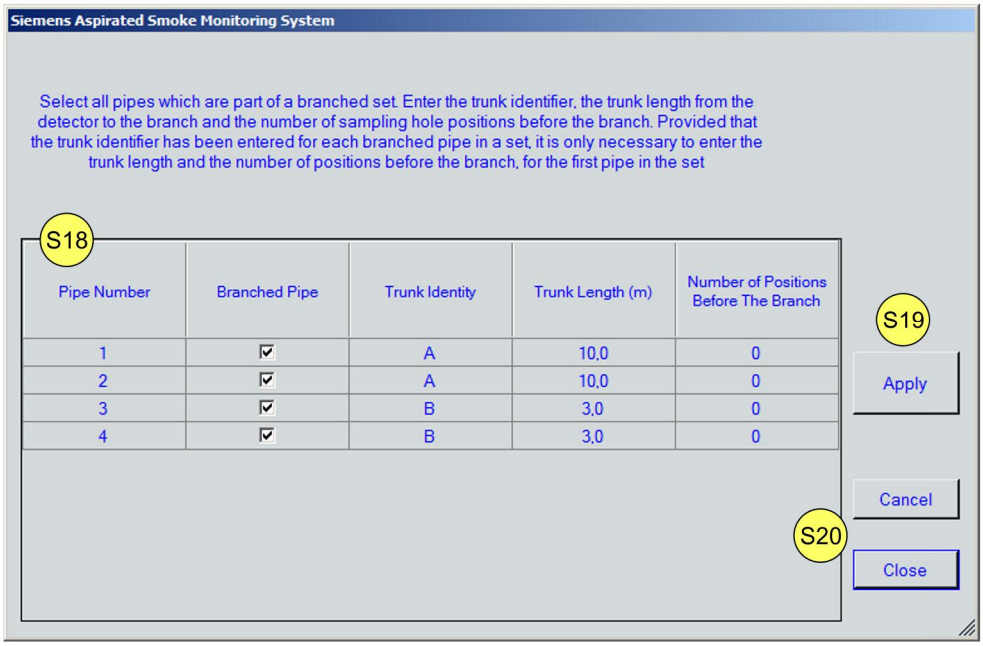

*Figure 7 Input screen for branched pipes, **option 2***

Option 2

The table at 'S18' allows the details of the branched pipes to be entered.

In this example, the project contains four pipes. Pipes 1 and 2 join onto one trunk and are identified as 'Trunk Identity A'. The length of this trunk is 10 m.

Pipes 3 and 4 are identified as 'Trunk Identity B'. The length of this trunk is 3 m.

Once you click on the **'Apply'** button ('S19'), the Asyst Tool checks the entered values and warns if the trunk lengths and number of sampling hole positions conflict with the values entered for each pipe on the 'Sector Details' screen.

Clicking on the **'Cancel'** button ('S20') clears the entered data, returning it to the previous values; clicking on the **'Close'** button ('S20') takes you back to the main screen.

2.4.3.1 Pipe Number

The 'Pipe Number' displayed identifies the pipe and is used in all displays and sections of the Asyst Tool software.

2.4.3.2 'Branched Pipe' Checkbox

Select which pipes are parts of a branched set of pipes and which pipes are single pipes, by checking or un-checking the box in column two of the table.

2.4.3.3 Trunk Identity

The Asyst Tool needs to know which pipes make up each branched pipe set; it does this by allocating the letter 'A' to the first set, 'B' to the second, and so on.

Enter a letter beside the branched pipes to identify which set they belong to; do not enter a letter against single pipes.

2.4.3.4 Trunk Length

Enter the length of single pipe measured from the detector to the junction of the branched pipes. For simplicity, it only needs to be entered for the first pipe in each branched set.

2.4.3.5 Number of Positions Before The Branch

Enter the number of sampling hole positions in the trunk of the pipe. This is the number of positions in the pipe between the detector and the junction of the branched pipes.

In 'Normal' mode, sampling hole positions are not allowed in the trunk of a branched pipe set; consequently, this input is not shown when using 'Normal' mode.

2.4.3.6 Schematics for Branched Pipes

Figure 8 shows an example of 'Schematics' for branched pipes.

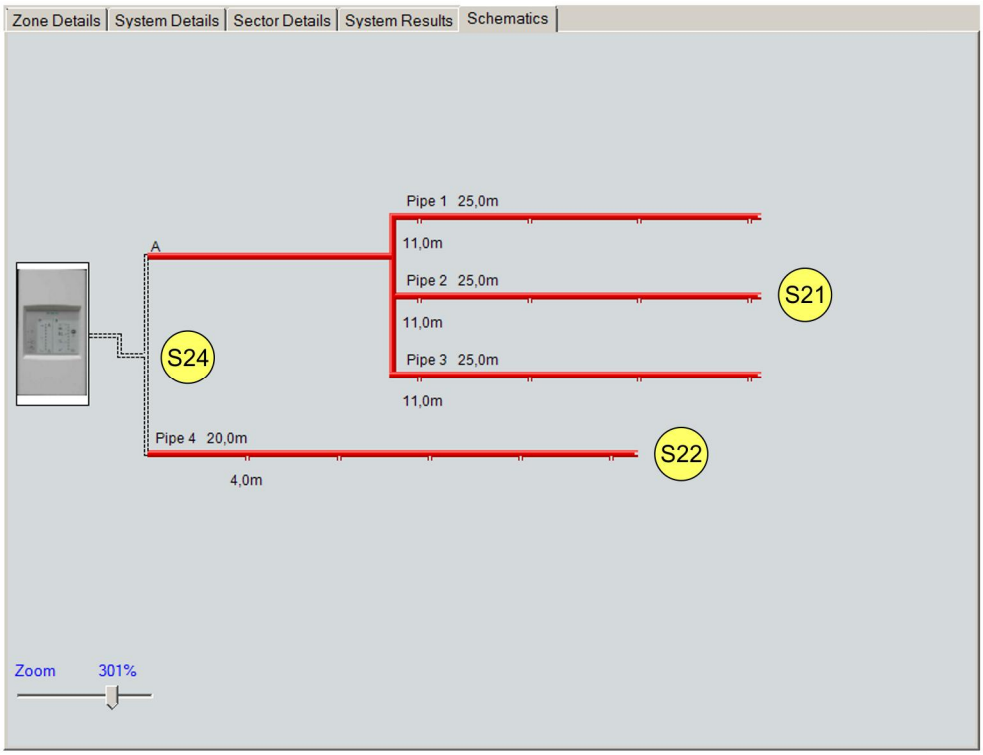

*Figure **8** 'Schematics' screen showing branched pipes with a trunk*

The 'Schematics' screen is a schematic only and is not drawn to scale.

'S21' shows trunk 'A' and pipes 1, 2 and 3.

'S22' shows pipe 4.

The first sampling hole position on each trunk and on the single pipes is shown, as is the length of each pipe including the trunk.

'S24' represents the manner in which the pipes are joined to the detector purely for this schematic.

Figure 9 shows an example of 'Schematics' for branched pipes.

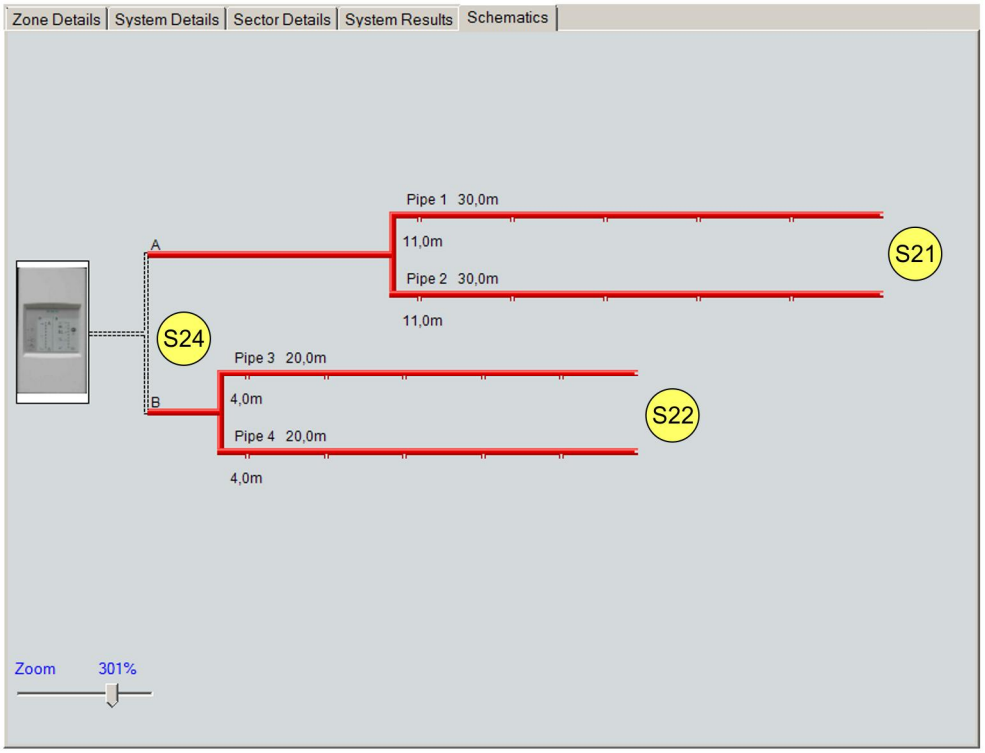

Figure 9 'Schematics' screen showing branched pipes with two trunks

The 'Schematics' screen is a schematic only and is not drawn to scale.

'S21' shows trunk 'A' and pipes 1 and 2.

'S22' shows trunk 'B' and pipes 3 and 4.

The first sampling hole position on each trunk and on the single pipes is shown, as is the length of each pipe including the trunk.

'S24' represents the manner in which the pipes are joined to the detector purely for this schematic.

2.5 'Sector Details' Screen (Scientific Mode)

Figure 10 shows the 'Sector Details' screen when 'Scientific' mode is selected.

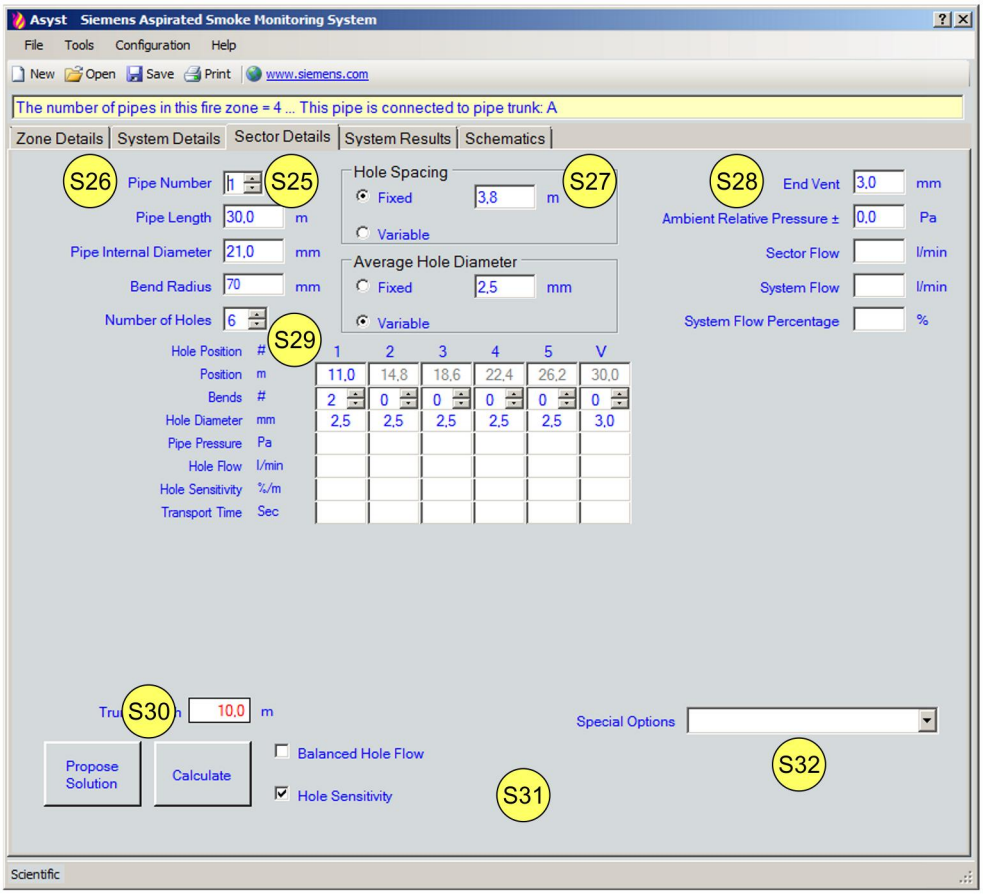

*Figure **10** 'Sector Details' screen in 'Scientific' mode*

This screen is used to enter the details of each sector (pipe) in the fire zone and then calculate the airflow through the pipes and sampling holes.

2.5.1 Elements on the 'Sector Details' Screen (Scientific Mode)

At 'S25' it is possible to select which pipe to edit or which pipe to view. The pipes are numbered 1…4, allowing each pipe to be uniquely identified.

The basic details of the pipe are entered at 'S26'. These include the 'Pipe Length', 'Pipe Internal Diameter' if it is not a preset fixed pipe size, the 'Bend Radius' of the pipe, and the 'Number of Holes', 'Hole Position', 'Position', and 'Bends' of the pipe.

At 'S27' select the spacing along the pipe between sampling hole positions ('Hole Spacing') and the diameter of the sampling holes ('Average Hole Diameter').

If the spacing between the sampling holes is the same throughout, the spacing can be entered at 'S27' with 'Fixed' selected. If the spacing between the sampling holes varies, 'Variable' can be selected and the individual spacing details entered under 'S29'. If you select 'gaps ', you can enter the spacing between adjacent sampling holes.

If the hole diameters are fixed then the value can be entered at 'S27': If the values vary from position to position, selecting the relevant option allows the diameters to be entered at 'S29'.

If you need to optimize the airflow share calculation by changing the 'End Vent' hole size, you can do this at 'S28'.

For further accuracy regarding transport time, the 'Ambient Relative Pressure' could also be entered at S28. If the 'Ambient Relative Pressure' is not known, leave it at the default value '0.0'.

There is no need to enter anything at 'Sector Flow', 'System Flow', or 'System Flow Percentage', as the Asyst Tool calculates these values.

Section 'S29' can be used to enter the details specific to each sampling hole position. These include:

- The 'Hole Position'
- The spacing between holes 'Position'
- The number of 'Bends' in the pipe section preceding this position

In addition to the input fields shown in Figure 10, the fields for the following options are shown based on the pipe settings made on the 'System Details' screen and at the top of the 'Sector Details' screen:

- Diameter of the sampling holes
- Pipe internal diameter
- Internal diameter and length of the sample tube
- Coil radius of the sample tube
- Number of holes at each sampling position
- Crosswind

A help prompt or information is displayed for most of these input fields. Hold the cursor on the input field to view the help message.

2.5.1.1 Pipe length

The length of a pipe is measured from the detector enclosure inlet port, to the far end of the pipe, where the end vent is located. For simplicity, the pipe is measured according to a square layout because any reduction in the actual length of line due to the presence of bends is accounted for in the Asyst Tool.

2.5.1.2 Pipe Internal Diameter

Enter the internal diameter of the pipe. If the internal diameter reduces along the pipe, enter the internal diameter at the detector. The remaining diameters can be set in the 'S29' area.

2.5.1.3 Bend Radius

Enter the bend radius used in the pipe-work. When operating in 'Scientific' mode, the Asyst Tool assumes that all bends along a pipe have the same radius.

Large bend radii do not affect the airflow or the transport time as much as small bend radii.

2.5.1.4 Number of Holes (Sampling Position)

Select the number of sampling holes along the pipe.

If the 'Hole Spacing' is set to 'Fixed', the Asyst Tool will distribute the sampling hole positions evenly. If the number of sampling holes changes, the sampling hole positions are redistributed with the exception of the first sampling hole position.

If the 'Hole Spacing' is set to 'Variable', then the Asyst Tool will ask you to select which sampling hole position is to be added or removed in the event that the 'Number of Holes' is changed.

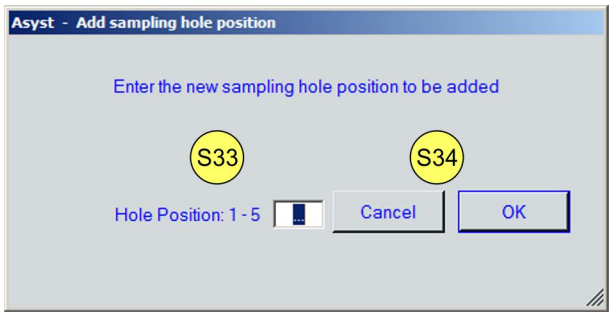

*Figure **11** 'Add sampling hole position' screen*

At 'S33' enter the number of the hole position to be added or to be removed. If a position is added, the Asyst Tool spaces it midway between the adjoining sampling hole positions. If a position is removed, the Asyst Tool adds together the adjoining spaces.

To accept the change, click on the 'OK' button; to cancel the change, click on the 'Cancel' button ('S34').

2.5.1.5 Hole Spacing

If the spacing between every sampling hole position is constant along a pipe, then select the 'Fixed' option under 'Hole Spacing' and enter the spacing value.

If the spacing varies, then select the 'Variable' option under 'Hole Spacing'. This allows you the enter the distances between the holes.

Place the cursor over the value in the 'Position m' row for the appropriate hole and type in the new value which is the distance to the next hole. This field displays the average spacing.

2.5.1.6 Average Hole Diameter

If all of the sampling holes along a pipe are the same diameter, then select the 'Fixed' option and enter the diameter.

If the sampling holes do not have the same diameter at every sampling hole position, then select the 'Variable' option and enter the diameter for each position at 'S29'. In this case, the average hole diameter will be displayed in this box.

2.5.1.7 End Vent

Typically the end vent is larger than other sampling holes, so that a strong airflow comes from the end of the pipe. Otherwise, for a long pipe the smoke transport time could be very slow indeed. However, too large a vent would impair the good balance and share of airflow among sampling holes.

Enter the diameter of the end vent.

2.5.1.8 Ambient Relative Pressure

In computer rooms or other mechanically ventilated areas, it is possible for individual pipes to be located in areas where the ambient atmospheric pressure is higher or lower than the pressure at the outlet of the aspirator.

The ambient pressure differential relevant to each pipe can be entered. It is unusual for pressure differentials to exceed 25 pascals (Pa) - at this pressure, doors become difficult either to open or to close, or ceiling tiles may lift.

2.5.2 Hole Input Details

The following items can be input, based on the settings selected for the pipe on the 'System Details' screen and at the top of the 'Sector Details' screen.

2.5.2.1 Position or Spacing of the Sampling Hole

Enter either the distance of the sampling hole position from the detector or, if the 'Position m' option has been selected, enter the distance from the previous sampling hole position to this position.

2.5.2.2 Bends

Enter the number of bends 'Bends #' for each sampling hole position in this section of pipe. Specify the number of bends between the detector and the first sampling hole position at 'Hole Position # 1'. For the other positions, specify the number of bends between the previous sampling hole position and this sampling hole position.

2.5.2.3 Pipe Internal Diameter

This option is normally not used. If the 'Stepped' pipe diameter option is selected in cases involving very long pipes, it is possible to enter the internal diameter of the section of pipe immediately preceding this sampling hole position.

It is possible to reduce the internal diameter of the sample tube as you move further away from the detector. This will improve the transport time, but possibly at the expense of sampling hole airflow share and balance.

2.5.2.4 Capillary Tube Internal Diameter

If capillary tubes are used, their internal diameter must be entered so that the air velocities can be calculated. If short, rigid sample tube droppers are used, these should be treated as capillary tubes and their lengths as well as sampling hole size entered.

If multiple sampling holes exist at a sampling hole position with sample tubes, the Asyst Tool assumes that all of those tubes at that position are identical in diameter.

2.5.2.5 Capillary Tube Length

The length of capillary tube(s) or dropper(s) used at a given position can be entered. (Maximum length of capillary tubes: 2 m).

If multiple sampling holes exist at a sampling hole position with sample tubes, the Asyst Tool assumes that all of those tubes at that position are identical in diameter.

2.5.2.6 'Capillary Tube Coil Diameter'

Capillaries are often coiled or curved, so the coil diameter can be entered.

If multiple sampling holes exist at a sampling hole position with sample tubes, the Asyst Tool assumes that all of those tubes at that position are identical in coil diameter.

2.5.2.7 Aspirating holes

The number of holes (sampling points) at each position can be set from 0 to 4.

Generally, one sampling hole is used. However, the pipe may be run above a corridor, with capillary tubes directed toward opposite rooms, requiring two sampling points at each location. Or the pipe may be run above a wall, with one tube directed toward each of four adjacent rooms at the cross-point.

'0' sampling holes can be used to simulate a blocked sampling hole.

If multiple sampling holes are used without capillary tubes, then the Asyst Tool assumes that all of these sampling holes are sampling air from the same source and adds together their effect.

2.5.2.8 Crosswind

This option is rarely used as the sampling holes are normally positioned 30 degrees off-center in relation to the oncoming airflow.

However, if the sampling hole is placed at 90 degrees to the airflow then with this option it is possible to see the effect of the crosswind.

Enter the crosswind velocity at each sampling hole to see the effect of external flows such as mechanical ventilation. The Asyst Tool is configured to calculate based on the worst-case scenario (90 degrees in relation to pipe and hole).

2.5.3 'Calculate' Button

If you click on the 'Calculate' button ('S30'), the Asyst Tool calculates the airflow through each of the sampling holes and the end vent along the pipe.

The Asyst Tool then displays the results of the calculation at 'S29' for each sampling hole position and at 'S33' for the pipe, and displays the sector airflow at 'S28'.

The pipe results are also displayed on the 'System Results' screen.

If the entered values prevent a valid calculation, the Asyst Tool displays a warning.

Changing the checkboxes at 'S31' alters either the calculation performed or the displayed result. If you select the 'Balanced Hole Flow' option, the Asyst Tool calculates and displays the hole diameters necessary to balance the flow of air and smoke through each sampling hole. If you deselect this option, the Asyst Tool reverts to the previous hole diameters.

If you select the 'Hole Sensitivity' option, the Asyst Tool displays the quantity of smoke required at each sampling hole to activate a fire alarm. If you deselect this option, the Asyst Tool displays the percentage airflow through each sampling hole.

The drop-down list of 'Special Options' at 'S32' allows additional or different information to be displayed following a calculation.

2.5.4 'Propose Solution' Button

In 'Scientific' mode, the 'Propose Solution' button is only available when the 'Hole Size Precision' has been set to medium.

If you click on the 'Propose Solution' button ('S30'), the Asyst Tool calculates the airflow through each of the sampling holes and the end vent along the pipe in the project. The Asyst Tool uses all of the entered values about each pipe and each sampling hole in those pipes, rather than the actual sampling hole diameters and the end vent diameters.

Following the calculations, the Asyst Tool displays the most suitable combination of sampling hole and end vent sizes for each pipe. It shows the values for the current pipe on the 'Sector Details' screen and for all of the pipes on the 'System Results' screen.

If the entered values prevent a valid calculation, the Asyst Tool displays a warning.

2.5.5 Displaying Results (Scientific Mode)

In 'Scientific' mode, the results for each sampling hole position are displayed on the 'Sector Details' screen.

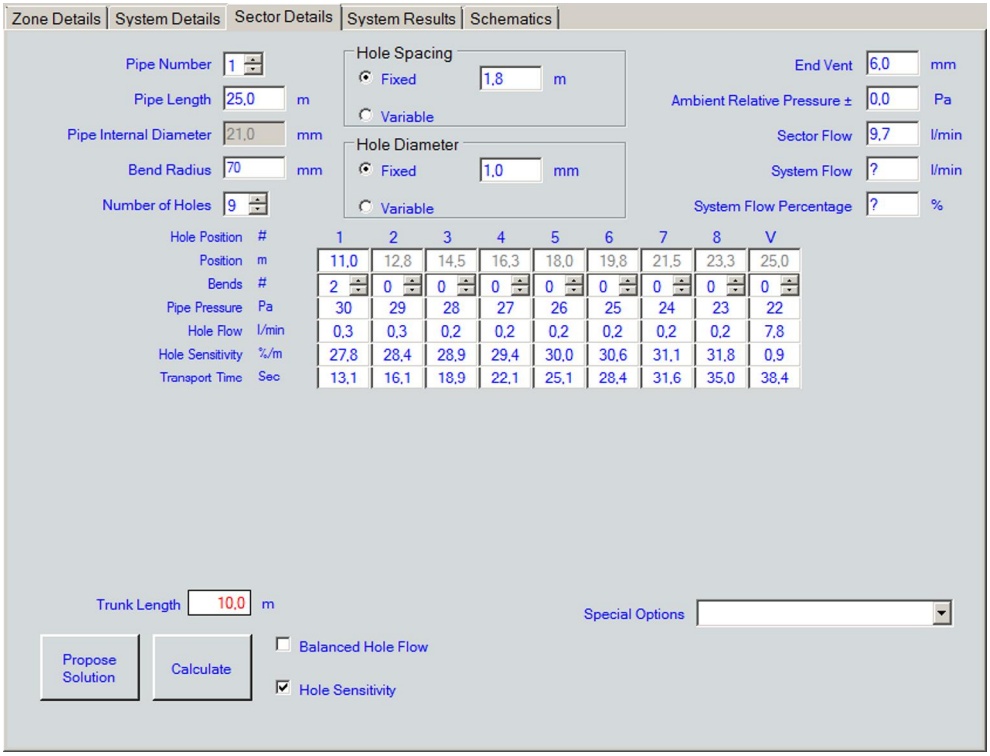

*Figure **12** 'Sector Details' screen displaying results*

In addition to the usual results, additional calculated values can be displayed for the pipe calculations or for the sampling tube calculations. In 'Scientific' mode, the additional results are displayed on the 'System Results' screen.

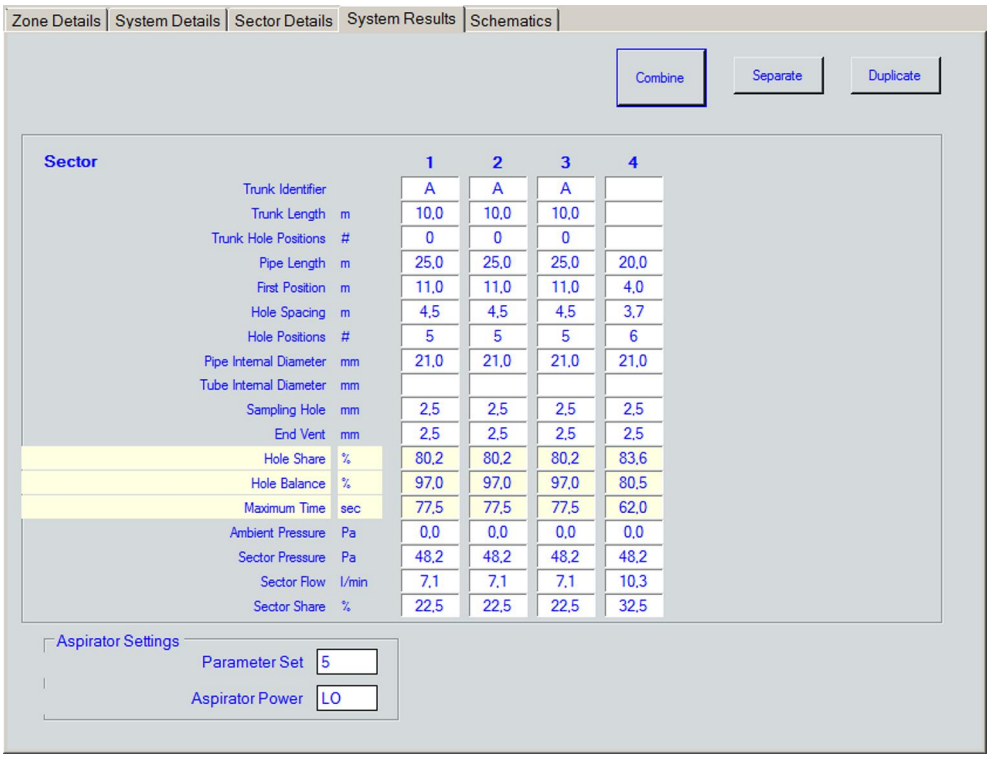

*Figure **13** 'System Results' screen*

2.5.5.1 Pipe Pressure

This is the air pressure within the pipe at that sampling hole position.

2.5.5.2 Hole Flow [l/min]

This is the airflow through the sampling hole(s) at that sampling position.

If multiple sampling holes are drilled into the pipe at a sampling position and that sampling position does not have sample tubes fitted, the Asyst Tool displays the sum of the flow though all of those sampling holes.

If sample tubes are fitted, the Asyst Tool assumes that each tube is sampling air from a different environment and displays the flow through each sampling hole.

2.5.5.3 Hole Flow [%]

This is the hole airflow expressed as a percentage of the total airflow through the pipe.

2.5.5.4 Hole Sensitivity

This is the level of smoke at a sampling hole that will trigger the fire alarm at the detector.

2.5.5.5 Transport Time

This is the time taken for smoke to travel from the sampling hole through any sampling tube at that sampling hole and the pipe to the detector.

If the calculations in 'Normal' mode are outside the recommendations displayed, a message will be displayed as shown in Figure 14.

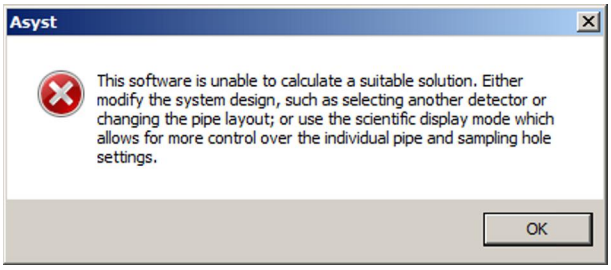

*Figure **14** 'Normal' mode: Message relating to calculations outside the recommendations*

If the calculations in 'Scientific' mode are outside the recommended transport time, this time is displayed in RED, as shown in Figure 15.

When the results are highlighted in RED, these are NOT the recommended results and the configuration needs to be recalculated using fewer holes or shorter pipe lengths!

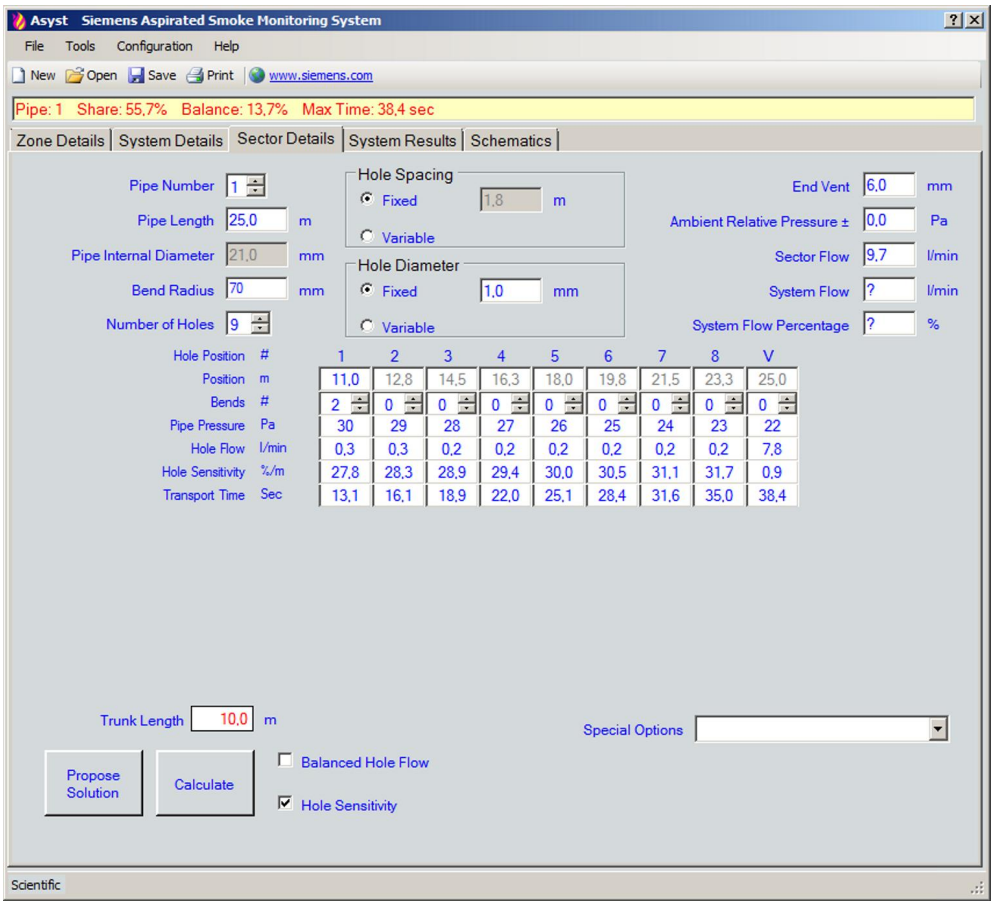

*Figure **15** 'Scientific' mode: Display of results outside the recommendations*

Advanced users can display extra information (see Figure 10); this is described in sections 2.5.5.6 to 2.5.5.15. This information is shown when the relevant function is selected from the 'Special Options' drop-down list (e.g., 'Pipe Details').

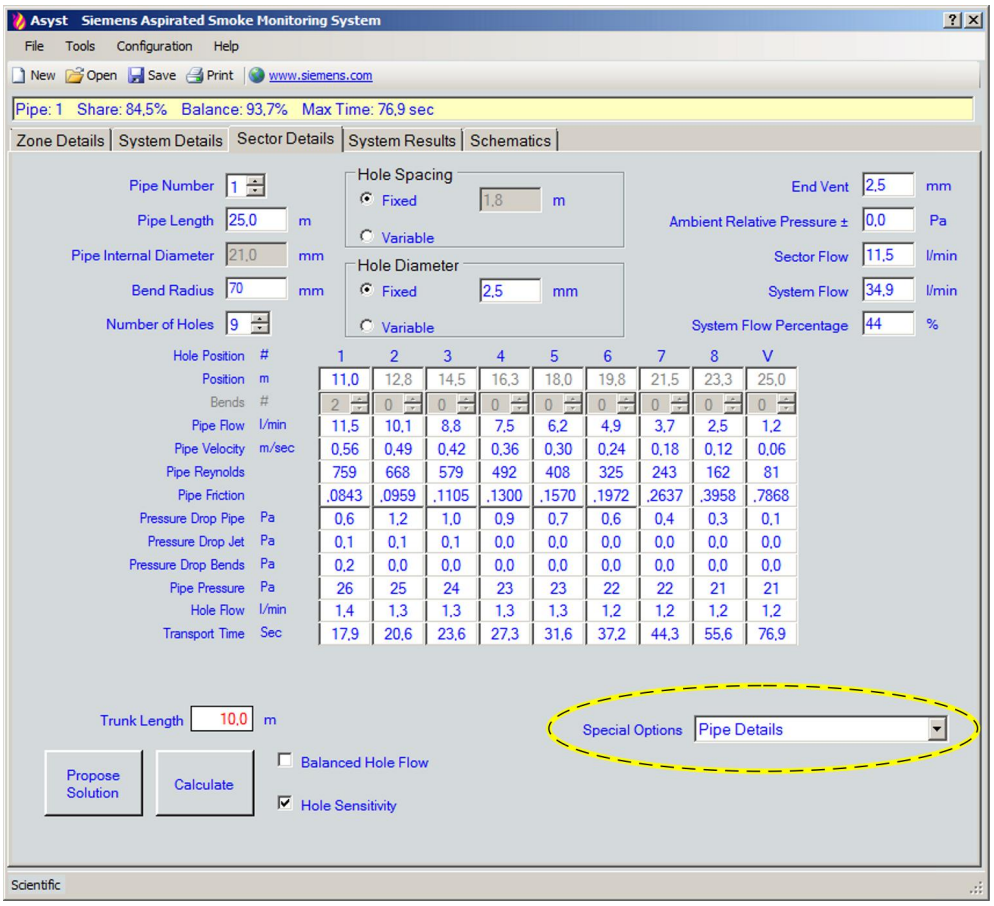

*Figure **16** 'Scientific' mode: Extra information with 'Pipe Details' option*

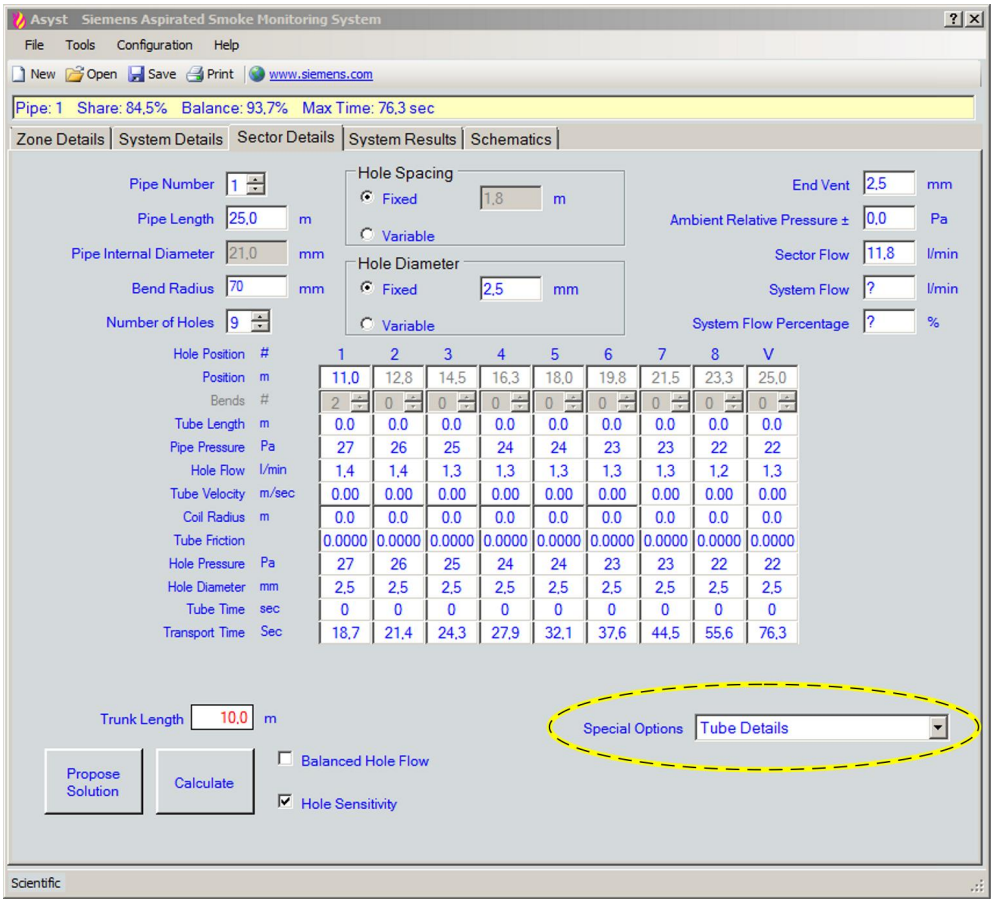

Figure 17 'Scientific' mode: Extra information with 'Tube Details' option

2.5.5.6 Pipe Flow

This is the flow rate of the air within the pipe at the sampling hole position.

2.5.5.7 Pipe Velocity

This is the velocity of the airflow within the pipe at the sampling hole position.

2.5.5.8 Pipe Reynolds

This is the friction value of the air flowing within the pipe at the sampling hole position.

2.5.5.9 Pressure Drop Pipe

This is the pressure drop due to the airflow within the pipe section prior to the sampling hole position.

2.5.5.10 Pressure Drop Jet

This is the pressure drop due to the airflow through the sampling hole at the sampling hole position.

2.5.5.11 Pressure Drop Bends

This is the pressure drop due to the airflow through the bends in the pipe section prior to the sampling hole position.

2.5.5.12 Tube Velocity

This is the velocity of the airflow within the sampling tube at the sampling hole position.

2.5.5.13 Tube Friction

This is the friction value of the air flowing within the sampling tube at the sampling hole position.

2.5.5.14 Hole Pressure

This is the air pressure across the sampling hole.

2.5.5.15 Tube Time

This is the transport time for smoke to travel from the sampling orifice at the end of the sampling tube to the pipe at the sampling hole position.

2.5.5.16 Hole Share

The 'Hole Share' is a measure of the airflow through all the sample tubes in a pipe (excluding the end vent), compared with the total airflow in that pipe. Generally, the higher the result, the better the system design, but this comes at the expense of an increase in the transport time.

2.5.5.17 Hole Balance

'Hole Balance' is a measure of the airflow through the sampling hole with the lowest flow in a pipe, compared with the average airflow through all sampling holes in that pipe (excluding the end vent). Generally, the higher the result, the better the system design.

2.5.5.18 Maximum Time

This is the longest time taken for smoke to travel from a sampling hole to the detector.

2.5.5.19 Sector Flow

This is the airflow at the detector end through the current sector (pipe).

When a pipe is calculated, this is the flow in that pipe assuming that all other pipes in the project are identical to this pipe. Once the combined system has been calculated allowing for each of the different pipes in the project, this value is updated.

2.5.5.20 System Flow

This is the airflow through the detector aspirator from all of the pipes connected to the detector.

2.5.5.21 System Flow Percentage

This is the share of 'System Flow' (see 2.5.5.20), expressed as a percentage. If the flow share is greater than 80 % of the maximum airflow allowed for the detector, then the result is colored red.

2.6 'Sector Details' Screen (Normal Mode)

Figure 18 shows the 'Sector Details' screen when 'Normal' mode is selected.

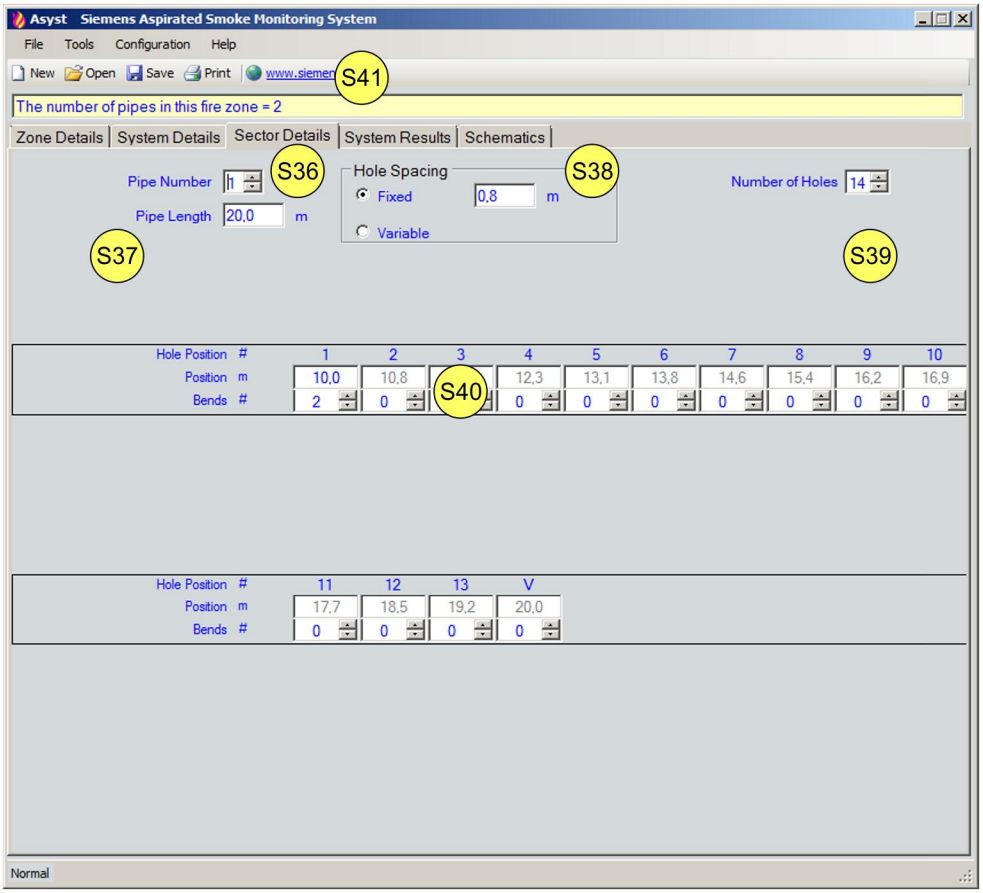

*Figure **18** 'Sector Details' screen in 'Normal' mode*

This screen is used to enter the details of each sector (pipe) in the fire zone.

At 'S36' it is possible to select which pipe to edit or which pipe to view. The pipes are numbered 1…4, allowing each pipe to be uniquely identified.

The pipe length is entered at 'S37' and the number of sampling hole positions in the pipe at 'S39'.

If the spacing between holes is uniform then it may be entered at 'S38'; if it is variable, selecting that option allows the individual positions or gaps between positions to be entered at 'S40'. If the positions are to be entered as gaps or distances between sampling hole positions, then check the box at 'S38'.

Section 'S40' can be used to enter the details specific to each sampling hole position. This includes the sampling hole position or gap between holes and the number of bends in the pipe section preceding this position.

In addition to these basic input fields, the fields for the following options are shown based on the pipe settings made on the 'System Details' screen:

- Internal diameter and length of the sample tubes
- Number of holes at each sampling position

A help prompt or information is displayed at 'S41' for most of these input fields.

Refer to Section 2.5 for the details of the values to be entered.

In 'Normal' mode, it is not possible to enter the coil radius of capillary tubes, crosswind values, or ambient relative pressure.

2.7 'System Results' Screen (Scientific Mode)

Figure 19 shows the 'System Results' screen when 'Scientific' mode is selected.

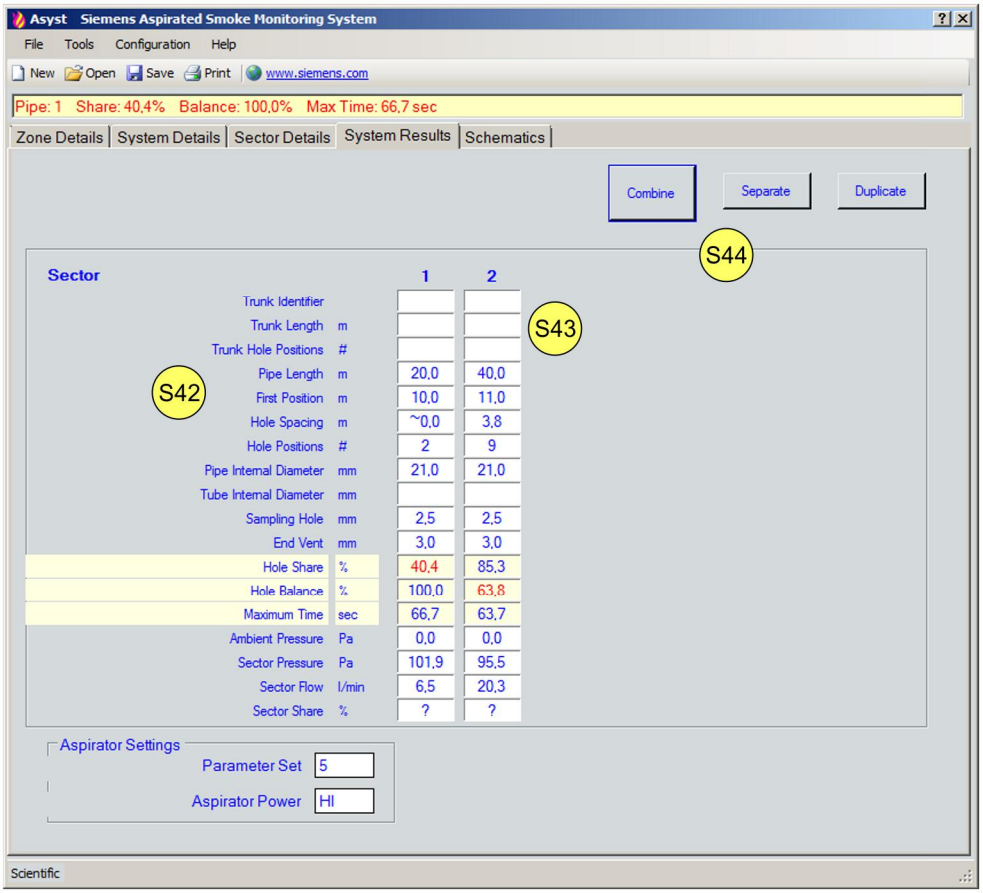

*Figure **19** 'System Results' screen in 'Scientific' mode*

Before this screen is used in 'Scientific' mode, the 'Sector Details' screen is used to optimize the results for the various pipes.

This screen is used to display the summary results of each sector (pipe) in the fire zone and to combine the airflow through those pipes to calculate the airflow through the entire system.

2.7.1 Elements on the 'System Results' Screen (Scientific Mode)

At 'S42' the summary results for each pipe are shown. Depending on the number of pipes in the project a column is added to the table at 'S43'.

The tilde symbol (~) denotes an average value where stepped sizes have been used.

The Asyst Tool cannot know the parameters of other pipes before their data has been entered. Thus, when a result for a given pipe is calculated on the 'Sector Details' screen, the Asyst Tool assumes that all pipes are identical for the time being.

2.7.2 'Duplicate' Button

If two pipes are identical, then click on the 'Duplicate' button at section 'S44' and follow the prompts to copy the details of one pipe to another pipe. Only pipes that have been calculated can be copied or duplicated.

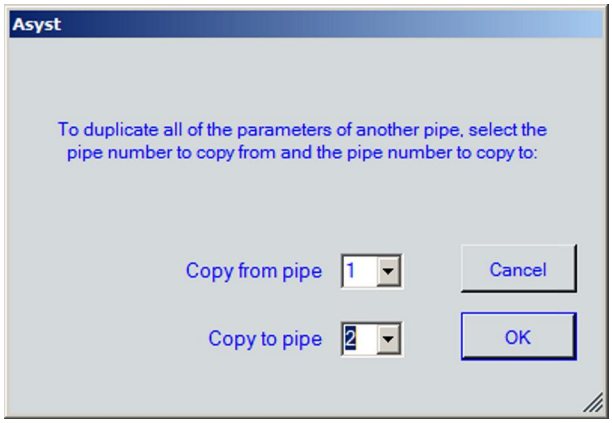

*Figure **20** Duplicate pipe screen*

At section 'S45' select the pipe to copy from; this includes a drop down list of all of the calculated pipes. Then select a pipe as a destination for the duplicate. Pipes that have not yet been calculated can be selected from a drop-down list.

If all of the pipes have been calculated then following a prompt, all of the pipes will be available to copy from and the copy to list will include all of the remaining calculated pipes.

To accept the change, click on the 'OK' button; to cancel the change, click on the 'Cancel' button ('S46').

2.7.3 'Combine' Button

Once all of the pipes in a project have been calculated, then click on the 'Combine' button ('S44') to combine the system as a whole, based on the different individual pipes actually specified.

Click on the 'Separate' button to return all the pipes to their pre-combined state.

2.8 'System Results' Screen (Normal Mode)

Figure 21 shows the 'System Results' screen when 'Normal' mode is selected.

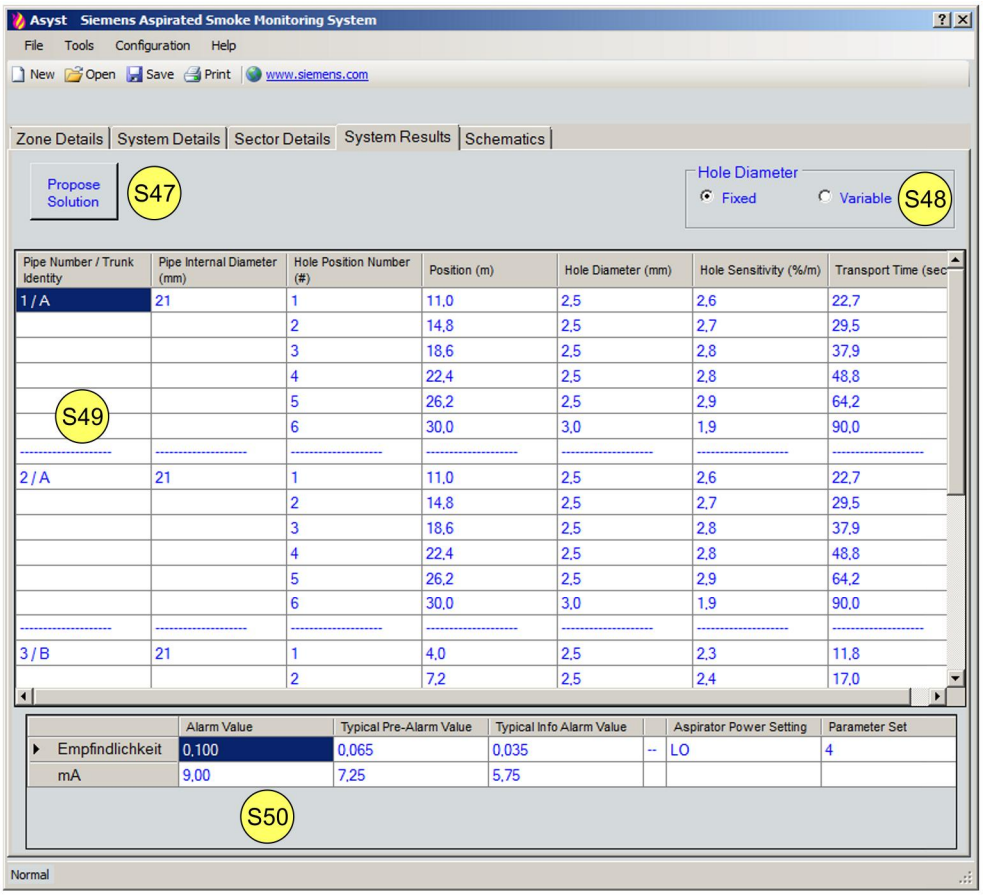

*Figure **21** 'System Results' screen in 'Normal' mode*

This screen is used to calculate and propose an optimum solution for all of the pipes in the project, to display the results of each pipe in the fire zone, and to display the aspirator and alarm settings to be used in the detector.

2.8.1 'Propose Solution' Button

If you click on the 'Propose Solution' button ('S47'), the Asyst Tool calculates the airflow through each of the sampling holes and the end vent along the pipe in the project. The Asyst Tool uses all of the entered values about each pipe and the sampling holes in those pipes, rather than the pipe diameters and the actual diameters of the sampling holes and end vent.

Following the calculations, the Asyst Tool displays the most suitable combination of pipe diameters and sampling hole and end vent sizes for each pipe.

If the entered values prevent a valid calculation, the Asyst Tool displays a warning.

2.8.2 'Hole Diameter'

At 'S48' it is possible to select fixed or variable hole diameters.

If you select the "Fixed' option, the Asyst Tool uses the same hole diameter at each sampling hole position. This simplifies the process of installing the piping, as the same drill size can be used at each sampling hole position along the pipe.

If you select the 'Variable' option, the Asyst Tool balances the flow through each sampling hole along the pipe. The advantage is that the sensitivity at each sampling hole position is more uniform; the disadvantage is that the installer may need to drill different hole sizes at each sampling hole position.

2.8.3 Pipe Results

The table at 'S49' displays the results and the hole sizes to be drilled at each sampling hole position on each pipe in the project.

First column: 'Pipe Number / Trunk Identifier'

Displays the 'Pipe Number' and, if the pipe is part of a branched set of pipes, the 'Trunk Identifier' (trunk identifier letter) entered when the branched pipes were defined. Refer to section 2.4.3 Branched Pipes.

Second column: 'Pipe Internal Diameter'

Displays the internal diameter of the pipe to be used for each sector (pipe number).

Third column: 'Hole Position Number(#)'

Displays the number of the pipe sampling hole positions.

Fourth column: 'Position (m)'

Displays the position as the distance between the detector and sampling hole position.

Fifth column: 'Hole Diameter (mm)'

Displays the diameter of the sampling holes to be drilled at each position.

Sixth column: 'Hole Sensitivity (%/m)'

Displays the calculated sensitivity of the sampling holes at each position.

Seventh column: 'Transport Time (sec)'

Displays the transport time taken for smoke to travel from a sampling hole to the detector.

2.8.4 Detector settings

Section 'S50' displays the settings to be applied to the detector for the proposed solution. Based on the characteristics of the detector and the selected output methods, the required details are displayed.

'Alarm Value' is the value to be set in the detector that applies to the reported sampling hole sensitivities. If parameter sets are being used then this is the alarm value set in the detector by setting the required parameter set.

'Typical Pre-Alarm Value' is a value that can be set in the detector as the pre-alarm setting. If parameter sets are being used then this is the pre-alarm value set in the detector by setting the required parameter set.

'Typical Ino Alarm Value' is a value that can be set in the detector as the alarm setting. If parameter sets are being used, then this is the alarm value set in the detector by specifying the required parameter set.

If the detector alarm values are set using parameter sets, then the appropriate parameter set number to be used to configure the detector is shown here.

If the detector has switchable aspirator power settings, the setting to be used is shown here.

2.9 'Schematics' Screen

Figure 22 shows the 'Schematics' screen.

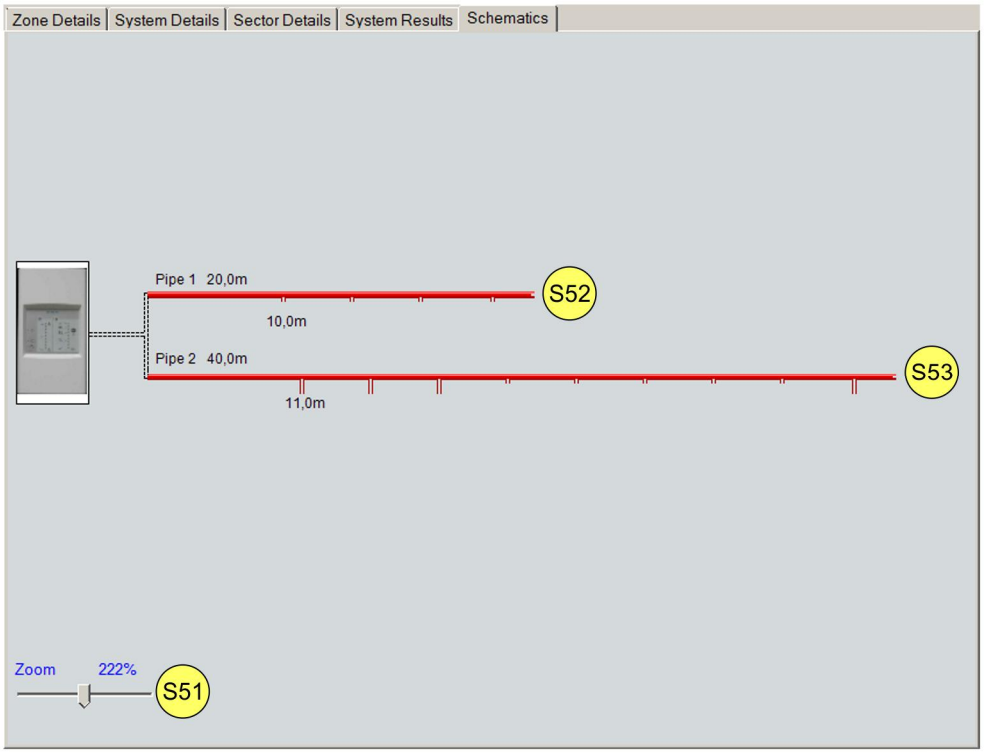

*Figure **22** 'Schematics' screen*

This screen is used to display the schematic arrangement of the piping connected to the detector.

This schematic plan of the system is not a scaled drawing with all individual system functions shown precisely in position. However, this simple plan should serve to illustrate the major system features and highlight possible inconsistent data.

It is possible to zoom in on or out of the plan to increase or decrease the display size and fit it into the space available on the screen or on the printed report.

Section 'S53' shows the schematic diagram of a pipe with sampling holes at positions 1, 2, 3, and 9. There are no sampling holes at the remaining positions.

Section 'S52' is the schematic of a shorter pipe containing four sampling hole positions and the end vent.

Grab and drag the zoom control 'S51' or click on the zoom bar to expand or shrink the schematic drawing so that you can examine shorter or longer pipes, or pipes with small gaps between adjacent sampling hole positions, more closely.

The zoom setting selected on this screen will be used when printing the project. If necessary, use the zoom control to stretch or shrink the schematic to fit onto the screen before printing. When printing is carried out, the Asyst Tool will issue a warning if the schematic does not fit on one page.

3 Hardware Reference Files

The Hardware Reference File contains the details of the available detectors and the local fire safety standards to be used.

If the detector to be used in the project is not shown in the detector's drop-down list, then you will need to obtain a new Hardware Reference File from Siemens.

3.1 Installing a New Hardware Reference File

To install this file, you will need to copy the file to your computer, into the current location (directory) used by the Asyst Tool for Hardware Reference Files.

To find this file location, run the Asyst Tool and select 'Configuration'→'File Location'. This shows the current location for the Hardware Reference File.

3.2 Changing a Hardware Reference File

To change the current Hardware Reference File used by the Asyst Tool, select 'Configuration'→'Change Hardware Reference File', then select the new reference file from the list of files.

3.3 Changing the Hardware Reference File Location

To change the location used to store the Hardware Reference Files, select 'Configuration'→'File Location'. You will find more information in section 4.2.

3.4 Project Files

When saving the project file, if a Hardware Reference File has previously been selected, that file is saved as part of the project file.

This ensures that the project can be opened on other computers with the Asyst Tool installed, even if these computers do not have the Hardware Reference File installed.

4 Other Functions and Screens

4.1 Information on the ASD Asyst Tool

Figure 23 shows the screen that appears if you select 'Help'→'About'.

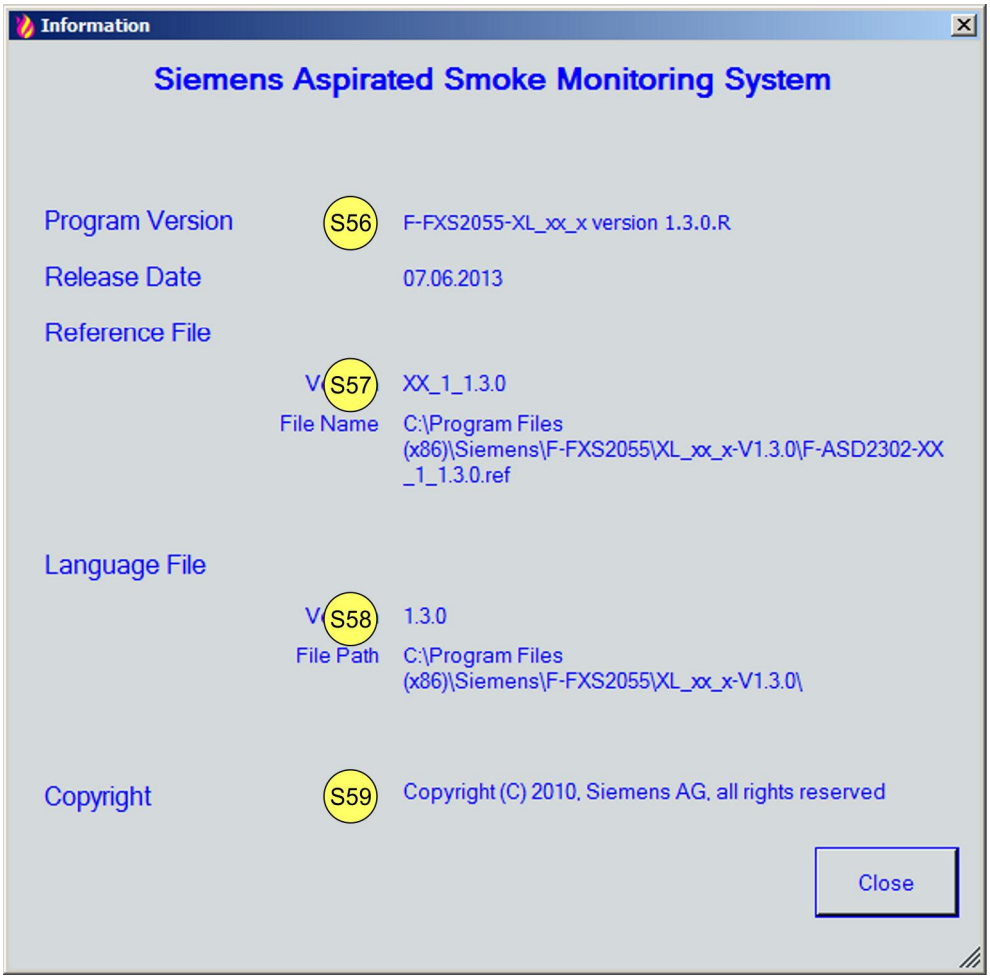

*Figure **23** Information on the ASD Asyst Tool*

This screen displays basic information about the Asyst Tool.

Section 'S56' shows the software version and release date.

Section 'S57' shows the version of the current Hardware Reference File used by the Asyst Tool and the full name and location of that file.

Section 'S58' shows the version of the current Language File in use by the Asyst Tool and the full name and location of that file.

Section 'S59' shows the Copyright statement.

Click on the 'Close' button to return to the main screen.

4.2 Screen With Locations for Files

Figure 24 shows the screen with the locations for files, which appears if you select 'Configuration'→'File Locations'.

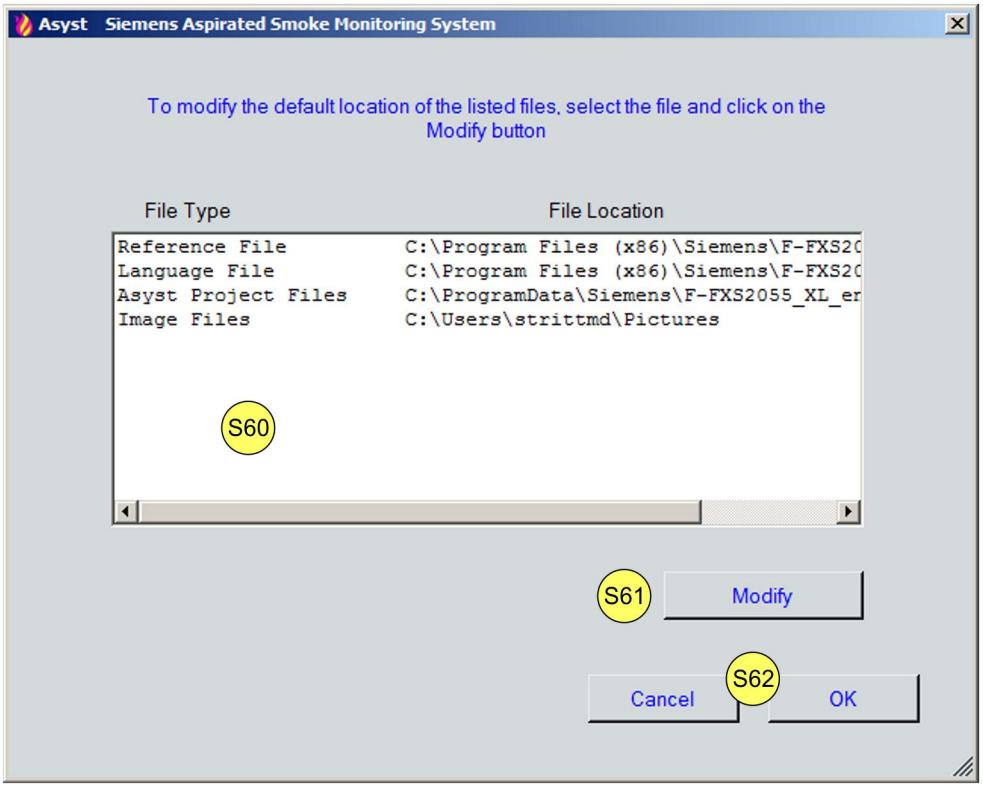

*Figure **24** Screen with locations for files*

This screen is used to show the current locations (directories) for storing specific project and system files, and to modify those locations.

Section 'S60' shows the current locations.

4.2.1 Modify File Locations

Select the item to be changed by clicking on the item in the list at 'S60'.

If you click on the 'Modify' button ('S61'), this opens another screen allowing you to browse for a folder (directory) or create a new folder. Select an existing folder or create a new folder. Click on the 'Close' button to return to the file locations screen. The selected folder is now shown on the screen.

To accept the change, click on the 'OK' button; to cancel the change, click on the 'Cancel' button ('S62').

Modifying the location to be used by the Asyst Tool for either the Hardware Reference Files or the Language Files does not move any of these files to the location. If these files are not stored at the listed file location, then the Asyst Tool will not be able to find them.

4.3 'Data Backup Period' Screen

Figure 25 shows the screen for data backup periods, which appears if you select 'Tools'→'Data Backup Period'.

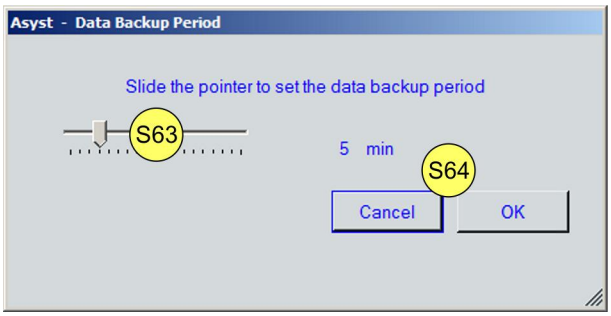

*Figure **25** 'Data Backup Period' screen*

This screen is used to change the data backup period for project files.

Backup copies of project files are created at regular intervals, ensuring that, if your computer stops responding or there is a power failure, you will not lose your work.

The time interval can be set between 2…20 minutes.

4.3.1 Set Data Backup Period

Select 'Tools'→'Data Backup Period'.

Grab the pointer at 'S63' with the computer mouse and slide it either left or right until the required period has been selected.

To accept the change, click on the 'OK' button; to cancel the change, click on the 'Cancel' button ('S64').

4.4 Design and Software Information

Figure 26 shows the screen that appears if you select 'Help'→'Design Information'.

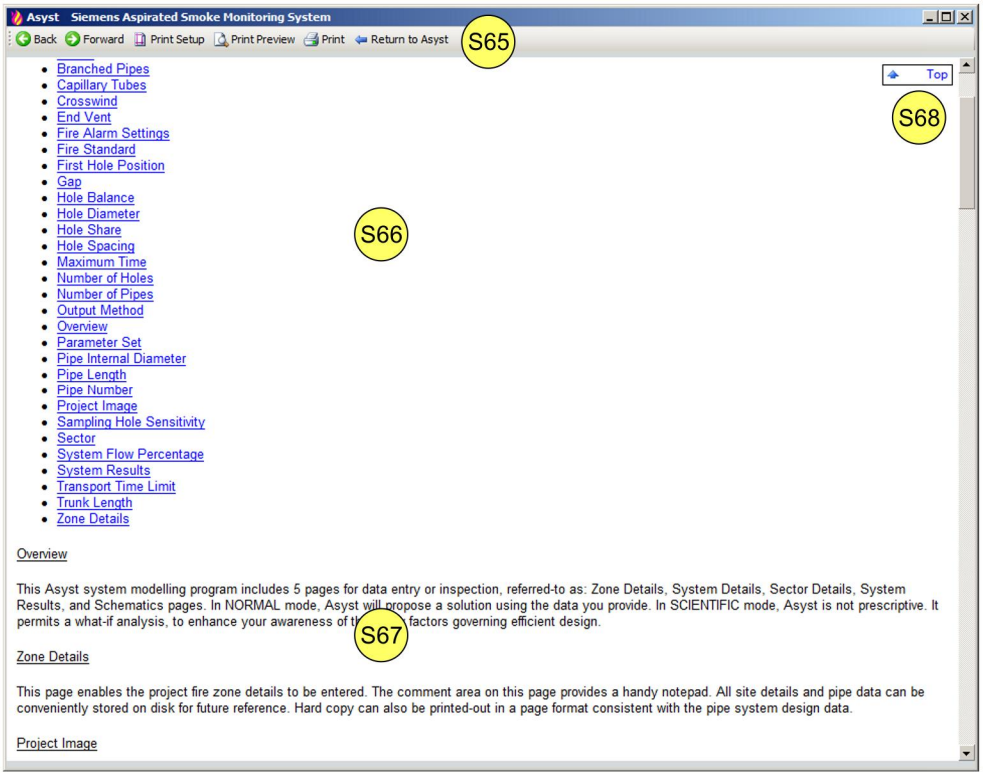

*Figure **26** Design and software information*

This screen is used to display either design information by selecting 'Help'→'Design Information' or software information by selecting 'Help'→'Program Information'. This screen can remain open even when you are working with the Asyst Tool screens.

Section 'S65' contains the 'Back', 'Forward', 'Print Setup', 'Print Preview', 'Print ', and 'Return to Asyst' buttons.

Section 'S66' is an index to the help items while section 'S67' contains the actual help text.

4.4.1 Navigation

It is possible to navigate through the help text using either the computer mouse or the keyboard.

Clicking on an index item at 'S66' will take you to that item.

Click on the 'Top' button ('S68') to return to the start of the index list.

Click on the 'Back' button ('S65') and 'Forward' button ('S65') to move to previously visited sections of the help text.

4.4.2 Printing the Help Information

Click on the 'Print Setup' button ('S65') to set the page layout.

Click on the 'Print Preview' button ('S65') to preview the pages before printing. This option also contains menu functions allowing the print setup to be modified, the printer to be selected, specific pages to be selected for printing and for those pages to be printed.

Click on the 'Print ' button ('S65') to print the full document.

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