

GasCalc

Help and Operating Instructions

Overview

The programme is designed to allow the user to design a low pressure natural gas supply network. It is suggested that the user should first draw a schematic drawing of the network showing all the connected gas appliances, valves (gas cocks), pipe lengths, pipe levels and pipe fittings (bends and tees). Each pipe length should be given a reference number. A new pipe reference length should be created each time the pipe conditions change, (another appliance is connected or the pipe level changes). Once the network drawing has been prepared the most remote appliance should be selected. It should be remembered that as natural gas is less dense than air a remote basement appliance is likely to be more difficult to supply than an appliance at a higher floor level.

The user should then work back to the meter location adding pipe lengths and appliance loadings on the way. The pressure drop between the most remote appliance and the meter should not exceed 0.0102 metres water guage (100Pa). The user should measure the total distance from the most remote appliance to the meter. The user should then divide the maximum pressure drop by total length to give average pressure drop per metre run of pipe. The user can use this figure when selecting the diameter of pipe required for each pipe length in the "index run" back to the gas meter.

The user can then repeat this exercise for the other branches of the system to ensure that all pipes are correctly sized.

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Worksheet tabs

The programme contains a number of worksheet tabs, these are named 'Help', 'Cover sheet', 'Input Reducers', 'Input Bends' and 'Input Tees'

'Help' tab - 'Help' tab contains the Help and Operating instructions for the programme

'Cover Sheet' tab - The 'Cover Sheet' tab contains the cover sheet template for the programme print out.

'Summary' tab - The 'Summary' sheet tab contains the gas supply network details listing the reference lengths, pipe diameters and appliance flow rates etc. which have been transferred from the 'GasSupply' sheet.

'GasSupply' tab - The 'GasSupply' sheet tab contains the main programme that allows the user to calculate the diameter of each section of piping in the gas supply network.

'GasInput' tab - The 'GasInput' sheet tab contains the sub programme that allows the user to calculate the gas flow rates for each length of pipe based upon the kW rating of the connected appliance.

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Inputting data **Only place data in boxes marked in green**

Gas Supply tab -

Project The user should input the name of the project in the box adjacent to the 'Project' indicator.

Location - The user should input the location of the project in the box adjacent to the 'Location' indicator.

Initial pipe level - The user should input the starting height of the first pipe above the gas meter. The height should be shown in meters. If the starting height is below the level of the gas meter the level should be shown as a minus figure. When a new branch is started the initial pipe level should be input for the starting point of this branch.

Pipe Reference No. - In the pipe reference number column the user should input the reference number for the pipe section being described. The numbers should match the numbers shown on the drawing that indicates the gas supply network.

Pipe Material - The pipe material for the section of the gas supply network should be selected from the drop down menu. The programme allows the user to select a different pipe material for each section of the system. This can be particularly useful when checking an existing system or a when the user is adding to or modifying an existing system. Once the pipe material has been selected the programme automatically selects the correct pipe diameter options for the material.

Pipe size - The pipe size for the section of the gas supply network should be selected from the list that is presented to the user. The list presented will be automatically selected by the programme based on the pipe material that is selected. The programme will automatically select an internal pipe diameter based on the nominal diameter that is selected by the user. The programme uses the internal pipe diameter to calculate the gas flow capacity of the pipe.

Pipe length - The user should input the pipe length for the selected pipe section.

Pipe Location - The pipe location for the selected pipe should be selected from the drop down menu. The programme allows the user to select a different pipe location for each section of the system. The pipe location has no effect on the pipe sizing but may be useful in locating a section of piping on a floor plan at a later date.

Flow Rate - At this point the user should switch to the 'GasInput' sheet. Once the gas flow has been calculated on the 'GasInput' sheet (see below for further details) a macro is activated to transfer the gas flow data to the 'flow rate' cell on this sheet.

Total Flow Rate - The total flow rate is automatically calculated by the programme. As each new length is added to the network the flow rate is automatically summed to give the total flow rate in the relevant pipe length.

Fittings Length - The fittings length is automatically calculated by the programme and represents the equivalent length of each fitting multiplied by the number of each type of fitting. The figure also includes the equivalent length of each valve included in the length.

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Total pipe Length - The total pipe length is automatically generated by the programme and represents the total of the measured pipe length and the equivalent length of the fittings and valves included in the section.

Head Loss - The head loss is automatically generated by the programme and represents the loss of head due to friction along the section of pipe and through any valves and

Total Head Loss - The total head loss is automatically generated by the programme and represents the sum of the head losses in each section of the gas supply network to that point.

Initial Head Available - The initial head available is provided by the programme. This head is 0.0102 metres water gauge or 100 Pascals (Pa). If the starting level of the branch is above or below the gas meter this will be taken account of in the initial head available.

Type of elbow - At present the programme allows only one type of elbow. This is a 90 degree elbow.

Number of elbows - The user should input the number of elbows in the section of the network.

Type of Tee - The user should select the type of tee from the drop down list. There are two tee options 'straight thru' and '90 degree turn'

Number of tees - The user should input the number of tees in the section of the network.

Number of gas cocks - The user should input the number of gas cocks in the pipe section.

Start level of pipe - The user should input the start level of the pipe section in metres.

Finish level of pipe - The user should input the finish level of the pipe section in metres. The programme will take account of any changes in the height of the pipe section and adjust the available pressure accordingly.

Head remaining - The programme automatically calculates the head remaining.

Head loss per metre - The programme automatically calculates the head loss per metre.

Gas Input tab -

Number of appliances - The user should input the number of appliances connected to the section pipe being calculated. If no additional appliances are connected to a section the number of appliances should be set to zero. Where an appliance is not listed or has a gas requirement different from that shown it should be shown in the 'other' category.

kW loading of appliance - The user should input the loading of appliances where necessary.

Gas consumption - The programme calculates the gas consumption of the appliances.

Total gas consumption - The programme calculates the total gas consumption of the appliances.

Total gas flow - The programme calculates the total gas flow. Once the total gas flow has been calculated the user can transfer the value to the 'gas supply' sheet by activating the correct macro. The user should only transfer the value when the relevant pipe section is located as the lowest row in the gas supply branch.

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Summary tab -

Transferring data - As each gas supply length is completed in the 'gas supply' sheet the data from the length should be transferred to the summary sheet using the appropriate button described below. The summary sheet will eventually contain all the lengths of all the branches in the gas supply network for the project.

Creating an additional section

To create an additional pipe length within the 'GasSupply' sheet press the "Add Row" button this activates a macro, which will add a new line below the existing line.

Removing a pipe length

To remove a pipe length within the 'GasSupply' sheet press the "Remove Last Row" this activates a macro, which will remove the last pipe length in the list. To remove a further pipe length press "Remove Last Row" button again. The programme will not allow the user to remove the first length on the 'GasSupply' sheet and a message will appear if this is attempted. The message will state 'Do not remove this row'.

Creating an additional branch within the network

Where a gas network has a number of branches it will be necessary to create a set of new rows on the 'Summary' sheet. To start a new branch list the user should press the "Start New Branch" button, this activates a macro, which will add a blank row to the 'Summary' sheet below the last row of the previous branch list.

Removing a pipe length from the 'Summary' sheet

To remove a pipe length within the 'Summary' sheet press the "Remove Last Row" button, this activates a macro, which will remove the last row in the 'Summary' sheet. This can be repeated as many times as necessary to clear the 'Summary' sheet. The programme will not allow the user to delete any more rows once the last row in the network has been cleared. A message will be displayed stating 'Do not remove this row'.

Transferring a row to the 'Summary' sheet

To transfer a row of data from the 'GasSupply' sheet to the 'Summary' sheet the user should press the "Transfer Row to Summary" button, this activates a macro which will transfer the data from the last row of the 'Gas Supply' sheet to the next row below the existing rows on the 'Summary' sheet. The macro only transfers the values given in the 'GasSupply' sheet so no alterations made in the 'GasSupply' sheet will effect any data shown in the 'Summary' sheet.

Transferring data from the 'GasInput' sheet to the 'GasSupply' sheet

To transfer gas flow data from the 'GasInput' sheet to the appropriate cell in the 'GasSupply' sheet the user should press the "Copy Data to Gas Supply" button, this activates a macro which will transfer the data from the 'GasInput' sheet to the correct cell in the last row in the 'GasSupply' sheet.

Clearing the 'GasInput' sheet

To clear the 'GasInput' sheet the user should press the "Clear Input" button, this activates a macro, which will clear the 'number of appliances' column on the 'GasInput' sheet ready for any new input

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Setting the print area

To set the print areas of the "Summary" sheet press the "Set Print Area" button, this activates a macro which will set the print areas ready for printing and display a print preview window.