Thank you for your interest in our products, and for taking the time to view our demonstration software. We hope that you will be pleased with what you see during the demonstration. We are truly committed to providing products that ensure your success. If you have suggestions which might help improve GASCalc to better meet your needs - *please*, let us know your ideas. Again, thank you for your interest...

Bradley B. Bean
# Table Of Contents

- Getting Help - Contact Us .......................................................... 1
- Hardware/Software Requirements .............................................. 1
- Installing GASCalc ................................................................. 1
- Starting GASCalc ................................................................. 2
- Using The Help System .......................................................... 3

## Example - US Dimensional Units ............................................ 4
  - Open The Pipe Flow Calculation Screen .................................. 4
  - Set The Base Conditions ...................................................... 5
  - Set The Heat Loss/Gain Data ............................................... 6
  - Set The Other Data ............................................................ 7
  - Enter The Pipe Data ........................................................... 7
  - Calculate The Outlet Pressure Value & The Pressure Drop ........... 9
  - Calculate The Pipe Size ..................................................... 10
  - Re-Calculate The Pipe Size ............................................... 13
  - Conclusion ........................................................................ 15

## Example - Metric Dimensional Units ...................................... 16
  - Open The Pipe Flow Calculation Screen .................................. 16
  - Set The Base Conditions ...................................................... 17
  - Set The Heat Loss/Gain Data ............................................... 18
  - Set The Other Data ............................................................ 19
  - Enter The Pipe Data ........................................................... 19
  - Calculate The Outlet Pressure Value & The Pressure Drop ........... 21
  - Calculate The Pipe Size ..................................................... 22
  - Re-Calculate The Pipe Size ............................................... 25
  - Conclusion ........................................................................ 27

## Additional Example Calculations .......................................... 27

## Uninstalling GASCalc .......................................................... 27
The information contained in this guide is provided to allow you to install and use the demonstration version of the software. The demonstration software is a full featured, time limited version of GASCalc. Working the example contained in this guide should give you a good introduction to the software’s features and ease of use. If you wish to explore the software further, we suggest reviewing the examples contained in the individual calculation references.

Getting Help - Contact Us

**Hours** - Our normal work hours are 8:00 A.M. to 5:00 P.M. Mountain Time, Monday through Friday. However if you have a problem, please try at any time, we may be in.

**By Telephone** - Telephone: (719) 578-9391

**By Email** - help@b3pe.com

**By Website** - www.b3pe.com

Hardware/Software Requirements

GASCalc will operate on any device configured to run the Windows XP through Windows 10 operating systems. The *Demonstration* version of the GASCalc software will require a minimum of 90 MB of free hard disk space when installed.

Installing GASCalc

An appropriate version of Windows must be running in order to install GASCalc. If it is not, start Windows now, then proceed with the installation process described below.

*Note:* On Windows Vista and newer devices, you will need to be logged on as the Full Administrator or use the “Run as administrator” option when executing the installation file.

- Download the compressed folder (.zip) containing the setup executable file from our website, to your device. Navigate to the folder’s location and open or explore it using Windows File Explorer.

- Double-click the setup file’s name in the compressed folder. If a Windows Security warning appears, allow your device to execute the file.

- After the setup program has been started, several screens will be displayed during the installation process. Read the contents of each screen carefully and respond appropriately.
On the Terms of Use Agreement screen, read the “Terms of Use” carefully and select the “Agree to” option to continue. If you do not wish to accept the Terms of Use, you will not be able to continue with the installation process.

A message will be displayed when the installation process is complete. The message will indicate whether the installation was successful or whether it failed. Select the appropriate option to clear the message.

Starting GASCalc

Note...
- An appropriate version of Windows must be running before GASCalc may be executed. If Windows is not running, begin its execution now.
- The device must be connected to the internet the first time that the GASCalc software is executed.
- On Windows Vista and newer devices, you will need to be logged on as the Full Administrator or use the “Run as administrator” option the first time you execute the GASCalc software.

From the Windows Desktop, double-click the GASCalc shortcut icon.

The GASCalc software will be started, and the Welcome screen will be displayed. Click the Continue command button.

The Demonstration Notes screen will be displayed. Read carefully, then click the Continue command button to hide the notes. The Pipe Flow calculation screen will be displayed.
Once installed and executed, the use of GASCalc is virtually self explanatory. To perform a calculation, choose the appropriate calculation routine from one of the menu lists, on the calculation screen click the red or blue label for the item to be calculated so that it is underlined, enter the desired values in the data fields, then click the Calculate command button.

Using The Help System

The GASCalc “Help System” consists of various Portable Document Format (PDF) documents. A suitable PDF document viewer or reader is required to view and print the documents. When associated with a calculation screen, the associated help file is referred to as a “calculation reference”.

The help documents are stored on the GASCalc server. You must be connected to the internet to access the help documents.

To view a calculation reference from a calculation screen, open the desired calculation screen by selecting the appropriate menu item. When opened, click the Help command button on the associated calculation screen.
Example - US Dimensional Units

The following example will guide you through the general steps involved with performing a GASCalc calculation. Although the example guides you through several pipe flow related calculations, the general steps involved with the calculation can be applied to perform nearly any of the other calculations. Because of the length of this topic, it might be beneficial to print the topic before proceeding with the example.

For this example, we will start by determining the pressure drop associated with the flow of 10 Mcfh through 1000 Feet of two inch plastic pipe. The inlet pressure to the pipe segment is 40 Psi. The average geographic elevation of the line is 300 Feet above sea level, and the average gas flowing temperature is 60 Fahrenheit. We will neglect the effect of fittings for this first calculation. After we have calculated the pressure drop, we will determine the minimum pipe size or sizes required to maintain a specific outlet pressure. Start by using the following steps to calculate the pressure drop associated with these conditions.

If GASCalc is not running, start it now.

Open The Pipe Flow Calculation Screen

- If the Pipe Flow calculation screen is not already displayed, from the Pipe menu list, select the Pipe Flow item. The Pipe Flow calculation screen will be displayed. Click the Clear command button.

Note... You will notice various data items, dimensional units, and calculated values listed on the screen. Data values are entered by typing the desired value into the associated data field, or for some items like pipe diameter, by selecting an item from the associated drop-down list. Dimensional units are set by selecting the desired item from the associated drop-down list. Several of the data values have a colored label next to them. For example, the labels for the Diameter, Length, Efficiency, Flow Rate, Inlet Pressure, and Outlet Pressure items are colored red on this calculation screen. These represent the individual data items that can be “unknown” or calculated. The “unknown” value will be underlined. To change the “unknown” value, click on the associated red label. Only one of the red item labels can be underlined per calculation.
Set The Base Conditions

Before performing most any pressure or flow related calculation, the base conditions for the calculation must be established. This involves setting the base pressure, temperature, gas property values, and atmospheric pressure calculation method. Set the base conditions as follows:

- On the Pipe Flow calculation screen, click the Base Conditions command button. The Base Conditions screen will be displayed. Set the following data values:

  - Pressure = 14.73 Psi (Abs)
  - Temperature = 60 Fahrenheit
  - Use Gas Properties File = us standard.prp
  - Atmospheric Pressure Method = AGA
  - Compressibility Method = None

- Click the Apply command button to save the changes.
Set The Heat Loss/Gain Data

For this example, we will not be performing any temperature calculations. Ensure that the temperature calculation methods are turned off. To check the settings:

- On the Pipe Flow calculation screen, select the Heat Loss/Gain Data tab. Set the following values:

  Calculation Method = **None**
  Include Joule-Thomson Cooling = **Unselect**
Set The Other Data

- If the *Other Data* tab has a number following the label, it is indicating that fittings or additional pipe segments are attached. If a number is shown, select the *Other Data* tab and click the *Clear* command button to remove the attached fittings or segments.

![Image of GASC Calc demonstration guide](image)

Enter The Pipe Data

- Return to the *Pipe Data* tab by clicking on the data tab heading.
  - In the *End Conditions* section, indicate that the *Outlet Pressure* value is to be calculated by clicking on the red *Outlet Pressure* label until it is underlined.
  - In the *Pipe Flow Equation* section, set the following values:
    
    \[
    \text{Pipe Flow Equation} = \text{Institute of Gas Technology - Improved}
    \]
  - In the *Segment Data* section, set the following values:
    
    \[
    \begin{align*}
    \text{Diameter} &= 2P-S11 \text{ Inches} \\
    \text{Length} &= 1000 \text{ Feet} \\
    \text{Efficiency} &= 0.95 \text{ Decimal} \\
    \text{Flow Rate} &= 10 \text{ Mcfh}
    \end{align*}
    \]
In the *End Conditions* section, set the following values:

- Inlet Pressure = **40 Psi**
- Inlet Elevation = **300 Feet**
- Outlet Elevation = **300 Feet**
- Inlet Temperature = **60 Fahrenheit**
- Outlet Temperature = **60 Fahrenheit**

In the *Calculated Values* section, set the following values:

- Min / Max Velocity Units = **Feet/sec**
Calculate The Outlet Pressure Value & The Pressure Drop

- Click the Calculate command button. The results should look similar to the following image.

Note... The results indicate that the Pressure Drop for these conditions is approximately 3 Psi resulting in an Outlet Pressure of about 37 Psi. For illustration purposes, let’s say that it is acceptable for the Outlet Pressure to be as low as 35 Psi, then let’s calculate the pipe size required to produce that value, with the other specified conditions remaining the same.
Calculate The Pipe Size

- In the Segment Data section, indicate that the Diameter value is to be calculated (“unknown”) by clicking on the Diameter label until it is underlined. In the End Conditions section, set the Outlet Pressure to 35 Psi.

Note... When calculating a Diameter value, GASCalc will calculate both an exact Inside Diameter value, and will select a combination of pipe size/types that will produce the exact Outlet Pressure value. The pipe size selection requires the User to indicate the pipe material that GASCalc can select size/types from. This is done using the Pipe Material item on the Other Data tab. The Pipe Property Table lists information about the various pipes available for use in the pipe related calculations. The values and settings in the Pipe Property Table can be modified by the User by selecting the Edit Pipe Properties item from the Pipe menu list. For this example we will use the standard settings.
For various reasons, sometimes specific design criteria will limit the velocity of the gas in a pipe segment. When calculating a Diameter value, GASCalc initially calculates the size based on the specified Inlet and Outlet Pressure values, it then checks whether the pressure based size meets the specified allowable velocity criteria. If it does not, the size is then recalculated based on the specified Allowable Velocity value.

Note...

Select the Other Data tab. In the Pipe Sizing Data section, set the following values:

- Pipe Material = Plastic - MDPE
- Allowable Velocity = 55 Feet/sec
- Use A Single Pipe Size Only = Unselect

For various reasons, sometimes specific design criteria will limit the velocity of the gas in a pipe segment. When calculating a Diameter value, GASCalc initially calculates the size based on the specified Inlet and Outlet Pressure values, it then checks whether the pressure based size meets the specified allowable velocity criteria. If it does not, the size is then recalculated based on the specified Allowable Velocity value.
Return to the Pipe Data tab. Click the Calculate command button. The results should look similar to the following image.

**Note...**
- The Diameter value represents the required inside pipe diameter to produce the specified pressure drop (difference in inlet and outlet pressure). The Selected Pipe Sizes item represents the sizes with the specified Pipe Material, whose Inside Diameter is closest to but not less than the calculated Inside Diameter value. In this case, only one size is shown with a note stating that the next smaller size of the specified Pipe Material cannot meet the allowable velocity criteria. The note means that the velocity is too high in the next smaller pipe size.

- In some cases, more than one size will be shown for the Selected Pipe Sizes. Lets increase the allowable velocity and see if a combination of sizes can be selected.
Re-Calculate The Pipe Size

- Select the Other Data tab. In the Pipe Sizing Data section, set the following values:

  Allowable Velocity = 130 Feet/sec
Return to the Pipe Data tab. Click the Calculate command button. The results should look similar to the following image.

![Pipe Flow Calculation Result](image)

**Note...** Notice that the calculated Diameter value is the same as in the previous calculation, however the Selected Pipe Sizes item now shows two pipe sizes. The value shows a combination of pipe sizes and associated lengths which if used would result in the specified Outlet Pressure for the specified conditions. Notice that the calculated Maximum Velocity value is greater than the previously specified allowable value, that is why the smaller pipe size could not be selected in the previous calculation.
Conclusion

The last step concludes this example. The entered data can be saved by clicking the Save command button. A previously saved calculation can be retrieved by clicking the Open command button. The calculation data and results can be printed by clicking the Print command button. To exit the calculation screen without saving the changes made during the example as the default data, click the Cancel command button. To exit the calculation screen and save the changes made during the example as the default data, click the Close command button.

The skills used in this example – entering data, setting dimensional units, selecting the unknown item, moving between data tabs, and performing the calculations – can be used to perform nearly any of the other calculation routines.
Example - Metric Dimensional Units

The following example will guide you through the general steps involved with performing a GASCalc calculation. Although the example guides you through several pipe flow related calculations, the general steps involved with the calculation can be applied to perform nearly any of the other calculations. Because of the length of this topic, it might be beneficial to print the topic before proceeding with the example.

For this example, we will start by determining the pressure drop associated with the flow of 250 m3h through 305 Metres of 63 Millimetre plastic pipe. The inlet pressure to the pipe segment is 2760 Millibar. The average geographic elevation of the line is 90 Metres above sea level, and the average gas flowing temperature is 15 Celsius. We will neglect the effect of fittings for this first calculation. After we have calculated the pressure drop, we will determine the minimum pipe size or sizes required to maintain a specific outlet pressure. Start by using the following steps to calculate the pressure drop associated with these conditions.

If GASCalc is not running, start it now.

Open The Pipe Flow Calculation Screen

- If the Pipe Flow calculation screen is not already displayed, from the Pipe menu list, select the Pipe Flow item. The Pipe Flow calculation screen will be displayed. Click the Clear command button.

Note... You will notice various data items, dimensional units, and calculated values listed on the screen. Data values are entered by typing the desired value into the associated data field, or for some items like pipe diameter, by selecting an item from the associated drop-down list. Dimensional units are set by selecting the desired item from the associated drop-down list. Several of the data values have a colored label next to them. For example, the labels for the Diameter, Length, Efficiency, Flow Rate, Inlet Pressure, and Outlet Pressure items are colored red on this calculation screen. These represent the individual data items that can be “unknown” or calculated. The “unknown” value will be underlined. To change the “unknown” value, click on the associated red label. Only one of the red item labels can be underlined per calculation.
Set The Base Conditions

Before performing most any pressure or flow related calculations, the base conditions for the calculation must be established. This involves setting the base pressure, temperature, gas property values, and atmospheric calculation method. Set the base conditions as follows:

- On the Pipe Flow calculation screen, click the Base Conditions command button. The Base Conditions screen will be displayed. Set the following data values:

  Pressure = **1013.25 mBar (Abs)**
  Temperature = **15 Celsius**
  Use Gas Properties File = **uk standard.prp**
  Atmospheric Pressure Method = **AGA**
  Compressibility Method = **None**

- Click the Apply command button to save the changes.
Set The Heat Loss/Gain Data

For this example, we will not be performing any temperature calculations. Ensure that the temperature calculation methods are turned off. To check the settings:

- On the Pipe Flow calculation screen, select the Heat Loss/Gain Data tab. Set the following values:
  
  **Calculation Method** = **None**
  **Include Joule-Thomson Cooling** = **Unselect**
Set The Other Data

- If the Other Data tab has a number following the label, it is indicating that fittings or additional pipe segments are attached. If a number is shown, select the Other Data tab and click the Clear command button to remove the attached fittings or segments.

Enter The Pipe Data

- Return to the Pipe Data tab by clicking on the data tab heading.
  - In the End Conditions section, indicate that the Outlet Pressure value is to be calculated by clicking on the red Outlet Pressure label until it is underlined.
  - In the Pipe Flow Equation section, set the following values:
    
    Pipe Flow Equation = Institution of Gas Engineers Recommendation 3 - Medium Pressure

- In the Segment Data section, set the following values:
  
  Diameter = 63P-S11 Millimetre  
  Length = 305 Metres  
  Efficiency = 0.95 Decimal  
  Flow Rate = 250 m3h
In the End Conditions section, set the following values:

- Inlet Pressure = 2760 Millibar
- Inlet Elevation = 90 Metres
- Outlet Elevation = 90 Metres
- Inlet Temperature = 15 Celsius
- Outlet Temperature = 15 Celsius

In the Calculated Values section, set the following values:

- Min / Max Velocity Units = Metres/sec
Calculate The Outlet Pressure Value & The Pressure Drop

- Click the Calculate command button. The results should look similar to the following image.

![Pipe Flow... dialog box](image)

**Note...** The results indicate that the Pressure Drop for these conditions is approximately 138 Millibar resulting in an Outlet Pressure of about 2620 Millibar. For illustration purposes, let’s say that it is acceptable for the Outlet Pressure to be as low as 2410 Millibar, then let’s calculate the pipe size required to produce that value with the other specified conditions remaining the same.
Calculate The Pipe Size

- In the Segment Data section, indicate that the Diameter value is to be calculated (“unknown”) by clicking on the Diameter label until it is underlined. In the End Conditions section, set the Outlet Pressure to 2410 Millibar.

![Pipe Data](image)

**Note...** When calculating a Diameter value, GASCalc will calculate both an exact Inside Diameter value, and will select a combination of pipe size/types that will produce the exact Outlet Pressure value. The pipe size selection requires the User to indicate the Pipe Material that GASCalc can select size/types from. This is done using the Pipe Material item on the Other Data tab. The Pipe Property Table lists information about the various pipes available for use in the pipe related calculations. The values and settings in the Pipe Property Table can be modified by the User by selecting the Edit Pipe Properties item from the Pipe menu list. For this example we will use the standard settings.

- Select the Other Data tab. In the Pipe Sizing Data section, set the following values:
  
  Pipe Material = **Plastic - PE**
  Allowable Velocity = **20 Metres/sec**
  Use A Single Pipe Size Only = **Unselect**
Note... For various reasons, sometimes specific design criteria will limit the velocity of the gas in a pipe segment. When calculating a Diameter value, GASCalc initially calculates the size based on the specified Inlet and Outlet Pressure values, it then checks whether the pressure based size meets the specified allowable velocity criteria. If it does not, the size is then recalculated based on the specified Allowable Velocity value.
• Return to the Pipe Data tab. Click the Calculate command button. The results should look similar to the following image.

Note...

• The Diameter value represents the required inside pipe diameter to produce the specified pressure drop (difference in inlet and outlet pressure). The Selected Pipe Sizes item represents the sizes with the specified Pipe Material, whose Inside Diameter is closest to but not less than the calculated Inside Diameter value. In this case, only one size is shown with a note stating that the next smaller size of the specified Pipe Material cannot meet the allowable velocity criteria. The note means that the velocity is too high in the next smaller pipe size.

• In some cases, more than one size will be shown for the Selected Pipe Sizes. Lets increase the Allowable Velocity and see if a combination of sizes can be selected.
Re-Calculate The Pipe Size

- Select the Other Data tab. In the Pipe Sizing Data section, set the following values:

  Allowable Velocity = 40 Metres/sec
Return to the Pipe Data tab. Click the Calculate command button. The results should look similar to the following image.

**Note...**

Notice that the calculated Diameter value is the same as in the previous calculation, however the Selected Pipe Sizes item now shows two pipe sizes. The value shows a combination of pipe sizes and associated lengths which if used would result in the specified outlet pressure for the specified conditions. Notice that the calculated Maximum Velocity value is greater than the previously specified allowable value, that is why the smaller pipe size could not be selected in the previous calculation.
Conclusion

The last step concludes this example. The entered data can be saved by clicking the Save command button. A previously saved calculation can be retrieved by clicking the Open command button. The calculation data and results can be printed by clicking the Print command button. To exit the calculation screen without saving the changes made during the example as the default data, click the Cancel command button. To exit the calculation screen and save the changes made during the example as the default data, click the Close command button.

The skills used in this example – entering data, setting dimensional units, selecting the unknown item, moving between data tabs, and performing the calculations – can be used to perform nearly any of the other calculation routines.

Additional Example Calculations

The GASCalc help documentation is stored on the GASCalc server. If you are connected to the internet, you may view and explore the examples for any and all of GASCalc’s calculation methods. To view a document click the Help command button on the associated calculation screen.

Uninstalling GASCalc

If after using the GASCalc software you wish to remove it, select the Uninstall GASCalc menu item from the GASCalc menu list.

- After the Uninstall Program has been started, read the contents of each screen carefully and respond appropriately.

Note... If the Uninstall Program asks to remove any shared system files, click the No command button.

- A message will appear when the uninstall process is complete. The message will indicate whether the uninstall process was successful or whether it failed. Select the appropriate option to clear the message.
Note... On some machines, the uninstall routine will not be able to remove any directory or file that has been created after the initial installation.

- Some of the files and/or folders created by GASCalc after the installation may include files in the initialization directory (ini), files in the default calculation file directory (files), and/or files in the application directory (app).

- To remove these files and/or folders, use *Windows File Explorer* to find and delete the remaining files and folders. An example of the path for the initialization folder is shown below. The other folders have similar path locations.

  - 32-bit machines - `C:\Program Files\GASCalc\ini`
  - 64-bit machines - `C:\Program Files (x86)\GASCalc\ini`