



Global Energy Associates Ltd

PipeCalc4 Pipework Pressure Loss Calculator User Guide

Table of Contents

| | |
|---|----|
| 1. Overview..... | 2 |
| 2. Basic Data Input and Calculation..... | 3 |
| 3. Projects: Saving Data to File..... | 4 |
| 4. Projects: Loading Data from File..... | 5 |
| 5. Deleting a Project..... | 6 |
| 6. Using Pipework Sections..... | 7 |
| 7. Running the PipeCalc4 Report..... | 8 |
| 8. Setting up User Details..... | 9 |
| 9. Conversion Factors..... | 10 |
| 10. PipeCalc4 PPLC Technical Summary..... | 11 |

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1. Overview

The PipeCalc4 Pipework Pressure Loss Calculator (PPLC) application is a tool to help gas engineers design pipework installations.

PipeCalc4 PPLC allows the user to input gas and pipework design criteria which it then uses to predict pressure loss, pipe velocity and volume metrics. These can be adjusted to allow for the effects of pipework fittings and change in height.

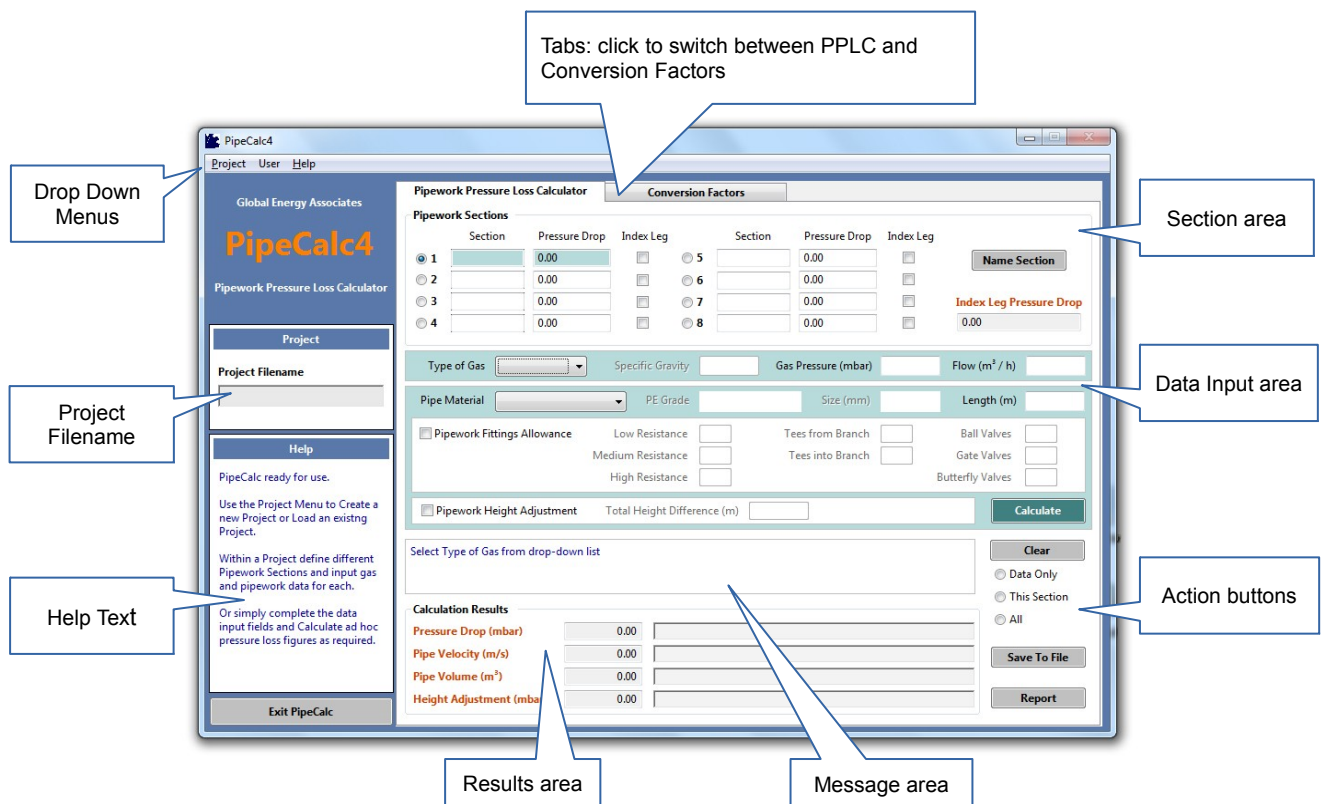
A gas installation project can be broken down into sections, each with their own set of gas and pipework data. Optionally, one or more sections can be included to calculate the Index Leg Pressure Drop which will show the highest pressure drop leg across the whole installation.

There are facilities to generate a formal report and to store project data for retrieval at a later date. There is also a useful conversion factors facility.

To assist the user, the application features comprehensive guidance text and messaging.

PipeCalc4 PPLC conforms to guidelines defined in Institution of Gas Engineers and Managers (IGEM) document UP/2 'Installation pipework on industrial and commercial premises' Edition 3.

On startup, PipeCalc4 PPLC will be displayed as shown below.





2. Basic Data Input and Calculation

The screenshot displays the software interface for basic data input and calculation. The interface is divided into several sections:

- Input Fields (Green Area):** This section contains fields for 'Type of Gas' (set to 'Natural'), 'Specific Gravity' (0.27), 'Gas Pressure (mbar)' (35.00), 'Flow (m³ / h)' (40.00), 'Pipe Material' (set to 'Natural'), 'PE Grade', 'Size (mm)' (80), and 'Length (m)' (7.00). There are also checkboxes for 'Pipework Fittings Allowance' and 'Pipework Height Adjustment', and a 'Total Height Difference (m)' field set to 1.00.
- Buttons:** A prominent 'Calculate' button is located at the bottom right of the input section. Below it are 'Clear', 'Save To File', and 'Report' buttons.
- Clear Options:** A radio button menu allows selecting 'Data Only', 'This Section', or 'All' for the Clear function.
- Calculation Results:** A section at the bottom left displays results: Pressure Drop (mbar) 0.04, Pipe Velocity (m/s) 2.16, Pipe Volume (m³) 0.04, and Height Adjustment (mbar) -0.05. A message below states 'Natural Gas gives pressure gain with height.'

Annotations with callout boxes provide additional instructions:

- 'Input / select gas and pipework data using the fields in the 'green' area.'
- 'Click Calculate to generate results'
- 'Use Clear with the appropriate radio button, e.g. 'Data Only' to clear data and results fields.'
- 'View calculation results and related messages.'

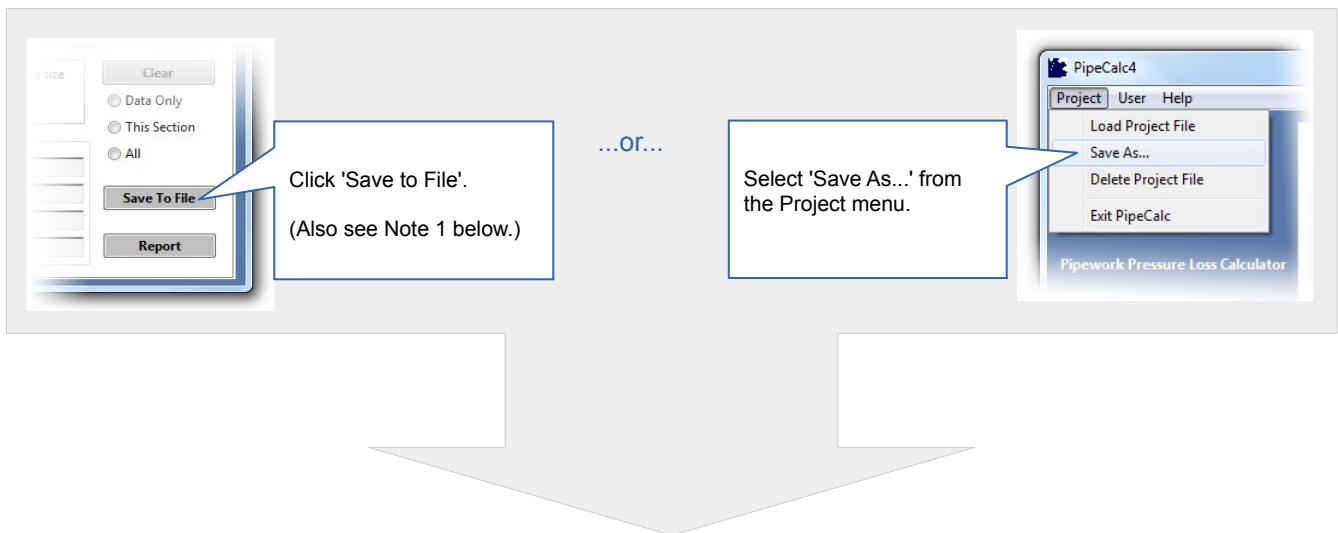
Notes

1. The Message area will display guidance on acceptable input values and highlight any incorrect input.
2. Input to 'Specific Gravity' is only possible when Type of Gas = 'User Specified'.
3. 'Pipe Material' lists the normal gas pipework material options. Note: CSST stainless steel flexible pipe is included although the associated diameter size options listed (under 'Size') relate to the manufacturers specified effective diameter, **not** the nominal pipe diameter.
4. Input to 'PE Grade' is only possible when the selected 'Pipe Material' is a PE material.
5. When checked, 'Pipework Fittings Allowance' will allow input to the adjacent 'resistance', 'tees' and 'valves' boxes. Input the number of fittings in each of these categories and the effect on pressure loss will be taken into account in calculations.
6. When checked, 'Pipework Height Adjustment' will allow input to 'Total Height Difference'. Input to this field will be used to adjust calculated pressure loss for the effects of altitude (e.g. pipes in high rise buildings).
7. Invalid input to any field will be highlighted when Calculate is clicked.
8. The Clear facility with 'Data Only' selected will clear all input data and results fields.
9. The Clear facility with 'This Section' selected will clear all input data and results fields plus section data for the current section only.
10. The Clear facility with 'All' selected will clear all fields in the PPLC window. i.e. it will be 'initialised' as when started up.
11. Using Clear will not delete any data saved to a Project File. See 'Deleting Projects' on how to do this.

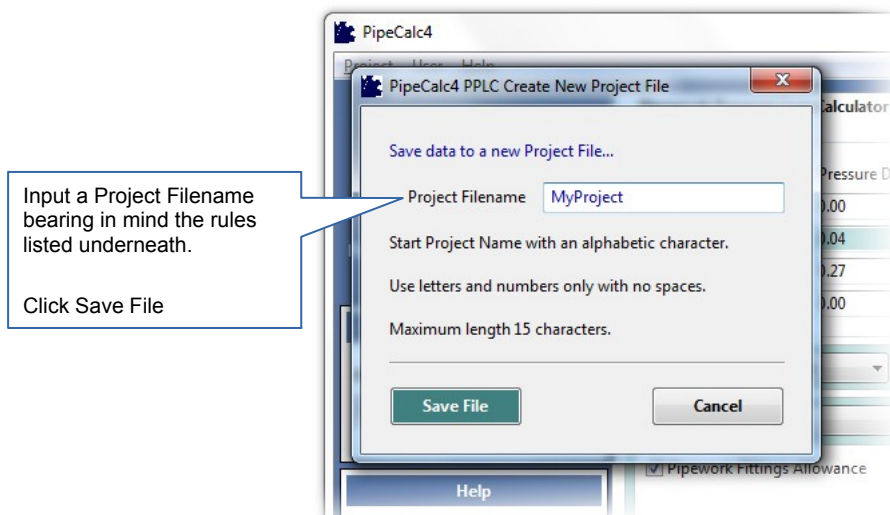


3. Projects: Saving Data to File

To save data and calculation results to a file for future use...



Both will display the 'Create New Project File' window...

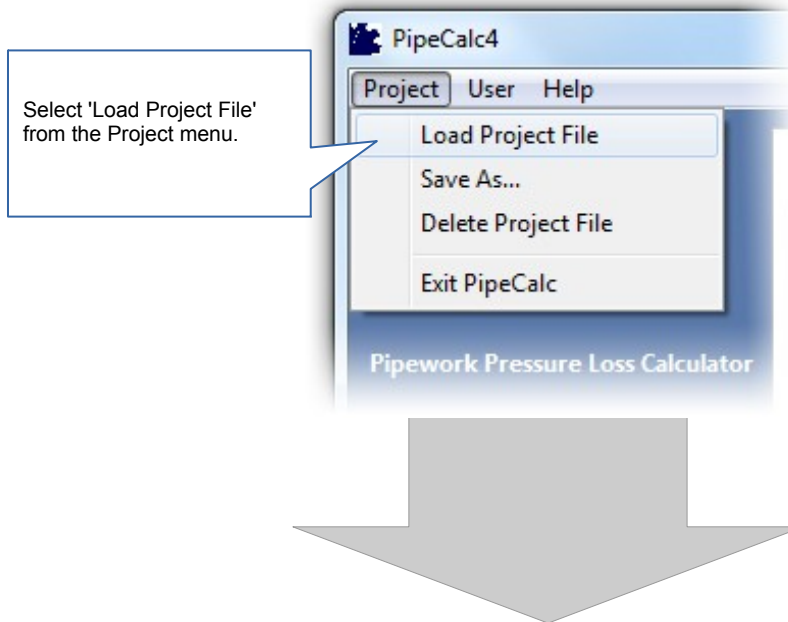


Notes

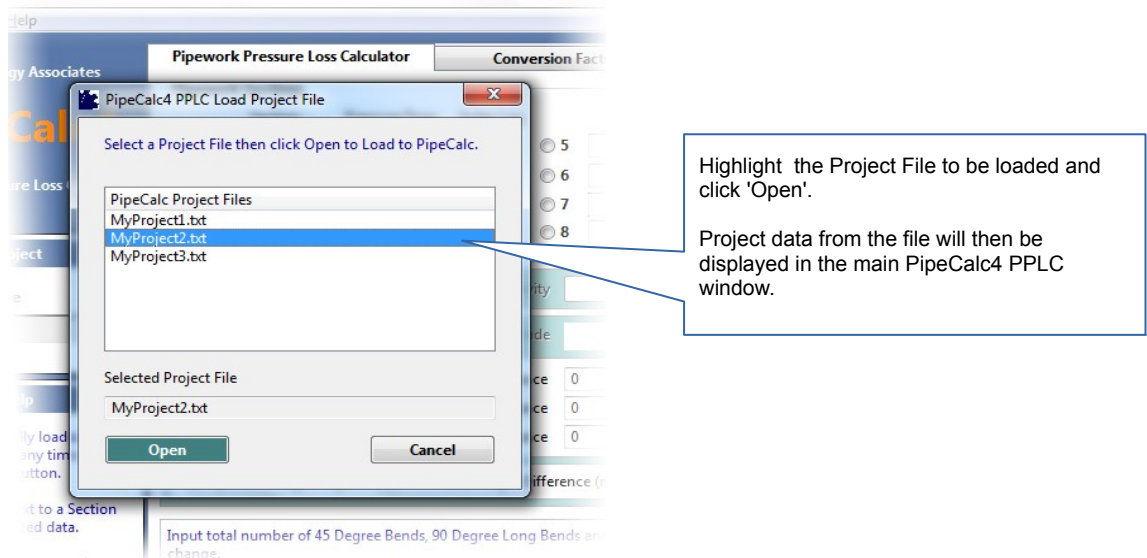
1. If data has already been saved to a file which is loaded to PipeCalc4 then clicking Save to File will just save the displayed data and results to the same file. The 'Create New Project File' window will not be displayed.



4. Projects: Loading Data from File



This will display the 'Load Project File' window...





5. Deleting a Project

Ensure that the Project to be deleted is already loaded to PipeCalc4.

Select 'Delete Project File' from the Project menu.

Check that the correct Project File is shown then click Delete button.

Click OK to confirm Project File deletion.

Notes

1. The Project File to be deleted must already be loaded to PipeCalc4 (see Section 4) before proceeding with the steps outlined above.
2. Once the confirmation to delete is given the Project File will be deleted and you will be returned to the Main Window which will be cleared of all data.



6. Using Pipework Sections

A gas installation Project can be broken down into Sections, up to 8 in total, each with their own set of gas and pipework data.

Click the 'radio' button next to a section to make it 'current'.

Click in the 'checkbox' to include a section in the Index Leg Pressure Drop calculation.

Optionally, use the Name Section button to give a name to each section used.

| Section | Pressure Drop | Index | Section | Pressure Drop | Index Leg |
|----------|---------------|-------------------------------------|---------|---------------|--------------------------|
| 1 A to B | 0.00 | <input type="checkbox"/> | 5 | 0.00 | <input type="checkbox"/> |
| 2 B to C | 0.04 | <input checked="" type="checkbox"/> | 6 | 0.00 | <input type="checkbox"/> |
| 3 C to D | 0.27 | <input type="checkbox"/> | 7 | 0.00 | <input type="checkbox"/> |
| 4 | 0.00 | <input type="checkbox"/> | 8 | 0.00 | <input type="checkbox"/> |

Index Leg Pressure Drop calculation for the included sections: 0.27

Input fields: Type of Gas: Natural, Specific Gravity: , Gas Pressure (mbar): 35.00, Flow (m³ / h): 40.00, Pipe Material: Steel, PE Grade: , Size (mm): 80, Length (m): 7.00

Calculation Results:

| | |
|-------------------------------|-------|
| Pressure Drop (mbar) | 0.04 |
| Pipe Velocity (m/s) | 2.16 |
| Pipe Volume (m ³) | 0.04 |
| Height Adjustment (mbar) | -0.05 |

Natural Gas gives pressure gain with height.

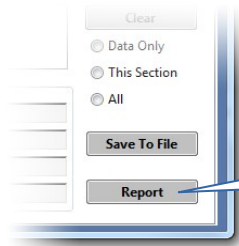
Notes

1. If you switch to another section using a 'radio' button, any data relating to the original section will be retained and will be redisplayed if you switch back again. Remember that if you want to keep data permanently you must save it to a Project File. Otherwise your data will be lost when you Exit PipeCalc4.
2. As well as assigning a name to a section, the Name Section button can also be used to change an existing name.
3. Pressure Drop as shown in Calculation Results is also displayed against the appropriate section in the Pipework Sections area.
4. Index Leg Pressure Drop is the sum of pressure drops for all sections selected for inclusion. The value is automatically adjusted when a section is included or subsequently excluded.



7. Running the PipeCalc4 Report

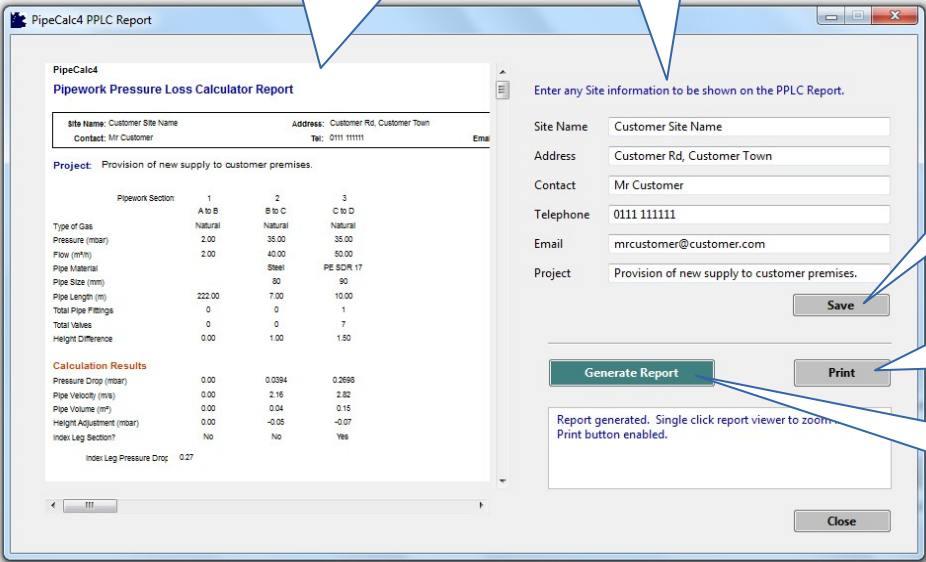
The Report summarises input data and calculation results for all Project sections currently loaded to PipeCalc4.



Click Report to open the Report window shown below.

Report Viewer. This will be empty until Generate Report is clicked. It will then display a preview of the report generated.

Optionally, input any customer details needed on the Report.



If you are using a Project File, the Save button will save any customer details input.

Once the Report has been generated click Print to print it.

Click to generate the PipeCalc4 Report.

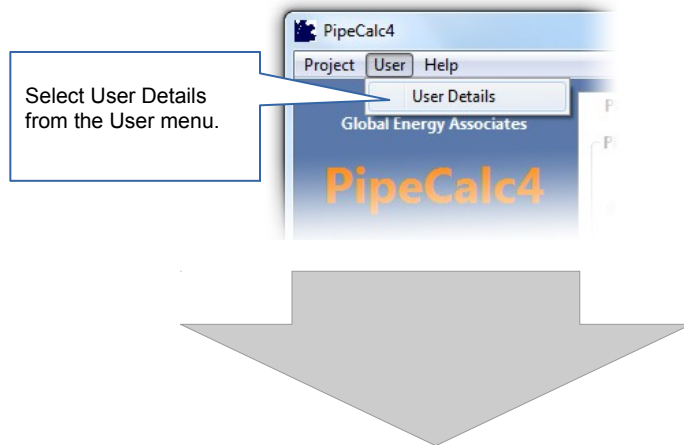
Notes

1. The Report will include your details if stored in User Details (see Section 8).
2. The Report will display a column of data for each section up to the last section used. Beyond the last section used any remaining columns will be blank.
3. Single click anywhere in the Report Viewer to zoom in / out.

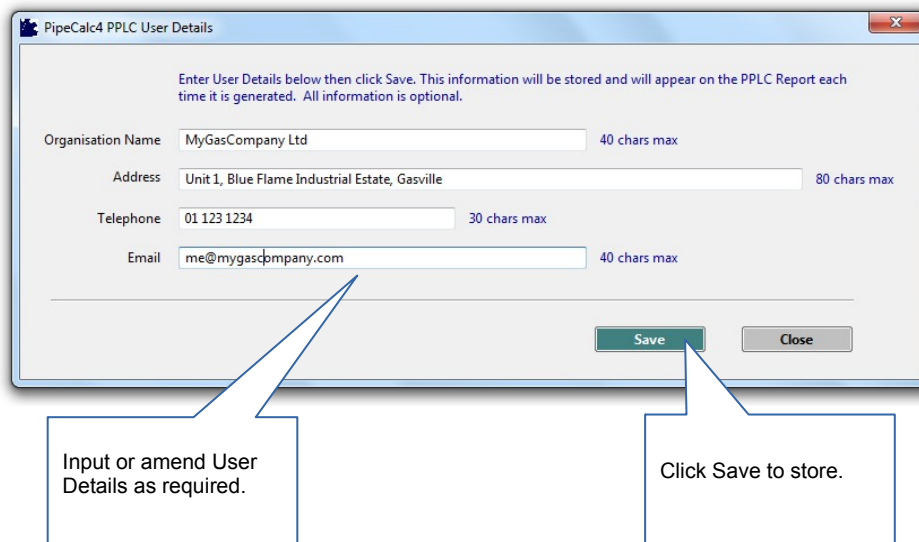


8. Setting up User Details

You can store your own details for inclusion on the PipeCalc4 Report (see Section 7).



This will display the 'User Details' window...



Notes

1. You only need to store details once. Clicking Save will store them permanently. Existing details can be amended as required.



9. Conversion Factors

Conversion Factors is a simple facility to convert units of measurement. Specifically:

- BTU per hour to Kilowatt and Megajoule per hour
- Kilowatt to Cubic Metre per Hour
- Water Column Inches to Millibar
- Feet to Metres

The screenshot shows the 'Conversion Factors' tab in the PipeCalc4 application. The interface includes a sidebar with 'Project' and 'Help' sections, and a main area with four conversion sections. Each section has input fields for the source unit and output fields for the target units. A 'Convert' button and a 'Clear' button are located at the bottom right. Callouts provide instructions: 'Click on tab to access Conversion Factors.' points to the 'Conversion Factors' tab; 'Input values to convert.' points to the '123.00' input field in the 'Convert Feet to Metres' section; 'Click to convert input.' points to the 'Convert' button; and 'Click to clear all fields.' points to the 'Clear' button.

Click on tab to access Conversion Factors.

Convert BTU per hour to Kilowatt and Megajoule per hour

| | | | | | |
|--------|---------|------|----|------|--------|
| 123.00 | BTU / h | 0.04 | kW | 0.13 | MJ / h |
|--------|---------|------|----|------|--------|

Convert Kilowatt to Cubic Metre per Hour

| | | | |
|--------|----|-------|---------------------|
| 456.00 | kW | 42.09 | m ³ / hr |
|--------|----|-------|---------------------|

Convert Water Column Inches to Millibar

| | | | |
|--------|---------|---------|------|
| 789.00 | inch WC | 1972.50 | mbar |
|--------|---------|---------|------|

Convert Feet to Metres

| | | | |
|--------|------|-------|--------|
| 123.00 | feet | 37.49 | metres |
|--------|------|-------|--------|

Input converted.

Convert

Clear

Input values to convert.

Click to convert input.

Click to clear all fields.

Notes

1. Any invalid input will be highlighted.



10. PipeCalc4 PPLC Technical Summary

- PipeCalc4 is compatible with MS Windows XP, Vista, 7, 8 and 10.
- Installation requires 9MB disk space minimum. Additional space is required for data files stored by PipeCalc4.
- To operate effectively, PipeCalc4 requires a minimum screen resolution of 1280 x 720.
- Conformant to Institution of Gas Engineers & Managers (IGEM) UP/2 'Installation pipework on industrial and commercial premises' Edition 3.