Restriction Orifice Plate Ver1.0

KLM Technology Group

Practical Engineering Guidelines for Processing Plant Solutions

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KLM Technology Group

SOLUTIONS, STANDARDS AND SOFTWARE
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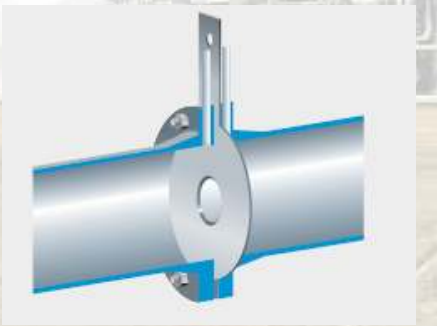
Introduction

Restriction orifice is a flow metering device based on Bernoulli's principle that states that flow rate was proportional to the square root of pressure drop.

Restriction orifice (RO) is mainly used to achieve controlled or restricted flow of a process medium. The orifice offers a restriction to the process flow and the pressure head drops from the upstream to the downstream.



Introduction

- KLM Technology Group Restriction orifice program assists in calculating Restriction Orifice Plate sizing at certain pressure and temperature which is essential in the process industries.

- This program considers:

Liquid flow

Gas flow

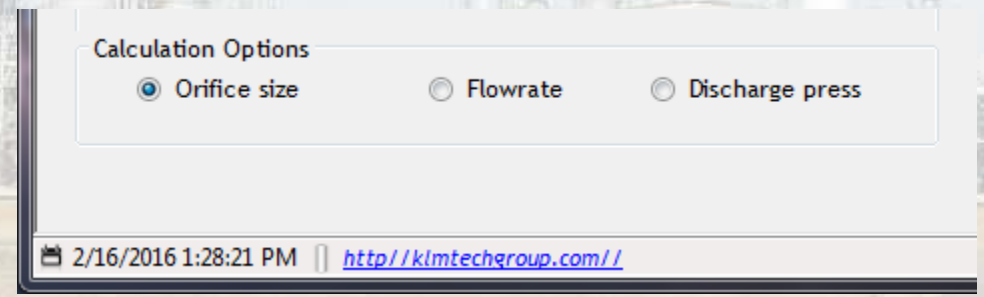
Perform Calculations

- Calculate either Orifice size, Flow rate or Discharge pressure
- Calculate the beta ratio
- Calculate the Reynold number
- Calculate the maximum power loss
- Calculate the minimum plate thickness
- Supply fluid properties at flow conditions
- Supply pipe sizes
- Supply element and pipe material
- Use English or SI engineering units in any mixture
- Use mass or volume flow units
- Import process data
- Print a calculation sheet
- Save the data

Calculation Options

Calculation options of Restriction Orifice Plate program are

- Orifice size
- Flow rate
- Discharge pressure



Liquid Data

- Engineering Units
- Base Conditions
- Fluid Properties
- Material Selection
- Input Data
- Filing and Moving On

Engineering Units

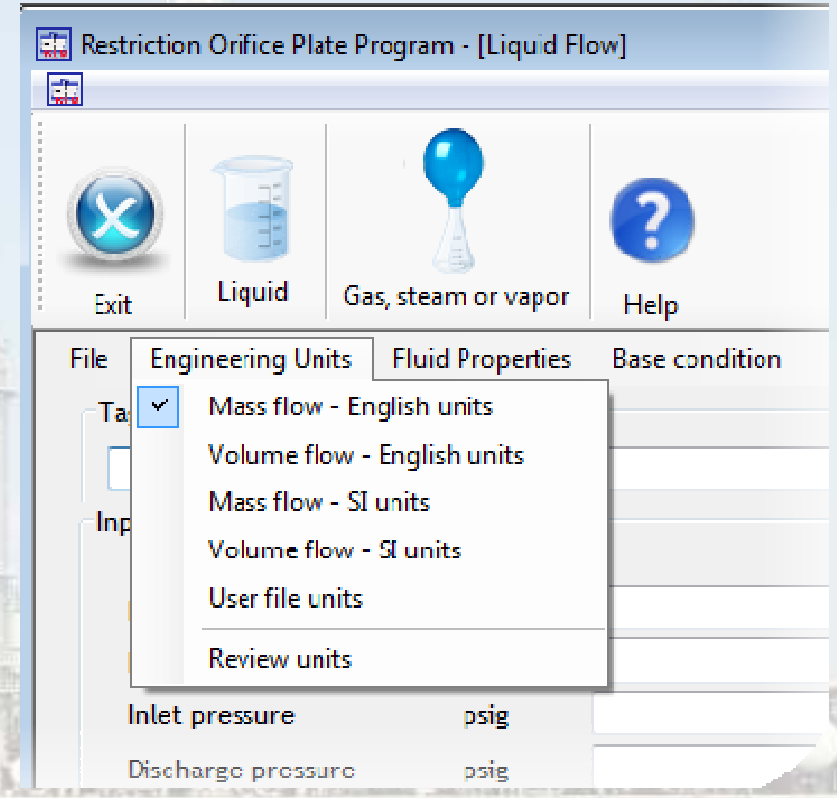
English units can change units in calculation to be english units standard, it comprises :

- ✓ Massflow
- ✓ Volumetric flow

SI units can change units in calculation to be SI (International System of units), it comprises :

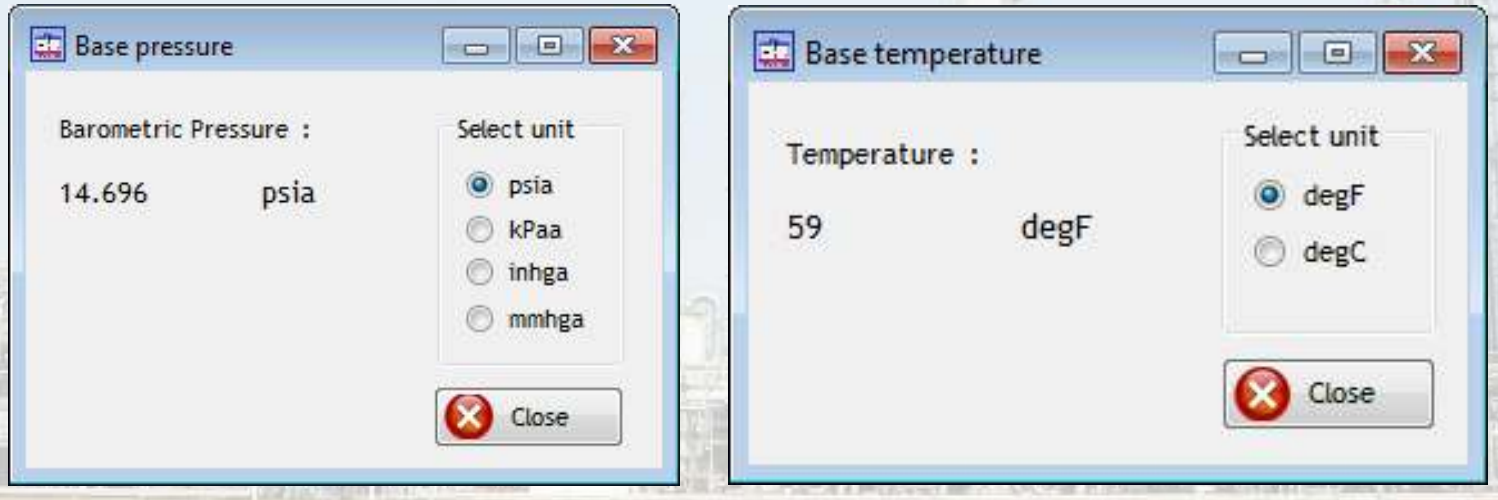
- ✓ Massflow
- ✓ Volumetric flow

User file units can change units in calculation based on desired user (can be setup in **review units** menu)



Base Condition

This program follows the ISO standard,
base pressure : 14.7 psia
base temperature : 59 degF



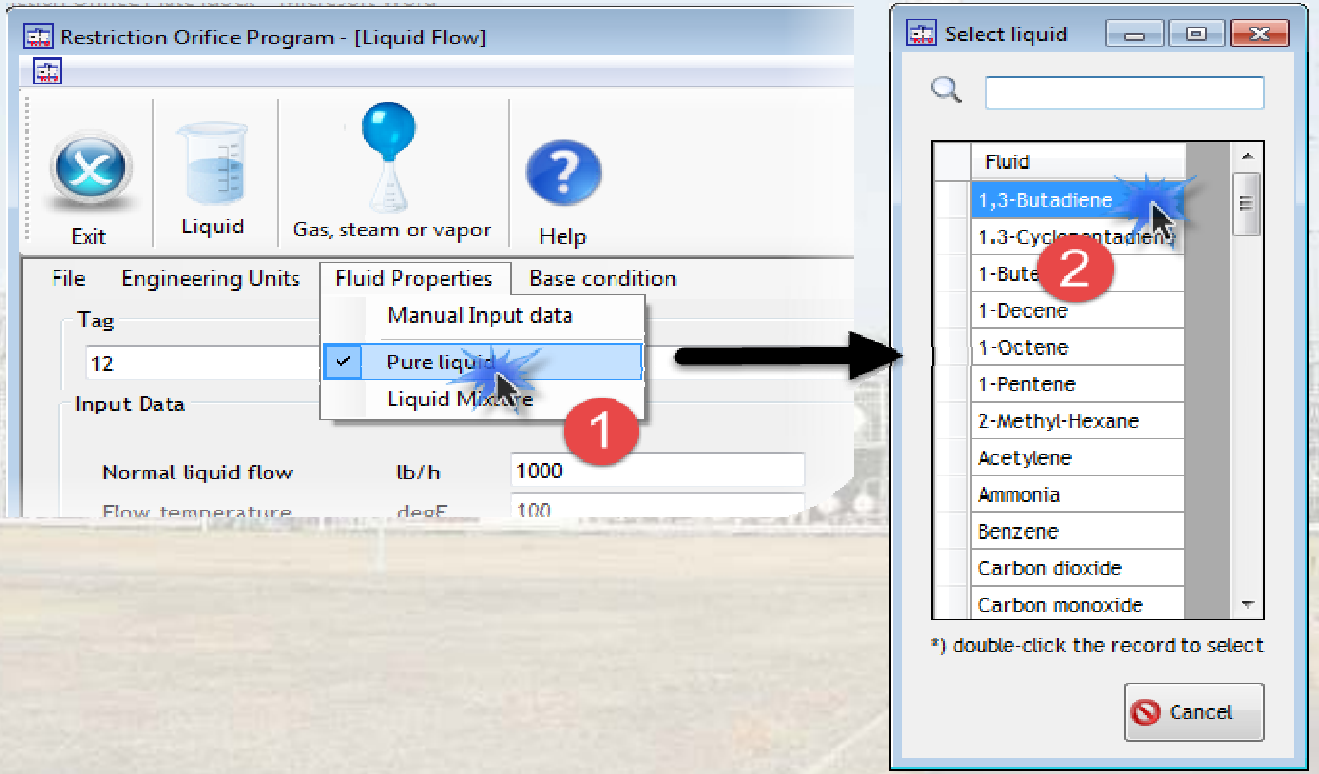
Fluid Properties

- Enabled when the pressure and temperature are entered
- Available :
  - Pure Liquids
  - Mixtures

Fluid Properties Cont'd

Pure Liquids

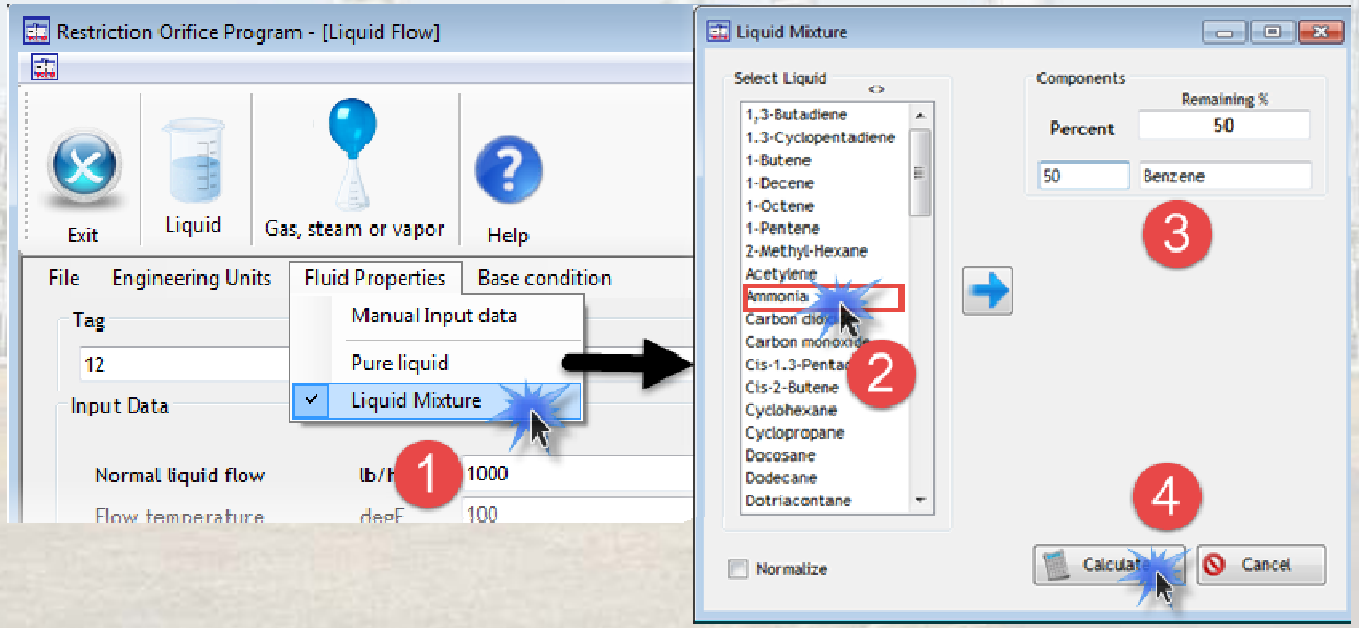
- Find the desired fluid name
- Select (or double-click) it
- The fluid properties will be entered



Fluid Properties Cont'd

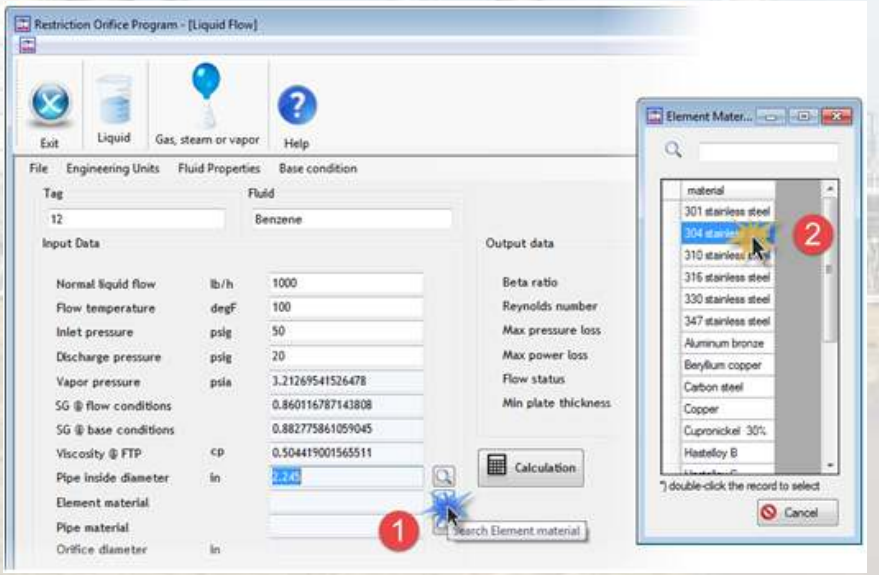
Mixtures

- Select the first component
- In the component box, enter the percentage
- Continue until the remaining percentage equals zero
- Click calculate button in the component box and the program will calculate and enter the mixture values



Material Selection

- Material selection is also considered to sizing restriction orifice. It effects the thermal expansion factor of element value.
  1. Click the **Element material** to display the materials screen.
  2. Select the required material on the materials screen.
  3. Repeat for the **Pipe material.**



Input Data

The **options selected** enable the input boxes of the data required for the calculation.

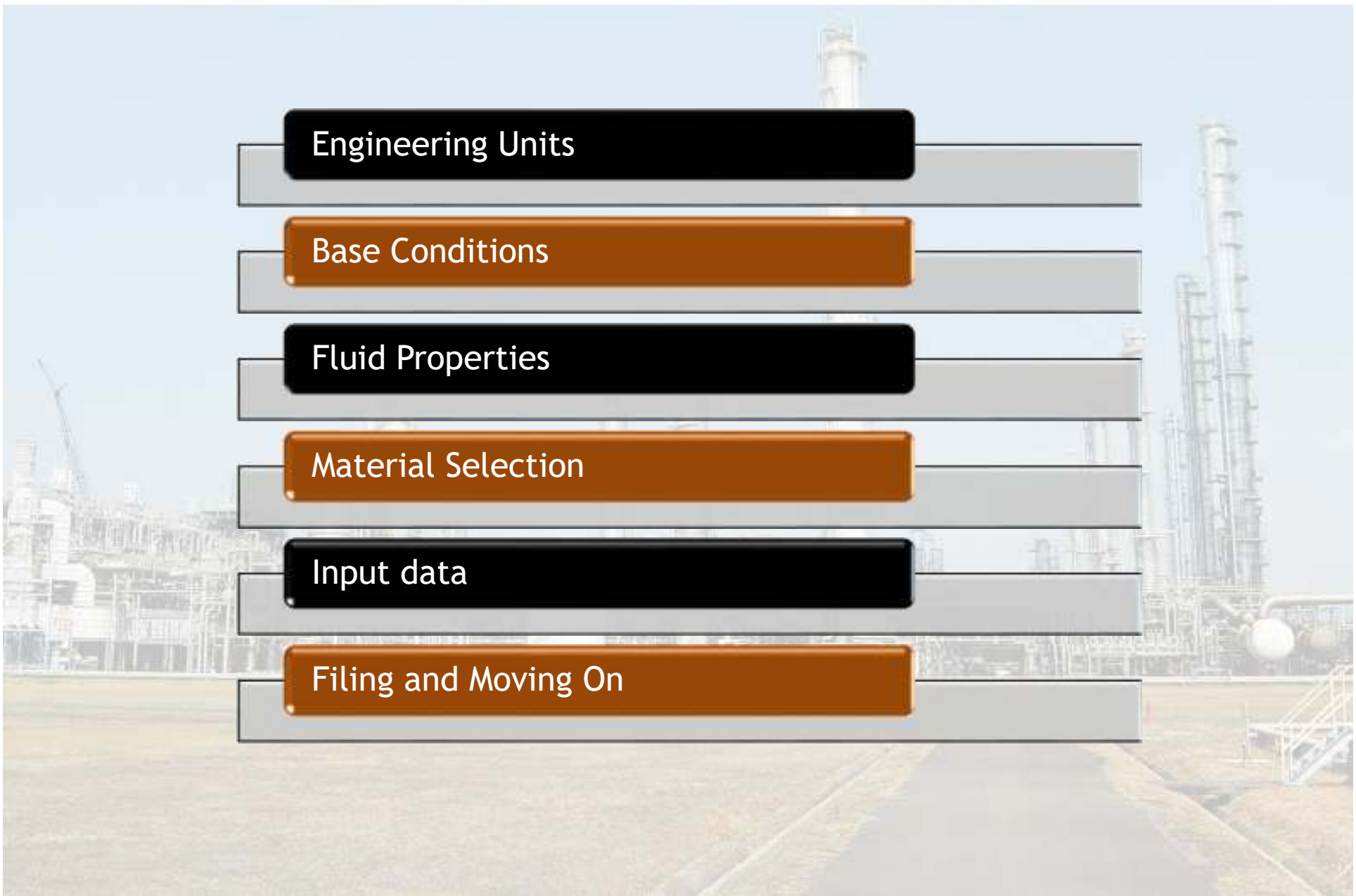
As example, the enable input for orifice size calculation :

1. Enter normal liquid flow
2. Enter flow temperature
3. Enter inlet and discharge pressure
4. Select desired fluid properties select either Manual Input data, Pure Liquid or Liquid Mixture
5. Select desired pipe inside diameter
6. Select desired element and pipe material

Filing and Moving On

- **Program menu –** It clears the calculation and returns to the main menu.
- **New** – It clears the screen for a new calculation.
- **Save -** It saves a new record if not previously saved or saves changes to an existing record to database. It is also used for saving temporary data, thus, the recorded data can be done printing calculation process.
- **Export data** – It saves input and output calculation record in *csv file.
- **Import data** – It opens *csv file record.
- **Print calculation** – It is enabled after calculation and save is made. It displays the screen to print a calculation.
- **Exit** – It leaves the program

Gas data


Engineering Units
Base Conditions
Fluid Properties
Material Selection
Input data
Filing and Moving On

Engineering Units

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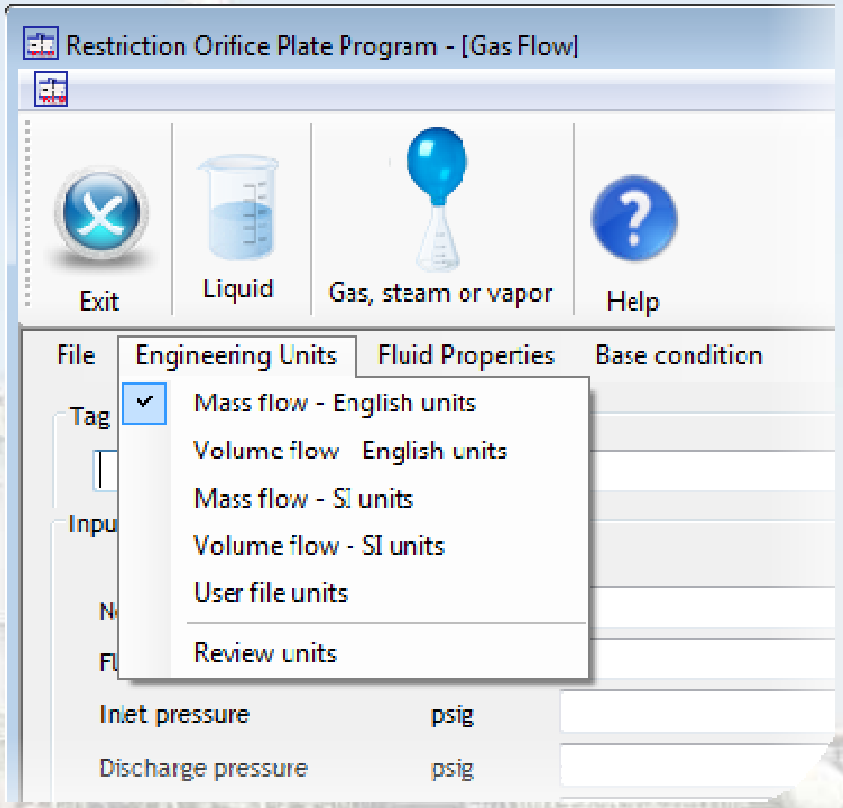

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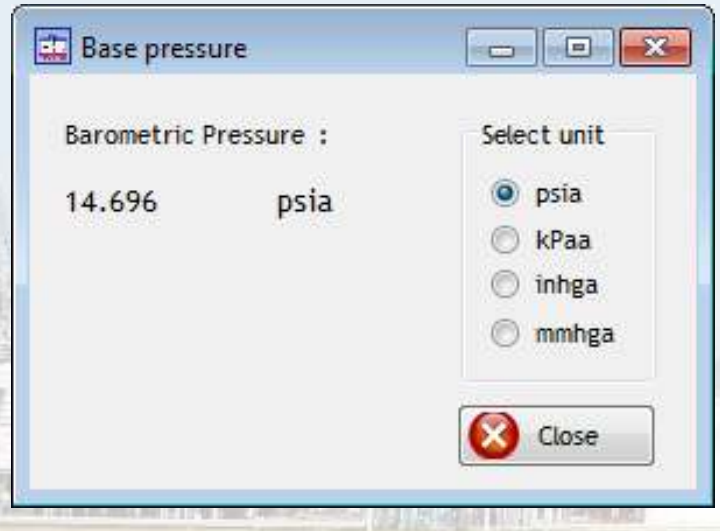
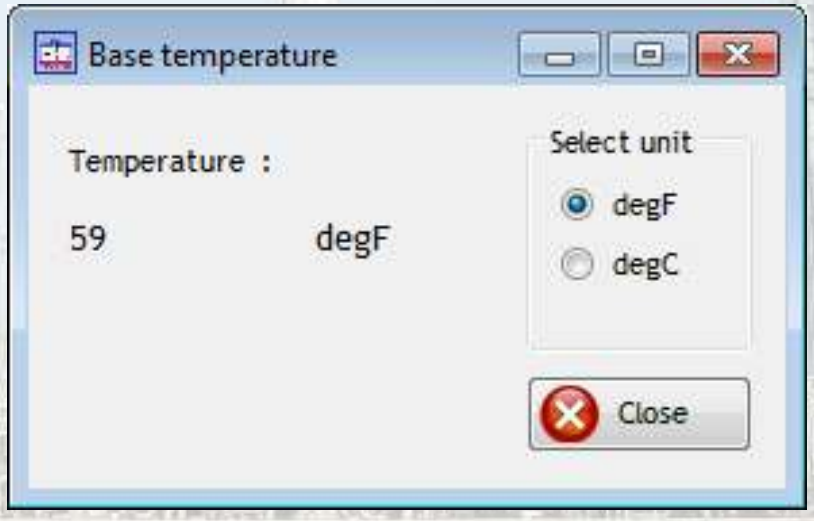
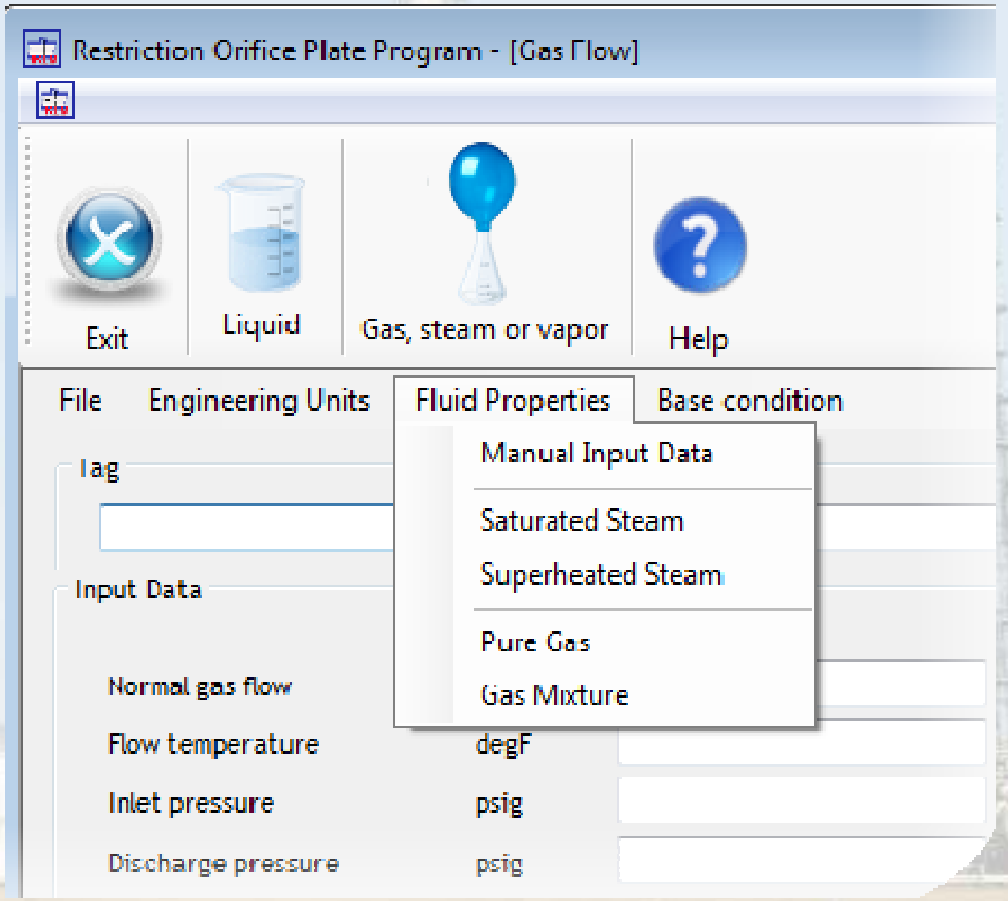




Fluid Properties

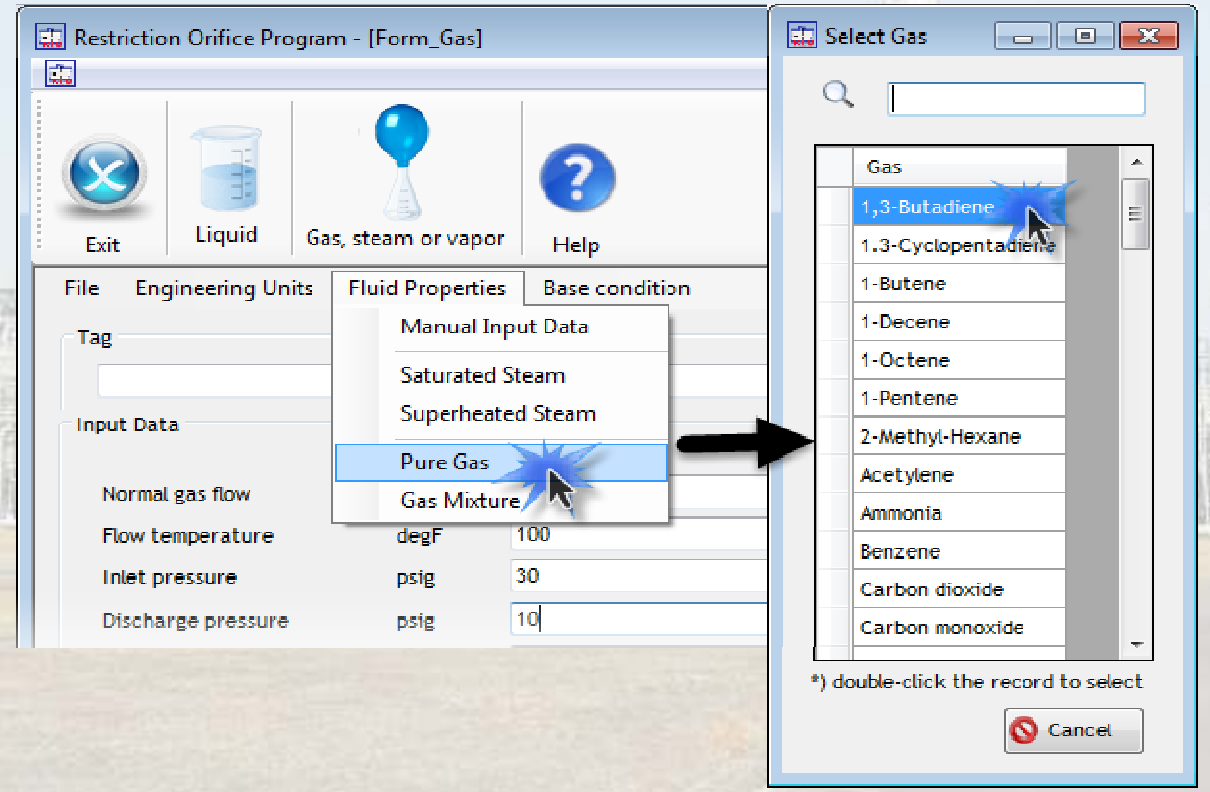
- Enable when the pressure and temperature are entered
- Available :
  - Saturated Steam
  - Superheated steam
  - Pure Gas
  - Mixtures
  - Manual Input Data



Fluid Properties Cont'd

Pure Gasses

- Find the desired fluid name
- Select (or double-click) it
- The fluid properties will be entered



Fluid Properties Cont'd

Mixtures

- Select the first component
- In the component box, enter the percentage
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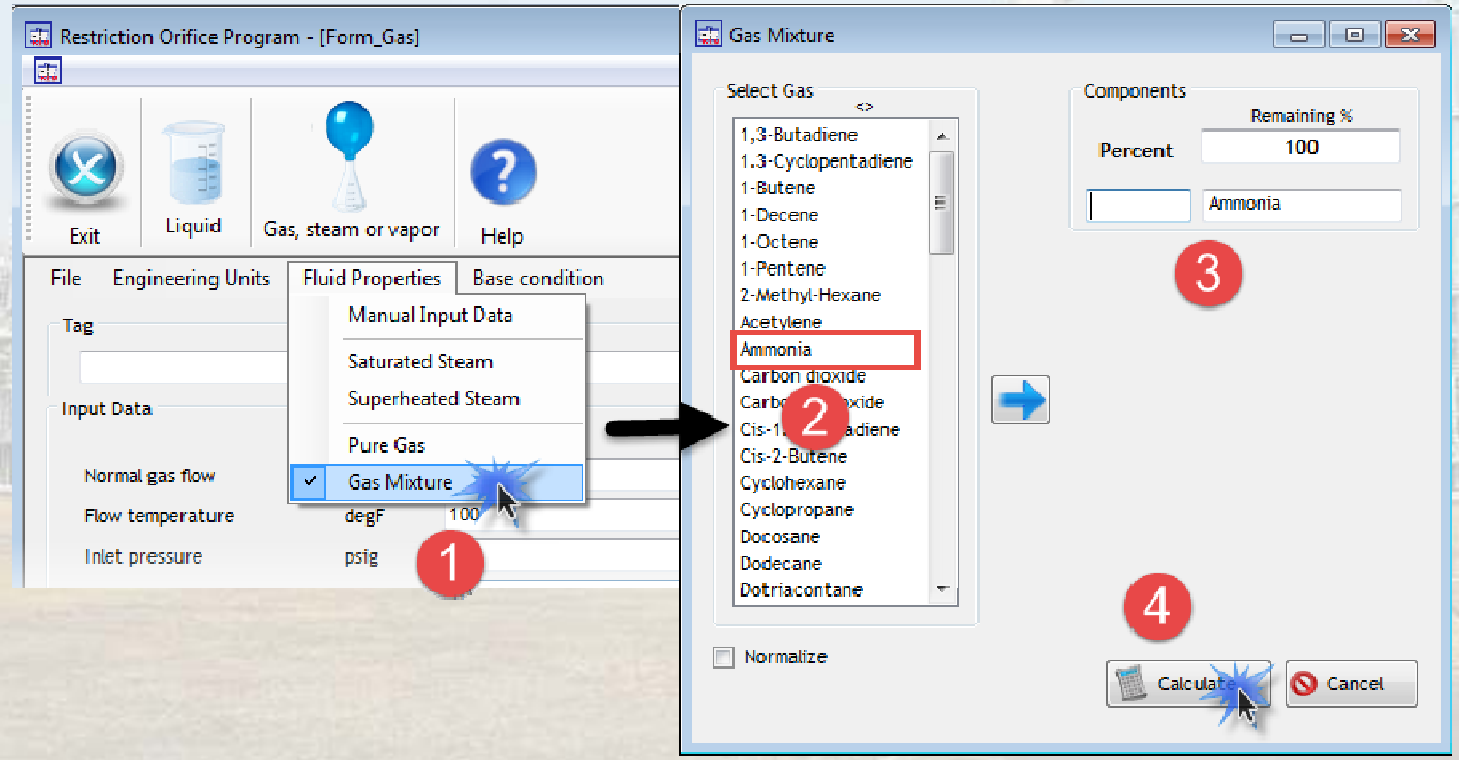

Material Selection

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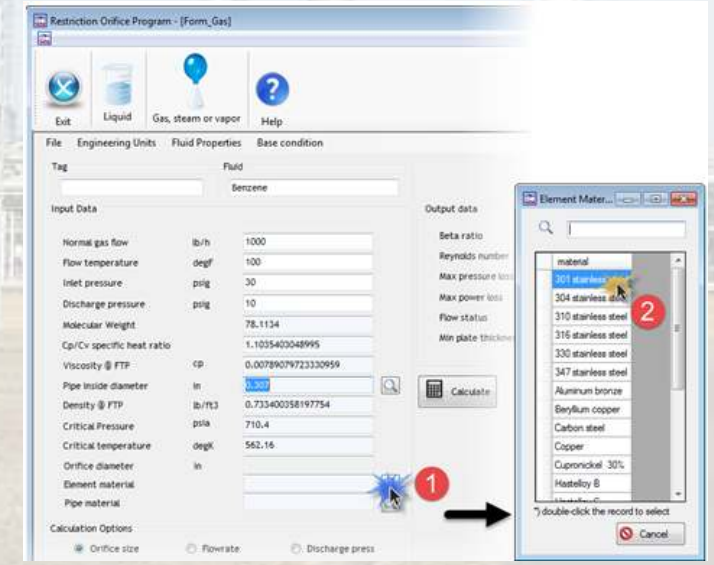
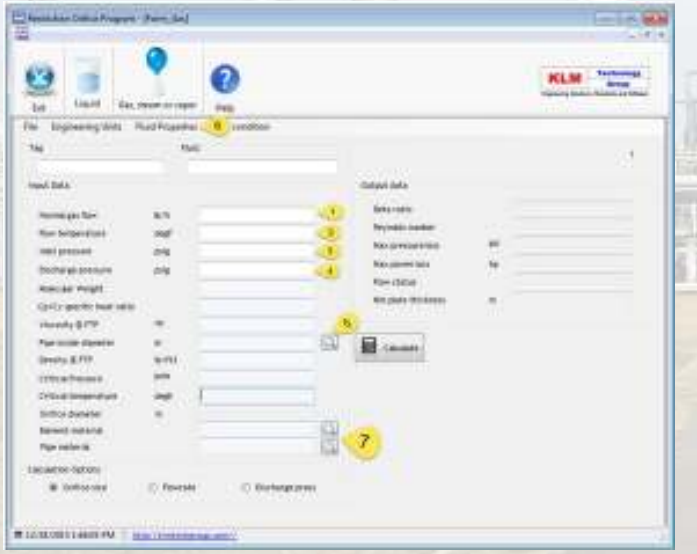


Input Data

The **options selected** enable the input boxes of the data required for the calculation.

As example, the enable input for orifice size calculation :

1. Enter normal gas flow
2. Enter flow temperature
3. Enter inlet and discharge pressure
4. From the **Fluid Properties**, select either **Superheated Steam, Saturated Steam, Pure Gas, Gas Mixture** or **Manual Input Data**
5. Select desired pipe inside diameter
6. Select desired element and pipe material



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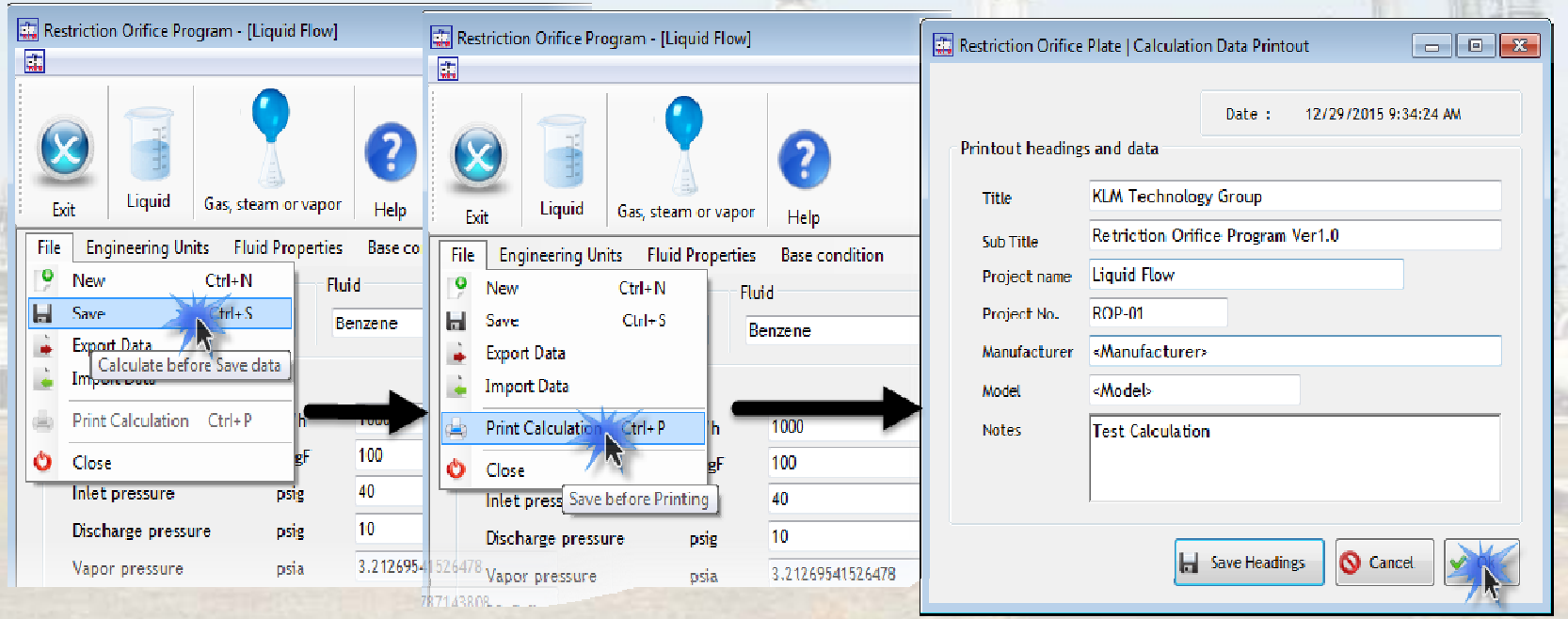
- **Export data** – It saves input and output calculation record in *csv file.
- **Import data** – It opens *csv file record.
- **Print calculation** – It is enabled after calculation and save is made. It displays the screen to print a calculation.
- **Exit** – It leaves the program

Calculation Printout

- This program will print the input and output calculation data and one associated comment. The comment is included in the data sheet for reference purposes.
- It also creates the default printout headings. The headings are printed at the top of all printouts.
- File → Save → Print Calculation

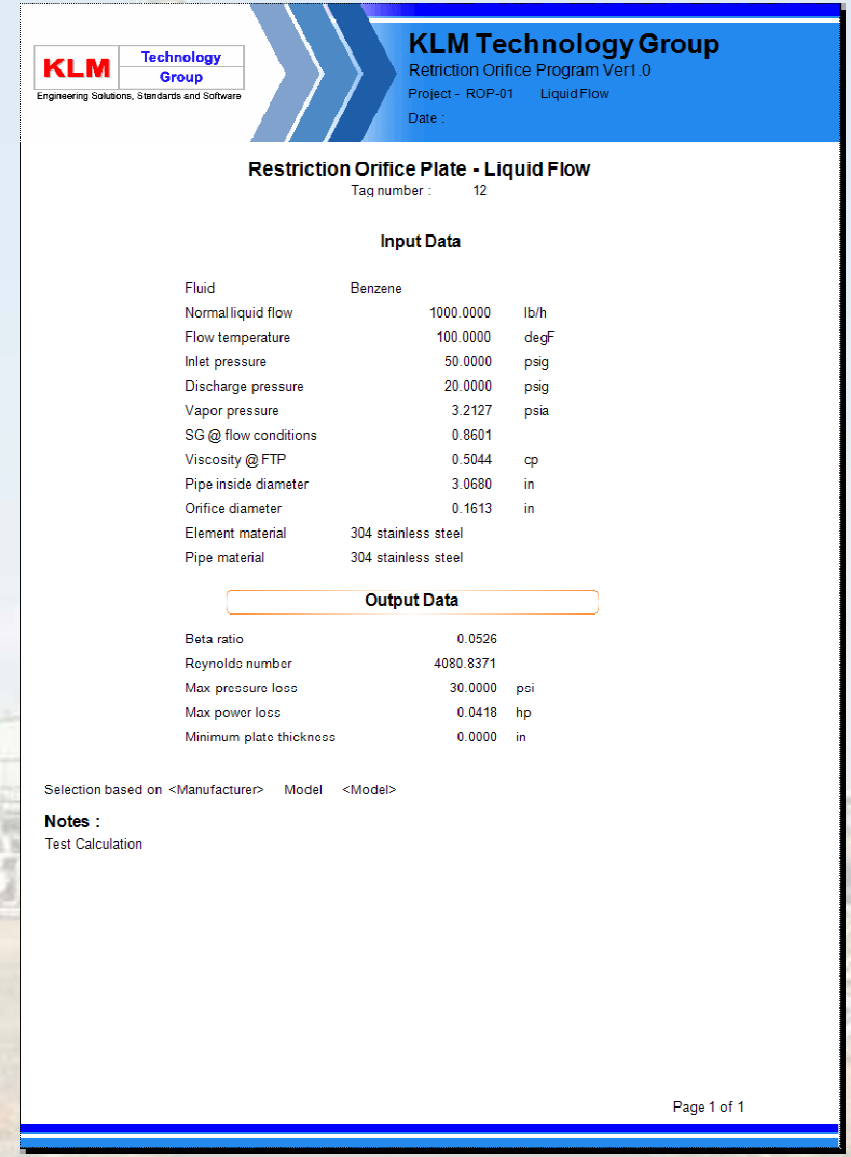


Calculation Printout Cont'd

Save. Saves the headings

Cancel. Returns to the calculation form without printing

OK. View report calculation, then prints the headings and calculation using the Windows Print Manager.



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Engineering Solutions, Standards and Software

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Retriction Orifice Program Ver1.0
Project - ROP-01 Liquid Flow
Date :

Restriction Orifice Plate - Liquid Flow
Tag number : 12

Input Data

Fluid	Benzene	
Normal liquid flow	1000.0000	lb/h
Flow temperature	100.0000	degF
Inlet pressure	50.0000	psig
Discharge pressure	20.0000	psig
Vapor pressure	3.2127	psia
SG @ flow conditions	0.8601	
Viscosity @ FTP	0.5044	cp
Pipe inside diameter	3.0680	in
Orifice diameter	0.1613	in
Element material	304 stainless steel	
Pipe material	304 stainless steel	

Output Data

Beta ratio	0.0526	
Reynolds number	4080.8371	
Max pressure loss	30.0000	psi
Max power loss	0.0418	hp
Minimum plate thickness	0.0000	in

Selection based on <Manufacturer> Model <Model>

Notes :
Test Calculation

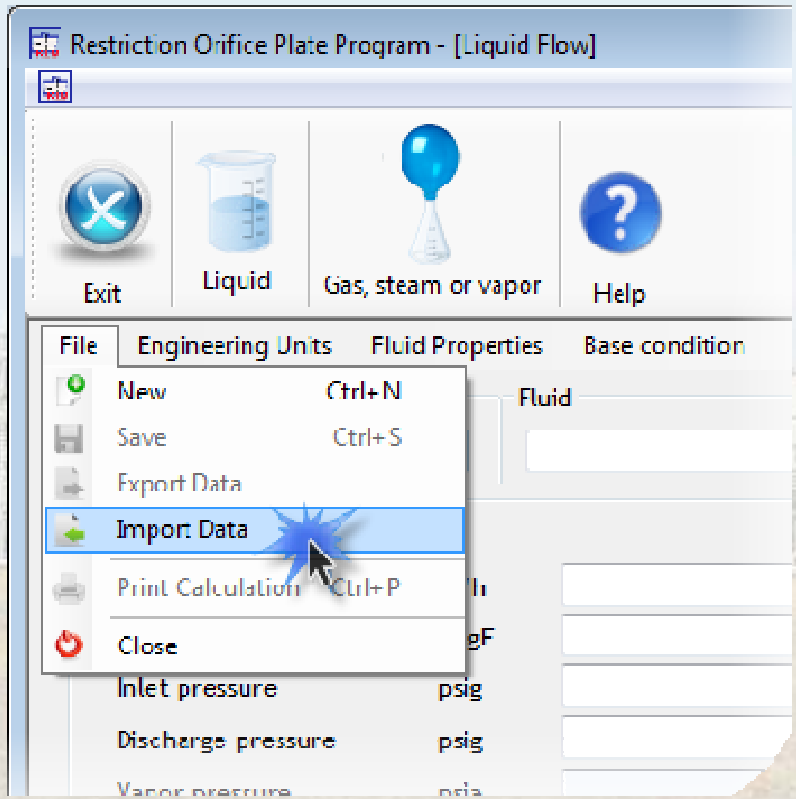
Page 1 of 1

Importing Data into a Calculation

To **Import** process data into a calculation :

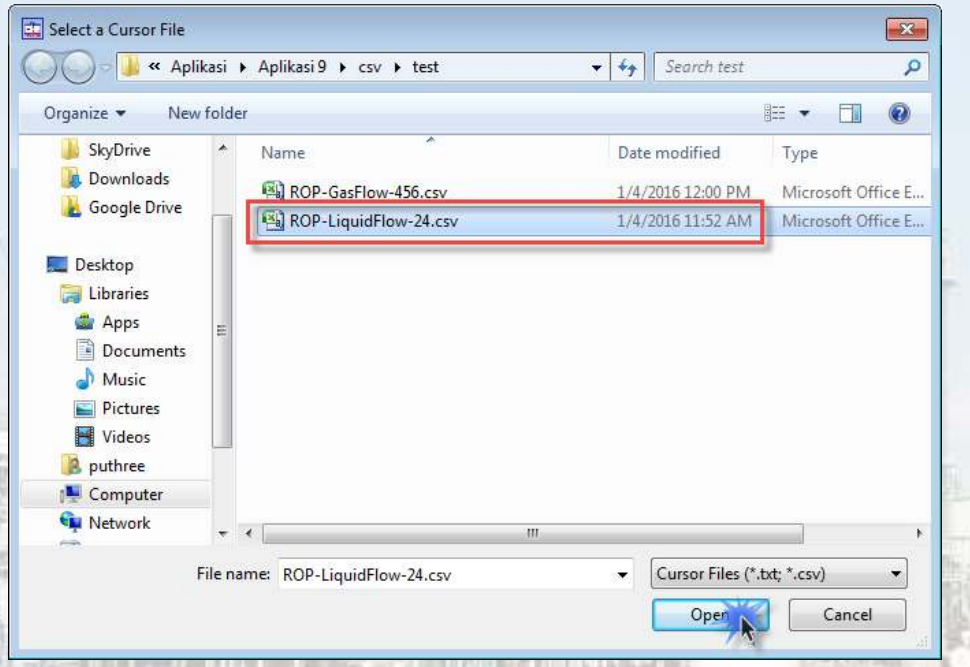
Make a sequential file for each calculation. Files to have a filename(Suggest the tag number) with no extension (eg ROP-LiquidData-24).

- Take the Import data menu option.

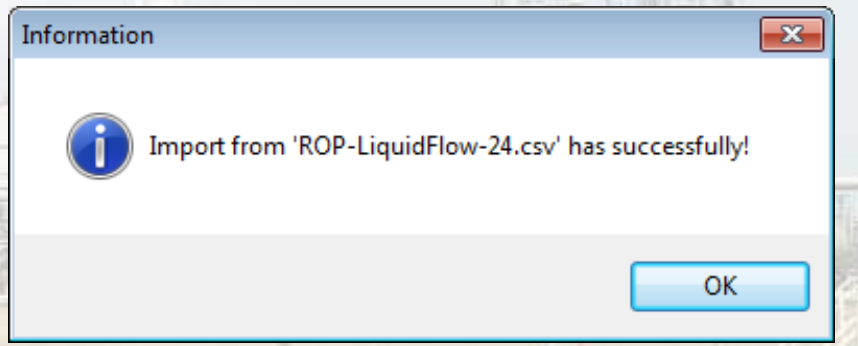


Importing Data into a Calculation

- Find the required file. (Using standard Windows procedures)
- Select the file and the data will be loaded.



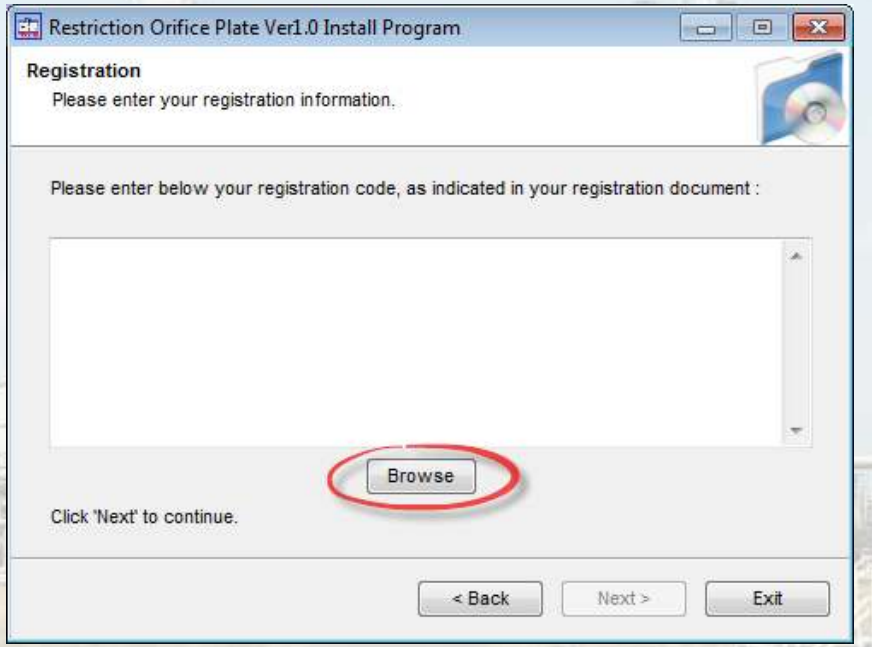
- If the import is successful it will appear the following information



- Proceed with the calculation and save the data.

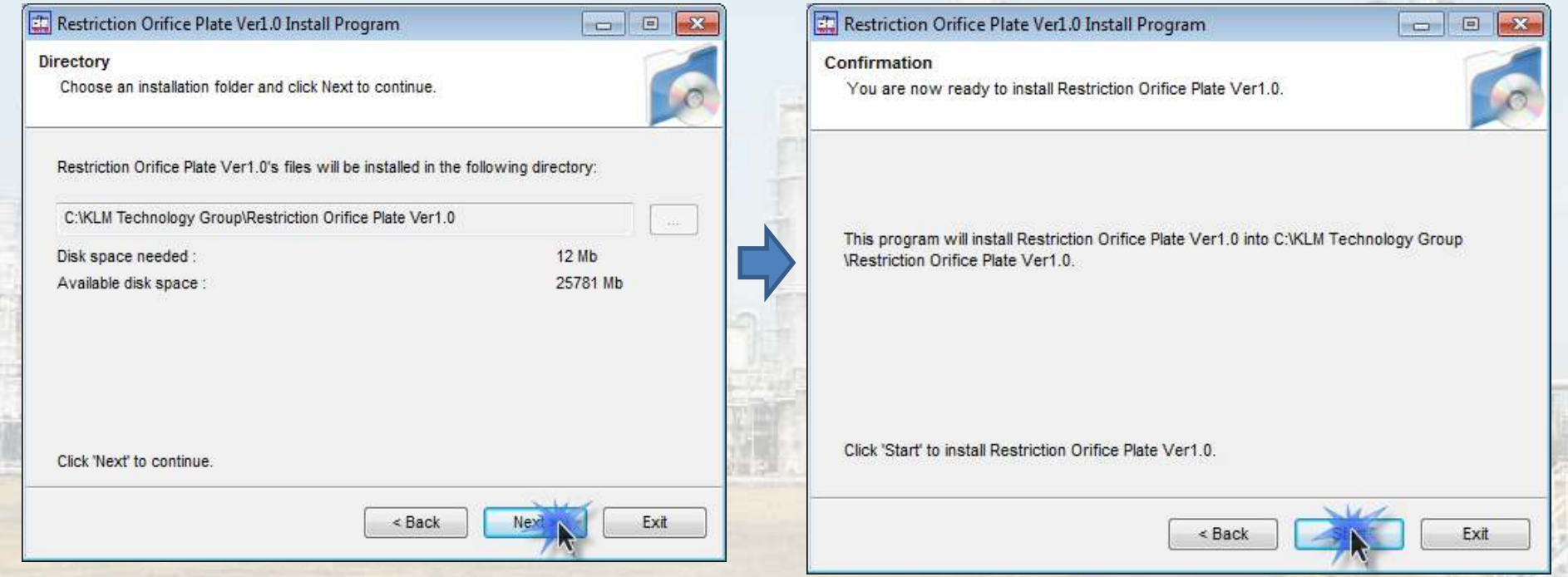
Installation

- Click Restriction Plate Orifice Ver1.0_Setup.exe → Click Next
- Enter your registration , click Next



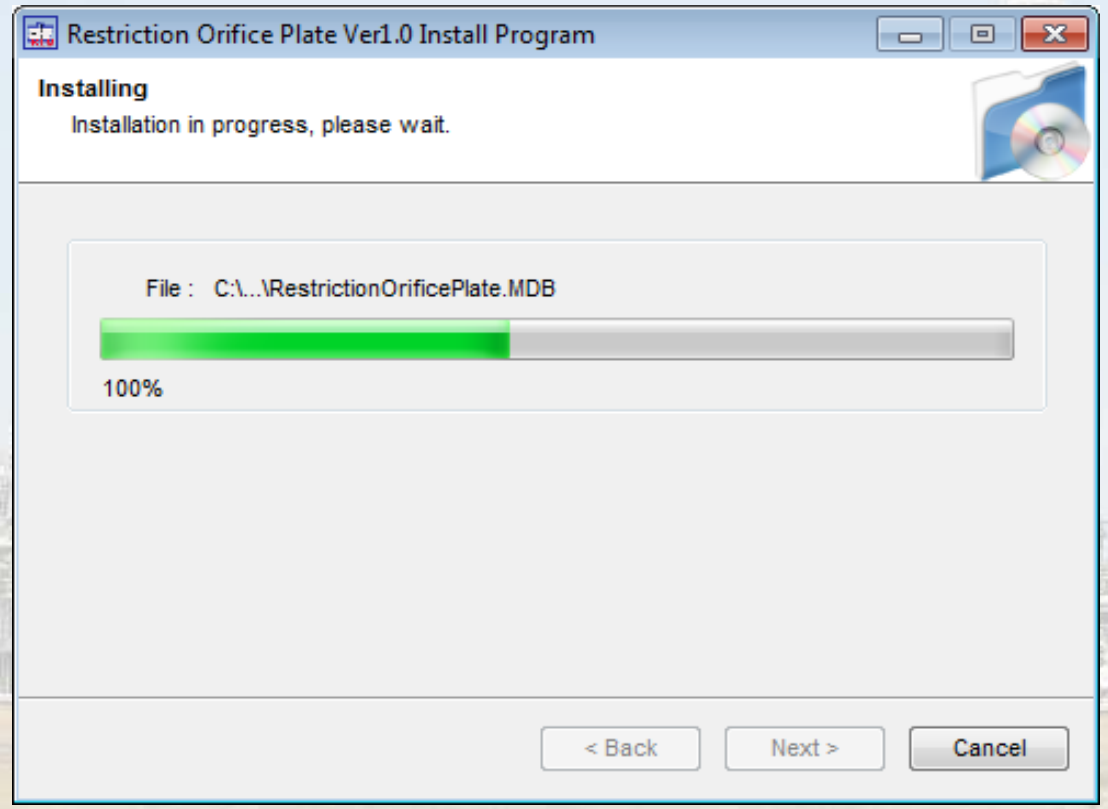
Installation Cont'd

- Click Next on Directory page



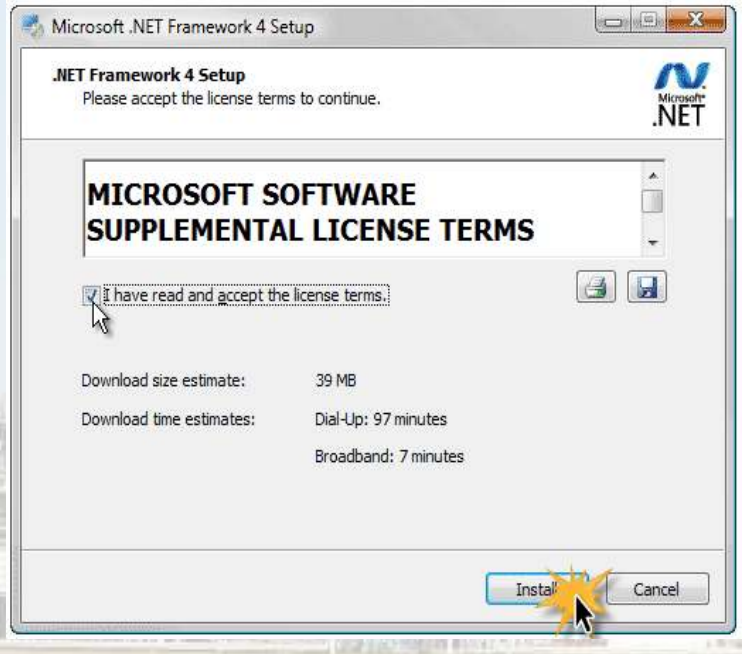
Installation Cont'd

- Install on Process

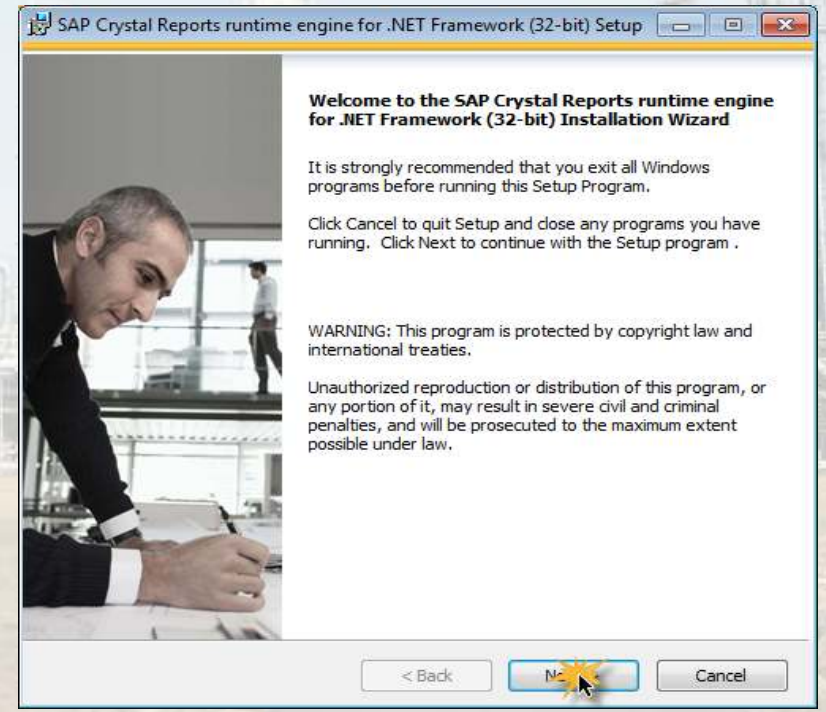


Installation Cont'd

- Install .NET Framework 4 for requirement system(if NOT Exist on PC)

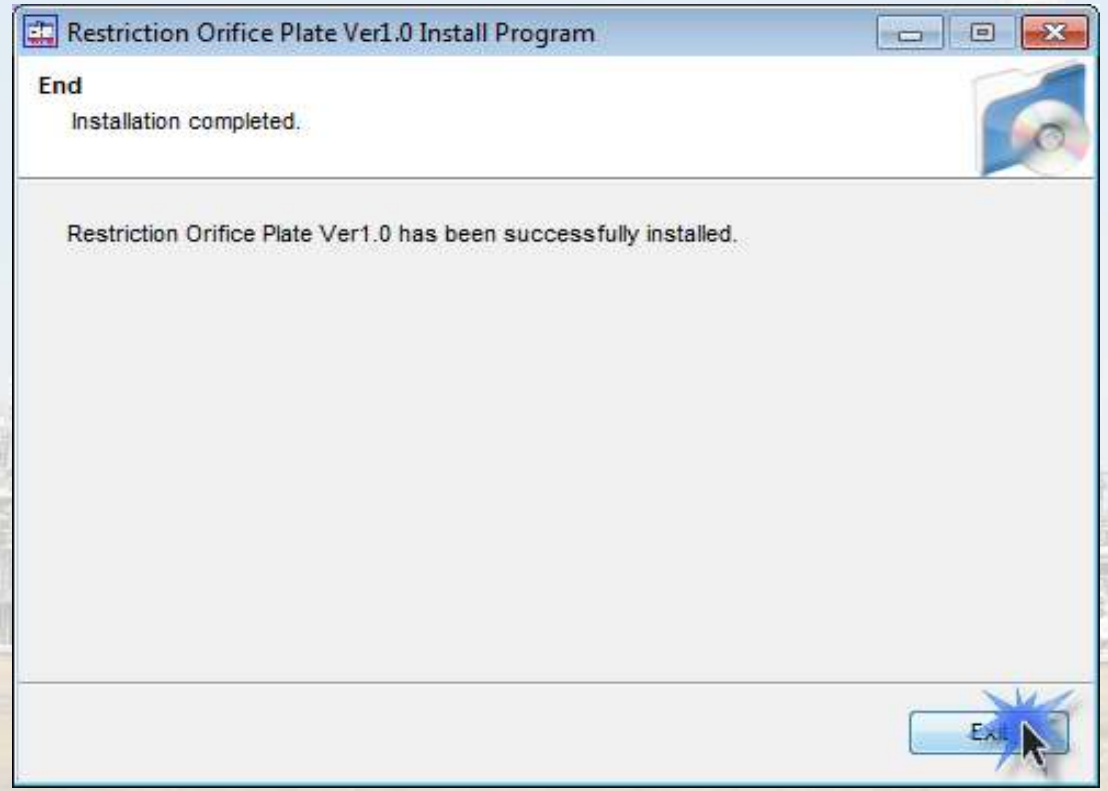


- Install Crystal Report for requirement system (if NOT exist on PC)



Installation Cont'd

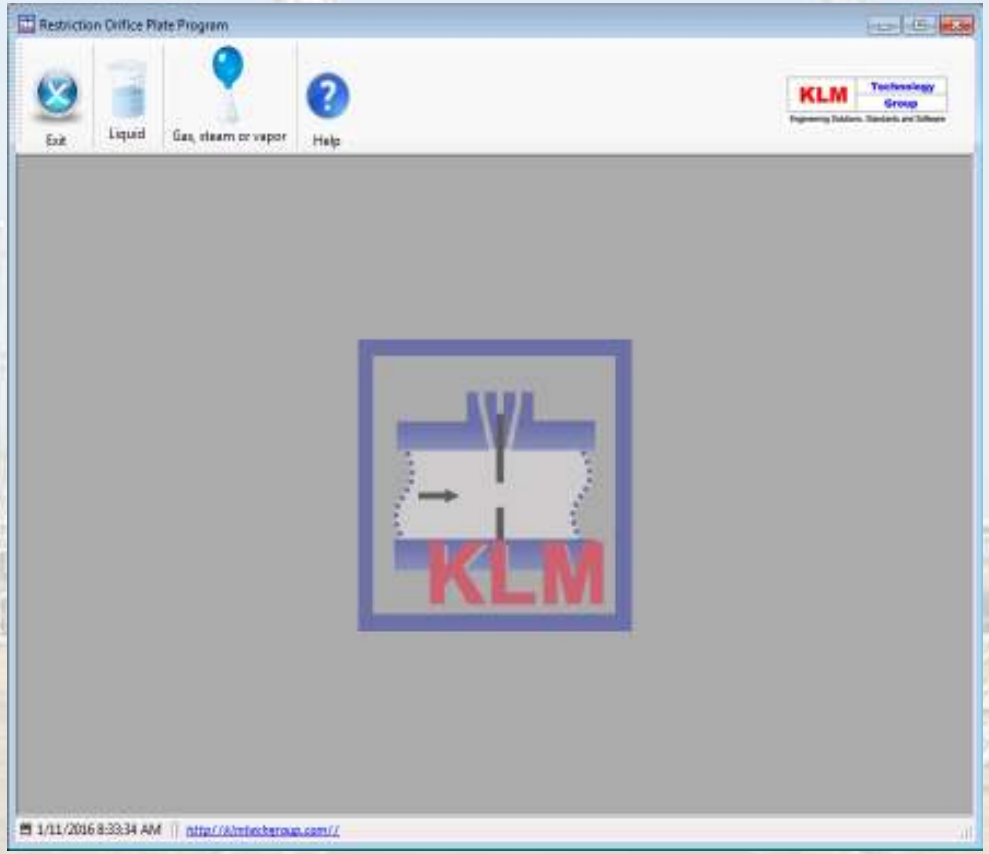
- If the installation is complete it will display a confirmation
- Click Exit



Installation Cont'd

- Enter password application and click **OK**

- Applications will be open



Restriction Orifice Plate Program

Restriction orifice program is specially designed to assist engineers for limiting the flow which is the intended purpose of reducing the flowing pressure or the rate of flow.

KLM Technology Group Restriction Orifice Program is very useful to calculate proper orifice size, flow rate, and discharge pressure based on conditions imputed. This program is also completed with many features that assist the engineer.

Restriction Orifice Plate Program Cont'd

This is one of the best stand alone Restriction Orifice Plate program available.

1. Liquid and gas, steam or vapor flow options.
2. Multiple units of measure choices - mass or volume
3. Physical properties based on chosen temperature and pressure
4. Element and pipe material selection
5. The ability to estimate maximum power loss
6. The ability to estimate minimum plate thickness at room temperature

Purchasing Software

Restriction Orifice Plate Program Ver1.0

USD $ 299.95

For detailed information :

info@klmtechgroup.com


Thank You